

Sustainable Retailing and Green Consumption: Bridging the Purchase Intention-Behavior Gap Through Consumer and Policy Perspectives

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Abstract

Growing environmental concerns have increased the importance of understanding the drivers of sustainable consumer behavior. This study develops and tests an integrated framework examining the effects of eco-friendly packaging, eco-friendly retailing, and green product accessibility on green product purchase intention and subsequent green consumption behavior. It further investigates the moderating roles of perceived green responsibility, perceived green self-efficacy, and perceived green policy effectiveness in the relationship between purchase intention and green consumption behavior. Data were collected from Taiwanese millennials using a questionnaire survey and analyzed with Partial Least Squares Structural Equation Modeling. The results indicate that eco-friendly packaging, eco-friendly retailing, and green product accessibility each have a significant positive effect on green product purchase intention, thereby promoting green consumption behavior. In addition, perceived green responsibility, perceived green self-efficacy, and perceived green policy effectiveness significantly strengthen the relationship between purchase intention and green consumption behavior. This study contributes to the sustainable consumption literature by integrating market-related factors with psychological mechanisms to explain green consumer behavior. The findings also provide practical implications for policymakers and practitioners seeking to promote sustainable consumption through environmentally friendly product design, green retail practices, improved product accessibility, and initiatives that enhance consumers' environmental responsibility and self-efficacy.

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Keywords: Green consumption behavior, Green product purchase intention, Eco-friendly packaging, Eco-friendly retailing, Green product accessibility, Green responsibility, Green self-efficacy, Green policy effectiveness.

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1. Introduction

Growing concerns over climate change, resource depletion, and environmental pollution have accelerated the global transition toward sustainable development. In response to these challenges, governments, businesses, and consumers are increasingly embracing environmentally responsible practices that reduce ecological impacts while supporting long-term economic and social well-being. Consequently, green consumption has evolved from a voluntary lifestyle choice into an essential component of sustainable business strategy (Dagilienė et al., 2022; Ghaffar & Islam, 2024; Kautish et al., 2022). As consumers become more aware of the environmental consequences of their purchasing decisions, organizations are under increasing pressure to provide products and services that are environmentally friendly throughout their life cycle, from production and packaging to distribution and retailing (Ghaffar et al., 2023; Koch et al., 2022).

The retail sector plays a particularly important role in promoting sustainable consumption because it serves as the primary interface between producers and consumers (Ghaffar et al., 2025). Retailers not only determine the availability and presentation of products but also influence consumer perceptions and purchasing decisions through their operational practices. In recent years, many retailers have introduced environmentally responsible initiatives, including recyclable or biodegradable packaging, refill stations, package-free shopping, recycling programs, and sustainable store operations, to reduce waste and encourage environmentally responsible consumption (Dagilienė et al., 2022). Simultaneously, businesses have expanded the availability of eco-friendly products to accommodate the growing demand for sustainable alternatives. These initiatives reflect a broader shift toward sustainable retailing, whereby retailers create shopping environments that facilitate environmentally responsible purchasing while reducing the ecological footprint of retail operations.

Among these initiatives, eco-friendly packaging has become an increasingly important marketing and sustainability strategy. Environmentally friendly packaging minimizes material consumption, facilitates recycling and reuse, and reduces waste generated throughout the product life cycle. Beyond its environmental benefits, sustainable packaging also functions as an external cue that communicates a firm's environmental commitment and enhances consumers' perceptions of product sustainability. Likewise, eco-friendly retailing creates a shopping environment that reinforces sustainable values through environmentally responsible store operations, waste reduction initiatives, and green merchandising practices. In addition, green product accessibility remains a critical determinant of sustainable purchasing because consumers are more likely to purchase environmentally friendly products when such products are readily available, conveniently located, and easily identifiable. Together, these retail-related factors can shape consumers' evaluations of green products and strengthen their intentions to make environmentally responsible purchasing decisions.

Despite the growing body of research on sustainable consumption, several

important gaps remain. Previous studies have primarily examined eco-friendly packaging, sustainable retailing, or green product accessibility as independent determinants of green purchasing behavior. Comparatively little research has investigated how these factors collectively influence consumers' green product purchase intention within an integrated framework (Alam et al., 2023, 2024; Ghaffar et al., 2025). Furthermore, although green product purchase intention has consistently been identified as an important predictor of green consumption behavior, empirical evidence continues to reveal a substantial intention-behavior gap. Consumers frequently express positive attitudes and purchase intentions toward eco-friendly products, but fail to translate these intentions into actual consumption behavior. This discrepancy suggests that favorable purchasing intentions alone are insufficient to explain sustainable consumption and that additional psychological and contextual mechanisms should be considered.

Drawing upon this perspective, the present study proposes that three factors may strengthen the translation of purchase intention into actual green consumption behavior. First, perceived green responsibility reflects consumers' sense of moral obligation to contribute to environmental protection through their purchasing decisions (Song et al., 2023). Individuals who perceive greater environmental responsibility are expected to be more committed to acting consistently with their environmental intentions. Second, perceived green self-efficacy represents consumers' confidence in their ability to perform environmentally responsible behaviors and make meaningful contributions to environmental sustainability (Povey et al., 2000). Individuals with stronger self-efficacy are generally more likely to overcome barriers to sustainable consumption and convert intentions into action. Third, perceived green policy effectiveness reflects consumers' confidence that government environmental policies and sustainability initiatives are effective in addressing environmental challenges (Wan et al., 2014). When consumers perceive environmental policies to be credible and effective, they may become more willing to support these initiatives through their own purchasing behavior. Collectively, these psychological and institutional factors may help explain why consumers with similar purchase intentions exhibit different levels of actual green consumption behavior.

Accordingly, this study develops and empirically tests an integrated research framework linking eco-friendly packaging, eco-friendly retailing, and green product accessibility to green product purchase intention and subsequent green consumption behavior. In addition, the study investigates whether perceived green responsibility, perceived green self-efficacy, and perceived green policy effectiveness moderate the relationship between green product purchase intention and green consumption behavior. By simultaneously considering external retail-related factors and internal psychological mechanisms, this research provides a more comprehensive understanding of the drivers of sustainable consumer behavior.

This study contributes to the literature in several important ways. First, it advances sustainable retailing research by integrating multiple retail-related determinants into a unified framework that explains consumers' green purchase intentions and

subsequent consumption behavior. Second, it extends the green consumption literature by examining three complementary moderators that help explain the intention–behavior relationship, thereby providing a more nuanced understanding of how consumers translate environmental intentions into actual purchasing behavior. Third, by incorporating perceived green policy effectiveness together with perceived green responsibility and perceived green self-efficacy, this study highlights the joint influence of institutional support and individual psychological characteristics on sustainable consumption, an area that has received limited empirical attention. Finally, the findings provide valuable practical implications for retailers and policymakers by demonstrating how environmentally friendly packaging, sustainable retail practices, greater accessibility of green products, and initiatives that strengthen consumers' environmental responsibility, self-efficacy, and confidence in environmental policies can collectively encourage green consumption behavior.

2. Research hypotheses

2.1 Eco-friendly packaging and green product purchase intention

Packaging has evolved beyond its traditional roles of protecting products and facilitating transportation to become an important communication tool that shapes consumers' evaluations and purchasing decisions. From a sustainability perspective, packaging serves as a salient environmental cue that conveys a firm's commitment to environmental responsibility and influences consumers' perceptions of a product's ecological value. As environmental awareness continues to increase, consumers are placing greater emphasis on packaging attributes when evaluating products, making eco-friendly packaging an important determinant of green purchasing behavior.

Eco-friendly packaging generally refers to packaging that minimizes environmental impacts throughout its life cycle through the use of recyclable, biodegradable, reusable, or reduced materials. Compared with conventional packaging, environmentally friendly packaging reduces resource consumption and waste generation while supporting circular economy practices. For example, reusable packaging provides both environmental and economic benefits because repeated use lowers material consumption and decreases the environmental cost associated with each usage cycle (Song et al., 2023). Consequently, firms have increasingly adopted sustainable packaging as a strategic approach to satisfy environmentally conscious consumers while demonstrating their commitment to sustainability.

Prior research consistently suggests that packaging characteristics significantly influence consumers' product evaluations and behavioral intentions. Consumers tend to perceive products with environmentally friendly packaging as being of higher environmental quality and are more willing to purchase them than products packaged with conventional materials (Prakash et al., 2019). Conversely, excessive or non-recyclable packaging may generate negative environmental perceptions and reduce consumers' purchase intentions. In addition, packaging contributes to brand

image and product differentiation by signaling environmental values that resonate with consumers' sustainability concerns (Magnier & Schoormans, 2015). Studies have further demonstrated that consumers' evaluations of sustainable packaging positively influence their attitudes toward green products, which subsequently increase purchase intention (Kauppinen-Räsänen & Luomala, 2010; Prakash & Pathak, 2017; Wilke et al., 2011).

These findings suggest that eco-friendly packaging functions not only as a product attribute but also as a credible environmental signal that reduces consumers' uncertainty regarding a product's sustainability. When consumers perceive packaging to be environmentally responsible, they are more likely to develop favorable evaluations of the product and express stronger intentions to purchase it. Consistent with recent evidence highlighting the growing importance of sustainable packaging in consumers' green purchasing decisions (Ghaffar & Islam, 2024), this study proposes that environmentally friendly packaging positively influences consumers' intention to purchase green products. Accordingly, this study postulates the following hypothesis:

H1: Eco-friendly packaging has a positive effect on green product purchase intention.

2.2 Eco-friendly retailing and green product purchase intention

Retailers play a critical role in promoting sustainable consumption because they directly influence consumers' purchasing decisions through product assortment, store operations, and the overall shopping environment. As the interface between manufacturers and consumers, retailers are uniquely positioned to encourage environmentally responsible purchasing by integrating sustainability into their sourcing strategies and retail practices. Consequently, eco-friendly retailing has emerged as an important mechanism for advancing sustainable consumption and achieving environmental sustainability.

Eco-friendly retailing refers to the adoption of environmentally responsible practices throughout retail operations, including the selection of sustainable products, environmentally friendly store management, waste reduction initiatives, and the promotion of green consumption. Retailers committed to sustainability typically prioritize products manufactured with environmentally friendly materials, low-carbon production processes, and sustainable packaging (Kumar, 2014; Wiese et al., 2012). In addition to responsible sourcing, they implement operational practices such as recycling programs, energy conservation, and emission reduction to minimize the environmental impacts of retail activities. These initiatives not only improve environmental performance but also communicate a retailer's commitment to sustainability, thereby enhancing consumers' trust in the environmental credibility of the products offered.

Beyond operational practices, eco-friendly retailers actively shape consumers' perceptions by emphasizing the environmental attributes and social value of green products. They frequently promote products with eco-labels and certifications,

collaborate with suppliers that demonstrate strong environmental performance, and highlight product characteristics such as recyclability, resource efficiency, fair trade, and community well-being (Doyle & Broadbridge, 1999; Pujari et al., 2003). Such efforts reduce consumers' uncertainty regarding product sustainability and strengthen the perceived authenticity of environmental claims. As consumers become increasingly concerned about environmental issues, retail environments that consistently communicate sustainability values are more likely to encourage favorable evaluations of green products and stimulate environmentally responsible purchasing decisions.

Prior empirical research provides evidence that sustainable retail practices positively influence consumers' attitudes and purchase intentions toward environmentally friendly products. Consumers are generally more willing to purchase green products from retailers that demonstrate a genuine commitment to environmental sustainability, while eco-labeling and environmental certifications further enhance consumers' confidence in product quality and environmental performance (Zhang et al., 2021; Zhou et al., 2017). These findings suggest that eco-friendly retailing functions not only as a distribution channel but also as a powerful environmental signal that reinforces consumers' green purchasing intentions. Accordingly, this study proposes that retailers' environmentally responsible practices positively influence consumers' intentions to purchase green products, and postulates the following hypothesis:

H2: Eco-friendly retailing has a positive effect on green product purchase intention.

2.3 Green product accessibility and green product purchase intention

Product accessibility is a fundamental determinant of consumer purchasing behavior because consumers are more likely to purchase products that are readily available and convenient to obtain. In the context of sustainable consumption, green product accessibility refers to the extent to which environmentally friendly products are available, visible, and easily obtainable through retail channels. Even consumers with strong environmental concerns may be discouraged from purchasing green products when they perceive them as difficult to locate or requiring additional time and effort to obtain. Consequently, accessibility represents an important external condition that facilitates consumers' adoption of sustainable purchasing behaviors. The availability of green products not only reduces the practical barriers associated with purchasing but also enhances consumers' perceptions of product attractiveness and market acceptance. Widely available products are generally perceived as more desirable and trustworthy, whereas limited availability may generate uncertainty and reduce consumers' willingness to purchase (Steinhart et al., 2013). For environmentally conscious consumers, restricted access to green products often necessitates traveling to specialized stores or distant supermarkets, thereby increasing search costs, transportation time, and purchase effort (Barbarossa & Pastore, 2015). These additional costs may discourage consumers from acting on their environmental preferences, despite having favorable attitudes toward

sustainable consumption.

Retailers therefore play a crucial role in improving green product accessibility by expanding product assortments, increasing product visibility, and implementing effective in-store communication and promotional strategies. Clear product displays, informative signage, and marketing campaigns can help consumers identify environmentally friendly products more easily while reinforcing their environmental attributes (Nguyen et al., 2017). Furthermore, a broader assortment of green products provides consumers with greater purchasing flexibility and enhances the likelihood that environmentally responsible alternatives will be selected over conventional products. Prior studies have shown that consumers are more inclined to purchase environmentally friendly products when retailers offer a wider range of sustainable options (Steg et al., 2014).

Taken together, these findings suggest that greater accessibility reduces the effort required to purchase green products, lowers situational barriers to sustainable consumption, and strengthens consumers' intentions to choose environmentally friendly alternatives. Accordingly, this study proposes that the accessibility of green products positively influences consumers' green product purchase intention, and postulates the following hypothesis:

H3: Green product accessibility has a positive effect on green product purchase intention.

2.4 Green product purchase intention and green consumption behavior

Purchase intention has long been recognized as one of the most reliable predictors of consumer behavior. It reflects an individual's conscious plan and willingness to purchase a particular product and represents the motivational force that precedes actual purchasing behavior (Poushneh & Vasquez-Parraga, 2017). In the context of sustainable consumption, green product purchase intention captures consumers' readiness to choose environmentally friendly products over conventional alternatives. As such, it represents a critical step in translating pro-environmental attitudes into actual consumption behavior.

The relationship between purchase intention and subsequent behavior has been widely supported in the consumer behavior literature. Individuals who express stronger purchase intentions are generally more likely to engage in the corresponding purchasing behavior because intention reflects the commitment to perform a specific action. Empirical studies across various consumption contexts have consistently demonstrated that purchase intention is a significant antecedent of actual purchasing behavior (Barber et al., 2012; Liao & Hsieh, 2013). Similar findings have been reported in sustainable consumption research, where consumers with stronger intentions to purchase environmentally friendly products are more likely to engage in green purchasing and consumption practices. For example, Liang et al. (2021) found that consumers' willingness to purchase solar photovoltaic systems significantly influenced their adoption of renewable energy technologies. Although consumers may encounter various situational constraints when making

purchasing decisions, green product purchase intention remains a fundamental driver of green consumption behavior. Consumers who have formed a strong intention to purchase environmentally friendly products are more likely to seek out sustainable alternatives, incorporate environmental considerations into their purchasing decisions, and consistently engage in environmentally responsible consumption. Therefore, stronger green product purchase intention should increase the likelihood that consumers will translate their environmental preferences into actual green consumption behavior. Accordingly, this study proposes the following hypothesis:

H4: Green product purchase intention has a positive effect on green consumption behavior.

2.5 Moderating effect of perceived green responsibility

Although consumers may express strong intentions to purchase environmentally friendly products, these intentions do not always translate into actual green consumption behavior. One important factor that may strengthen this intention-behavior relationship is perceived green responsibility, which reflects an individual's perceived moral obligation and personal accountability for protecting the environment through responsible consumption. Individuals who perceive themselves as responsible for environmental sustainability are more likely to view their purchasing decisions as meaningful contributions to addressing environmental problems.

The concept of perceived green responsibility is rooted in the notion that individuals who recognize the environmental consequences of their actions are more likely to accept personal responsibility for mitigating those consequences (Wang et al., 2018). This sense of responsibility establishes internal moral norms that encourage individuals to behave consistently with their environmental values. Consequently, environmentally responsible consumers are more likely to translate favorable purchase intentions into actual purchasing and consumption behaviors because failing to do so would conflict with their personal moral standards.

Empirical evidence supports the important role of perceived green responsibility in promoting sustainable behavior. For example, Song et al. (2023) found that consumers who experience a stronger sense of environmental responsibility are more willing to adopt reusable packaging. Similarly, Confente and Scarpi (2021) demonstrated that perceived environmental responsibility significantly enhances environmentally responsible behavior among both tourists and local residents. These findings suggest that consumers with a stronger sense of green responsibility are more committed to acting on their environmental intentions than those with lower perceived responsibility.

Accordingly, this study argues that perceived green responsibility strengthens the positive relationship between green product purchase intention and green consumption behavior. Specifically, consumers with higher levels of perceived green responsibility are more likely to convert their purchase intentions into actual

green consumption because they perceive environmentally responsible purchasing as a personal obligation rather than merely a preference. Accordingly, this study proposes the following hypothesis:

H5: Perceived green responsibility positively moderates the relationship between green product purchase intention and green consumption behavior.

2.6 Moderating effect of perceived green self-efficacy

The Theory of Planned Behavior (TPB) posits that behavioral intention is the most immediate antecedent of behavior. To enhance the explanatory power of the TPB, scholars have proposed incorporating self-efficacy as an additional psychological construct that reflects individuals' confidence in their ability to perform a specific behavior. Armitage and Conner (1999) demonstrated that self-efficacy significantly improves the prediction of behavioral intentions beyond perceived behavioral control. Similarly, Povey et al. (2000) argued that integrating self-efficacy into the TPB provides a more comprehensive explanation of behavioral decision-making, while self-efficacy is a stronger predictor of intention than perceived behavioral control in many behavioral contexts.

In the context of green consumption, perceived green self-efficacy refers to consumers' beliefs that their individual purchasing decisions can make meaningful contributions to environmental protection (Berger & Corbin, 1992; Roberts, 1996). Consumers with high perceived green self-efficacy believe that their actions can reduce environmental degradation and promote sustainability, making them more likely to engage in environmentally responsible behaviors. Because these consumers perceive themselves as capable of making a difference, they are more willing to act consistently with their environmental values and purchasing intentions. Prior research has consistently demonstrated the importance of perceived green self-efficacy in promoting sustainable consumption. Consumers with stronger environmental self-efficacy are more likely to develop favorable attitudes toward sustainable products and translate these attitudes into actual purchasing behavior (Vermeir & Verbeke, 2008). Empirical studies have further shown that perceived green self-efficacy positively influences environmentally and socially responsible consumption (Webb et al., 2008), energy conservation and recycling behaviors (Kang et al., 2013), and consumers' willingness to purchase environmentally friendly products. Beyond the environmental context, self-efficacy has also been found to strengthen purchase intentions and actual purchasing behavior across a variety of consumption settings, including functional foods (Nystrand & Olsen, 2020), sustainable products (Furner et al., 2018), and online shopping (Peña-García et al., 2020). Collectively, these findings suggest that consumers who have greater confidence in their ability to contribute to environmental sustainability are more likely to act upon their green purchase intentions.

Accordingly, this study proposes that perceived green self-efficacy strengthens the relationship between green product purchase intention and green consumption behavior. Specifically, consumers with higher levels of perceived green self-

efficacy are expected to translate their purchase intentions into actual green consumption more effectively because they believe that their purchasing decisions can generate meaningful environmental benefits. Consequently, this study postulates the following hypothesis:

H6: Perceived green self-efficacy positively moderates the relationship between green product purchase intention and green consumption behavior.

2.7 Moderating effect of perceived green policy effectiveness

While consumers' environmental intentions are primarily driven by individual beliefs and motivations, the policy environment also plays an important role in facilitating sustainable consumption. Government policies can encourage pro-environmental behavior by reducing external barriers, providing institutional support, and creating favorable conditions for consumers to adopt environmentally responsible practices. However, the effectiveness of these policies depends not only on their implementation but also on how they are perceived by consumers. Consequently, perceived green policy effectiveness has emerged as an important contextual factor influencing sustainable consumer behavior.

Perceived green policy effectiveness refers to consumers' evaluations of the clarity, adequacy, and effectiveness of environmental policies and related implementation measures (Wan et al., 2014). When consumers perceive environmental policies to be well designed, clearly communicated, and effectively implemented, they are more likely to believe that their own environmentally responsible behaviors complement broader societal efforts to address environmental challenges. This perception strengthens consumers' confidence that their individual purchasing decisions can contribute to meaningful environmental outcomes.

Previous studies have shown that effective environmental policies positively influence individuals' environmental attitudes and behaviors (Steg et al., 2006). Wan and Shen (2013) further argued that policy measures function as motivational mechanisms by reinforcing individuals' intentions to engage in pro-environmental behavior. Rather than serving solely as a direct antecedent of behavior, perceived policy effectiveness can also strengthen the relationship between behavioral intention and actual behavior by creating a supportive institutional environment (Wan et al., 2014). Likewise, Wang et al. (2021) demonstrated that consumers' perceptions of policy effectiveness independently influence their willingness to participate in environmental initiatives, beyond the effects of personal attitudes. These findings suggest that when consumers perceive environmental policies as credible and effective, they are more likely to act on their existing intentions to purchase environmentally friendly products.

Accordingly, this study proposes that perceived green policy effectiveness strengthens the positive relationship between green product purchase intention and green consumption behavior. Specifically, consumers who perceive environmental policies to be effective are expected to translate their purchase intentions into actual green consumption more readily because they view their purchasing decisions as

being supported by a favorable policy environment. Consequently, this study postulates the following hypothesis:

H7: Perceived green policy effectiveness positively moderates the relationship between green product purchase intention and green consumption behavior.

3. Methodology

3.1 Data Collection

A questionnaire survey method was adopted to empirically test the proposed research model. This study focused on Taiwanese millennials, as this generation is widely recognized for its heightened environmental awareness and stronger engagement in sustainable consumption compared with previous generations (Hall et al., 2017; Lee et al., 2022). Millennials, generally defined as individuals aged between 18 and 39 years, are characterized by greater environmental consciousness, higher digital literacy, and stronger responsiveness to sustainability-related information (Kumar et al., 2017). These characteristics make them an appropriate target population for investigating the determinants of green product purchase intention and green consumption behavior.

Judgmental sampling was employed to recruit respondents who met the predefined sampling criteria. Eligible participants were Taiwanese millennials aged between 18 and 39 years and capable of completing the questionnaire independently. Data were collected through a self-administered online survey, which enabled broad geographic coverage and enhanced respondents' accessibility.

The required sample size was determined using G*Power 3.1 (Faul et al., 2009). Assuming a medium effect size ($f^2 = 0.15$), a significance level of 0.05, seven predictors, and a statistical power of 0.95, the minimum sample size required was estimated to be 153 respondents. To ensure adequate statistical power and improve the robustness of the findings, 500 questionnaires were distributed to Taiwanese millennials. A total of 431 questionnaires were returned, yielding a response rate of 86.2%. After excluding incomplete questionnaires and responses exhibiting inconsistent answer patterns, 417 valid responses were retained for subsequent analysis, substantially exceeding the minimum sample size required.

Regarding the sample characteristics, all respondents were between 20 and 39 years of age, consistent with the study's target population. Female respondents constituted 57% of the sample, while male respondents accounted for 43%. In addition, approximately 92% of the participants possessed a university or postgraduate degree, indicating a relatively well-educated sample that is well suited to investigating environmentally conscious consumption behavior.

3.2 Measurements

All measurement items were adapted from previously validated scales to ensure content validity and construct reliability. Minor modifications to item wording were made where necessary to better reflect the context of green consumption in Taiwan

while preserving the original conceptual meaning of each construct. Green product purchase intention was measured using items adapted from Liang et al. (2021). Eco-friendly packaging was assessed using the scale developed by Pan et al. (2021), whereas eco-friendly retailing was measured using items adapted from De Canio et al. (2021). Green product accessibility was evaluated using the instrument proposed by Carrión Bósquez et al. (2023). Green consumption behavior was measured with items adapted from Matharu et al. (2021). Regarding the moderating variables, perceived green responsibility was measured using items adapted from Song et al. (2023), Wang et al. (2019), and Han (2014). Perceived green self-efficacy was assessed using scales developed by Nystrand and Olsen (2020), Kang et al. (2013) and Roberts (1996), while perceived green policy effectiveness was measured using items adapted from Wan et al. (2014) and Song et al. (2023). All constructs were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with higher scores indicating stronger agreement with the corresponding statements.

The questionnaire was developed in Chinese, the primary language used in Taiwan, to ensure respondents' comprehension and improve response quality. Before the formal survey, a pilot test was conducted to evaluate the clarity, readability, and content validity of the questionnaire. Feedback from the pilot participants confirmed that the survey items were clearly understood and that respondents were comfortable completing the questionnaire. Participants were also informed that all responses would remain anonymous and be used exclusively for academic research, thereby minimizing potential social desirability bias.

3.3 Common Method Bias

Because all variables were measured using self-reported data, potential common method bias was addressed through both procedural and statistical remedies. Procedurally, temporal separation of measurements was employed during the questionnaire design to reduce respondents' ability to infer relationships among the study constructs (Podsakoff et al., 2003). Statistically, Harman's single-factor test was conducted as a post hoc diagnostic to assess the presence of common method variance (Harman, 1976).

Following the procedure recommended by Podsakoff et al. (2003), an exploratory factor analysis including all measurement items was performed to determine whether a single latent factor emerged or whether one general factor accounted for the majority of the covariance among the constructs. The results indicated that the first unrotated factor explained 28.59% of the total variance, which is substantially below the commonly accepted threshold of 50%. Therefore, common method bias is unlikely to have materially influenced the relationships observed in this study.

3.4 Reliability Analysis and Validity Analysis

The measurement model was evaluated by examining internal consistency reliability, convergent validity, discriminant validity, and multicollinearity following the recommendations of Hair et al. (2021). Internal consistency reliability was assessed using Cronbach's Alpha and Composite Reliability. As reported in Table 1, Cronbach's Alpha values ranged from 0.779 to 0.908, while Composite Reliability values ranged from 0.782 to 0.910, both exceeding the recommended threshold of 0.70 and indicating satisfactory internal consistency.

Table 1: Constructs reliability and validity

Constructs	Cronbach's Alpha	Composite Reliability	AVE
Eco-friendly packaging (EP)	0.803	0.805	0.612
Eco-friendly retailing (ER)	0.861	0.864	0.675
Green product accessibility (GPA)	0.779	0.782	0.597
Green product purchase intention (GPI)	0.908	0.910	0.763
Green consumption behavior (GCB)	0.852	0.856	0.668
Perceived green responsibility (PGR)	0.814	0.817	0.639
Perceived green self-efficacy (PGS)	0.895	0.901	0.721
Perceived green policy effectiveness (PGP)	0.838	0.843	0.646

Convergent validity was assessed using the Average Variance Extracted (AVE). The AVE values ranged from 0.597 to 0.763, all exceeding the recommended minimum value of 0.50 (Fornell & Larcker, 1981), thereby confirming that the indicators adequately captured the variance of their respective latent constructs. Discriminant validity was evaluated using the Fornell-Larcker criterion. As shown in Table 2, the square root of the AVE for each construct exceeded its correlations with all other constructs, demonstrating adequate discriminant validity (Fornell & Larcker, 1981). In addition, multicollinearity was assessed using the Variance Inflation Factor (VIF). Following the recommendations of Kleinbaum et al. (1988), all VIF values ranged from 1.037 to 2.795, well below the commonly accepted threshold of 10, indicating that multicollinearity was not a concern.

Overall, the results demonstrate that the measurement model possesses satisfactory internal consistency reliability, convergent validity, discriminant validity, and an absence of problematic multicollinearity, thereby supporting the suitability of the measurement model for subsequent structural model analysis.

Table 2: A summary of the Fornell-Larcker criterion

	EP	ER	GPA	GPI	GCB	PGB	PGS	PGP
EP	0.782							
ER	0.625	0.822						
GPA	0.529	0.213	0.773					
GPI	0.354	0.346	0.235	0.873				
GCB	0.458	0.297	0.159	0.366	0.817			
PGB	0.306	0.198	0.389	0.259	0.241	0.799		
PGS	0.502	0.321	0.429	0.371	0.373	0.372	0.849	
PGP	0.531	0.267	0.390	0.284	0.513	0.405	0.361	0.804

Notes: The bold values in the parentheses are the square root of AVE.

4. Results and Discussions

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), a variance-based SEM technique that is particularly suitable for simultaneously estimating complex relationships among multiple latent constructs and is robust to violations of multivariate normality (Dash & Paul, 2021; Sarstedt et al., 2022). After confirming the adequacy of the measurement model, the structural model was examined using the bootstrapping procedure implemented in Smart PLS 4. The results, summarized in Table 3, indicate that eco-friendly packaging exerted a significant positive effect on green product purchase intention ($\beta = 0.279$, $p < 0.01$), supporting **H1**. Likewise, eco-friendly retailing positively influenced green product purchase intention ($\beta = 0.198$, $p < 0.01$), providing support for **H2**. Green product accessibility also demonstrated a significant positive relationship with green product purchase intention ($\beta = 0.301$, $p < 0.01$), thereby supporting **H3**. Furthermore, green product purchase intention had a strong positive effect on green consumption behavior ($\beta = 0.586$, $p < 0.01$), supporting **H4**. Overall, the structural model results provide empirical evidence that eco-friendly packaging, eco-friendly retailing, and green product accessibility significantly enhance consumers' intentions to purchase green products, thereby promoting green consumption behavior.

Table 3: Path coefficients

Hypotheses	β	t	Decision
H1: EP→GPI	0.279*	5.907	Supported
H2: ER→GPI	0.198*	3.165	Supported
H3: GPA→GPI	0.301*	6.258	Supported
H4: GPI→GCB	0.586*	12.719	Supported
H5: PGR×GPI→GCB	0.237*	5.183	Supported
H6: PGS×GPI→GCB	0.215*	4.736	Supported
H7: PGP×GPI→GCB	0.163*	2.819	Supported

Note: * $p < 0.01$

The moderation analysis results are also presented in Table 3. As hypothesized, perceived green responsibility significantly strengthened the positive relationship between green product purchase intention and green consumption behavior ($\beta = 0.237, p < 0.01$), thereby supporting **H5**. Likewise, perceived green self-efficacy positively moderated the relationship between green product purchase intention and green consumption behavior ($\beta = 0.215, p < 0.01$), providing support for **H6**. Furthermore, perceived green policy effectiveness exerted a significant positive moderating effect on the relationship between green product purchase intention and green consumption behavior ($\beta = 0.163, p < 0.01$), supporting **H7**. Collectively, these findings suggest that consumers are more likely to translate their intentions to purchase green products into actual green consumption when they possess a stronger sense of environmental responsibility, greater confidence in their ability to contribute to environmental sustainability, and stronger beliefs regarding the effectiveness of environmental policies.

The findings provide empirical support for the proposed research framework and demonstrate that sustainable retailing strategies play an important role in encouraging environmentally responsible consumer behavior. Specifically, eco-friendly packaging, eco-friendly retailing, and green product accessibility significantly increased consumers' intentions to purchase green products, thereby promoting green consumption behavior. These results reinforce the view that sustainable retail practices create favorable conditions for consumers to adopt environmentally responsible purchasing decisions by reducing barriers and enhancing the attractiveness and accessibility of green products.

The findings are consistent with previous research demonstrating that environmentally friendly packaging, sustainable retail environments, and the availability of green products positively influence consumers' purchasing intentions and sustainable consumption behaviors (Ghaffar & Islam, 2024; Ghaffar et al., 2023; Nguyen et al., 2017; Song et al., 2023; Steinhart et al., 2013). By integrating these retail-related factors within a single framework, this study extends the sustainable retailing literature by showing that retailers can influence green consumption through multiple complementary mechanisms rather than relying on a single sustainability initiative.

More importantly, this study contributes to the literature by demonstrating that psychological and contextual factors strengthen the translation of purchase intention into actual behavior. The significant moderating effect of perceived green responsibility indicates that consumers who feel a stronger moral obligation toward environmental protection are more likely to act consistently with their purchase intentions. Similarly, consumers with higher levels of perceived green self-efficacy are more likely to convert their intentions into actual purchasing behavior because they believe their individual actions can contribute meaningfully to environmental sustainability. In addition, the positive moderating effect of perceived green policy effectiveness suggests that supportive and credible environmental policies reinforce consumers' confidence that their purchasing decisions align with broader societal efforts to address environmental challenges. These findings highlight that

sustainable consumption depends not only on consumers' intentions but also on the psychological and institutional conditions that facilitate the translation of those intentions into behavior.

Overall, the results underscore the importance of integrating market-related factors with individual psychological characteristics to explain green consumption behavior better. While eco-friendly retailing initiatives stimulate consumers' intentions to purchase environmentally friendly products, their effectiveness is enhanced when consumers perceive environmental responsibility as a personal obligation, believe their actions can make a meaningful difference, and have confidence in the effectiveness of environmental policies. These findings provide a more comprehensive understanding of the mechanisms through which sustainable retailing promotes green consumption among millennials.

5. Implications

5.1 Academic implications

This study provides several important theoretical implications for the sustainable consumption, green marketing, and sustainable retailing literature. First, this study advances sustainable retailing research by proposing and empirically validating an integrated framework that simultaneously incorporates eco-friendly packaging, eco-friendly retailing, and green product accessibility as antecedents of green product purchase intention. While previous studies have largely examined these retail-related factors independently, the present research demonstrates that they collectively shape consumers' purchasing decisions. By integrating these complementary retailing strategies into a single model, this study offers a more comprehensive explanation of how sustainable retail practices influence consumers' intentions to purchase environmentally friendly products.

Second, this study contributes to the sustainable consumption literature by addressing the long-standing intention-behavior gap. Although prior research has consistently identified purchase intention as a key predictor of green consumption, comparatively little attention has been devoted to understanding the conditions under which consumers successfully translate their intentions into actual behavior. By demonstrating that perceived green responsibility, perceived green self-efficacy, and perceived green policy effectiveness strengthen the relationship between green product purchase intention and green consumption behavior, this study provides new insights into the psychological and institutional mechanisms underlying sustainable consumer decision-making.

Third, the findings extend the explanatory scope of the Theory of Planned Behavior (TPB). The TPB posits that behavioral intention is the most immediate determinant of behavior; however, it offers only a limited explanation for why individuals with similar intentions frequently exhibit different behavioral outcomes. By incorporating perceived green responsibility, perceived green self-efficacy, and perceived green policy effectiveness as moderating variables, this study demonstrates that both individual psychological characteristics and contextual

policy perceptions influence the extent to which purchase intentions are translated into actual green consumption behavior. Consequently, this research enriches the application of the TPB within the context of sustainable consumption by providing a more nuanced explanation of the intention-behavior relationship.

Fourth, this study contributes to the sustainability literature by integrating external market-related factors with internal psychological and institutional mechanisms within a unified theoretical framework. Existing research has generally focused either on retailer-related initiatives that encourage sustainable purchasing or on consumers' environmental beliefs and values. By simultaneously examining retail strategies, consumers' psychological characteristics, and perceptions of environmental policy effectiveness, this study provides a more holistic understanding of the determinants of green consumption behavior. This integrated perspective offers a valuable theoretical foundation for future research investigating the interactions between retail environments, consumer psychology, and public policy in promoting sustainable consumption.

Finally, this study contributes to the emerging literature on sustainable retailing in developing and emerging economies. Although environmentally responsible retailing has received increasing scholarly attention, relatively limited research has examined how consumers' confidence in environmental policies influences the effectiveness of sustainable retail practices. By demonstrating the moderating role of perceived green policy effectiveness, this study highlights the importance of institutional trust in reinforcing consumers' environmental intentions. The findings suggest that consumers are more likely to translate their green purchase intentions into actual consumption behavior when they perceive environmental policies to be credible and effective. This contribution broadens current understanding of how institutional contexts interact with retailer initiatives and individual psychological factors to promote sustainable consumption.

5.2 Practical implications

The findings of this study provide valuable practical implications for retailers, manufacturers, brand managers, and policymakers seeking to accelerate the transition toward sustainable consumption. The results suggest that promoting green consumption requires coordinated efforts across the retail supply chain, supported by effective environmental policies and consumer-oriented sustainability initiatives. First, retailers should view sustainability as a strategic capability rather than a collection of isolated environmental practices. The significant effects of eco-friendly packaging, eco-friendly retailing, and green product accessibility indicate that consumers evaluate retailers based on the overall sustainability of the shopping experience. Consequently, retailers should integrate environmental considerations throughout their operations by adopting recyclable or biodegradable packaging, reducing single-use plastics, expanding refill and recycling programs, improving energy-efficient store operations, and increasing the visibility and availability of environmentally friendly products. Such initiatives not only encourage consumers'

green purchase intentions but also strengthen corporate reputation, enhance customer loyalty, and create sustainable competitive advantages in increasingly environmentally conscious markets.

Second, manufacturers and brand managers should recognize that sustainable packaging functions as both an environmental innovation and a marketing signal. Environmentally friendly packaging communicates a firm's commitment to sustainability and enhances consumers' perceptions of product quality and environmental value. Therefore, firms should invest in innovative packaging technologies that minimize resource consumption, facilitate recycling, and reduce environmental impacts throughout the product life cycle. Equally important, environmental claims should be communicated transparently through credible eco-labels and sustainability information to enhance consumer trust and reduce uncertainty during the purchasing process.

Third, improving the accessibility of green products should become a strategic priority throughout retail channels. The findings demonstrate that consumers are more likely to purchase environmentally friendly products when they are readily available and easy to identify. Retailers should therefore expand the assortment of sustainable products, allocate prominent shelf space, and employ effective in-store merchandising and digital marketing strategies that increase product visibility. Likewise, online retailers can facilitate green purchasing by establishing dedicated sustainability sections, incorporating environmental search filters, and providing comprehensive sustainability information that enables consumers to make informed purchasing decisions.

Fourth, organizations should complement sustainable retail practices with initiatives that strengthen consumers' perceived green responsibility and perceived green self-efficacy. Environmental campaigns should move beyond raising awareness by emphasizing that individual purchasing decisions collectively contribute to addressing climate change and environmental degradation. Educational programs, personalized sustainability feedback, carbon footprint information, and storytelling campaigns can reinforce consumers' confidence that their purchasing decisions generate meaningful environmental benefits, thereby increasing the likelihood that green purchase intentions are translated into actual consumption behavior.

Finally, policymakers play a critical role in creating an institutional environment that supports sustainable consumption. The significant moderating effect of perceived green policy effectiveness suggests that consumers are more likely to act on their environmental intentions when they perceive environmental policies to be credible, transparent, and effectively implemented. Governments should therefore strengthen environmental regulations, establish reliable eco-labeling and certification systems, provide financial incentives that encourage sustainable production and consumption, and communicate policy outcomes more effectively to the public. Such initiatives can enhance public trust in environmental governance and reinforce consumers' confidence that their individual purchasing decisions contribute to broader societal sustainability goals.

Overall, the findings demonstrate that promoting sustainable consumption among millennials requires collaboration across multiple stakeholders. Retailers and manufacturers must create accessible and attractive sustainable shopping environments, while policymakers should establish supportive institutional frameworks that reinforce consumers' confidence in environmental initiatives. At the same time, organizations should leverage digital technologies and consumer engagement strategies to cultivate environmental responsibility and self-efficacy. Such coordinated efforts will be more effective in transforming green purchase intentions into enduring sustainable consumption behavior.

6. Limitations and Future Directions

Despite its theoretical and practical contributions, this study has several limitations that provide opportunities for future research. First, this study employed a cross-sectional research design, which limits the ability to establish causal relationships among the study variables. Although the proposed research framework was developed based on established theories and empirical evidence, consumers' environmental attitudes and purchasing behaviors may evolve as sustainability awareness, market conditions, and environmental policies change. Future studies could employ longitudinal or experimental research designs to examine how changes in retail sustainability initiatives and environmental policies influence green purchase intention and green consumption behavior over time.

Second, the study focused exclusively on Taiwanese millennials. While millennials represent an important consumer segment because of their relatively high environmental awareness and purchasing power, the findings may not be directly generalizable to other age groups or cultural contexts. Future research should examine whether the proposed model is applicable across different generations, such as Generation Z and older consumers, and conduct cross-country comparisons to investigate how cultural values, economic development, and institutional environments influence sustainable consumption behavior.

Third, the study adopted a quantitative survey approach using self-reported measures. Although procedural and statistical remedies were implemented to reduce common method bias, self-reported data remain susceptible to social desirability bias and the well-documented intention–behavior gap. Future studies could incorporate objective behavioral measures, field experiments, retail transaction data, or longitudinal purchase records to validate whether consumers' reported purchase intentions are reflected in their actual purchasing behavior.

Fourth, this study examined three retail-related antecedents of green product purchase intention and three moderating variables influencing the intention–behavior relationship. Although the proposed framework explained a substantial proportion of consumers' green consumption behavior, sustainable purchasing decisions are also influenced by other contextual and psychological factors. Future research could extend the model by incorporating variables such as environmental concern, green trust, environmental knowledge, perceived product quality, green

skepticism, price sensitivity, social influence, or environmental identity. In addition, organizational and market-level factors, including corporate sustainability reputation, digital retail innovation, and government incentives, may further enrich the explanatory power of the proposed framework.

Finally, this study focused primarily on traditional sustainable retailing practices, including eco-friendly packaging, eco-friendly retailing, and product accessibility. As digital technologies continue to reshape the retail landscape, future studies should investigate how emerging technologies, including artificial intelligence, personalized recommendation systems, digital product passports, blockchain-enabled supply chain transparency, and augmented reality shopping experiences, influence consumers' sustainable purchasing decisions. Examining the interaction between technological innovation and sustainable retailing may provide valuable insights into the future development of green retail ecosystems.

7. Conclusion

This study examined the factors influencing green consumption behavior by integrating eco-friendly packaging, eco-friendly retailing, green product accessibility, and green product purchase intention into a unified framework, while considering the moderating roles of perceived green responsibility, perceived green self-efficacy, and perceived green policy effectiveness. The findings demonstrate that sustainable retailing practices significantly enhance consumers' purchase intentions, which subsequently promote green consumption behavior. Furthermore, the identified psychological and institutional moderators strengthen the translation of purchase intention into actual behavior. Overall, this study enriches the sustainable consumption literature and provides valuable insights for retailers and policymakers seeking to encourage environmentally responsible consumer behavior.

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