IMPACT OF ECO-LABELS ON GREEN PURCHASE BEHAVIOR: MEDIATING ROLE OF ENVIRONMENTAL CONCERN AND ATTITUDE TOWARDS GREEN PRODUCT

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Abstract

This study explores the influence of eco-labels on green purchase behavior in Pakistan's urban markets, emphasizing the mediating roles of environmental concern and attitudes toward green products. Anchored in the Theory of Planned Behavior, it investigates how eco-labels act as informational cues that shape consumer perceptions, attitudes, and subsequent purchasing intentions. Data were gathered through a structured questionnaire from 450 consumers in major urban centers and analyzed using structural equation modeling (SEM) to test hypothesized relationships. Findings demonstrate that eco-labels significantly and positively affect green purchase behavior both directly and indirectly by fostering stronger environmental concern and more favorable attitudes toward green products. The results indicate that while eco-labels can effectively promote sustainable consumption, their impact depends on consumers' environmental values and perceived credibility of labeled products. The study offers practical guidance for policymakers, businesses, and certification bodies, highlighting the importance of enhancing eco-label visibility, credibility, and consumer education. By providing empirical evidence from a developing country context, this research advances understanding of eco-labels as strategic tools for encouraging sustainable consumer behavior. Limitations—such as cross-sectional design, urban-

focused sampling, and reliance on self-reported data—point to future research opportunities involving rural populations, experimental designs, and differentiation across eco-label types.

Introduction

The fast-growing rate of environmental degradation, expressed in climate change, deforestation, resource depletion, and loss of biodiversity has increased global debate regarding sustainable consumption patterns (Afridi, Javed, et al., 2023; Ibrahim et al., 2025). Growing recognition of the importance of environmentally sound production and consumption approaches has come from business, policymakers, and consumers (Fosu et al., 2024; Jang, 2024). Of several market-based interventions, eco-labels have come to the fore as an important strategic instrument to drive consumer purchasing decisions by communicating the environmental characteristics of products (Carrión-Bósquez et al., 2024; Prieto-Sandoval et al., 2016). Eco-labels provide standardized, trustworthy information meant to alleviate uncertainty, make green products distinct from non-green counterparts, and eventually drive green purchasing behavior (Lou & Xu, 2024; Țigan et al., 2021).

Despite the growing adoption of eco-labels worldwide, their actual effectiveness in shaping purchasing decisions remains contested. While some studies suggest a positive impact of eco-labels on consumer choices (Afridi et al., 2021; Nakaishi & Chapman, 2024), others report limited or negligible effects, often due to low awareness, skepticism regarding label credibility, or perceived trade-offs in price and quality (Donato & Adıgüzel, 2025; Kumar et al., 2021). This inconsistency highlights the need to examine psychological mechanisms that translate eco-label exposure into purchase action. From a behavioral perspective, eco-labels work not solely through information provision but by activating environmental concern and attitude towards green

products; two critical predictors of sustainable consumption (Donato & Adıgüzel, 2025; Ghouse et al., 2024).

Environmental concern reflects an individual's cognitive and emotional involvement with environmental issues and a perceived sense of personal responsibility to act (Van Hoang, 2024; Zeng et al., 2023). High environmental concern has been shown to enhance responsiveness to eco-label cues, increasing the likelihood of environmentally friendly purchase decisions (Hoang & Tung, 2024; Stojanova et al., 2023). Similarly, attitude towards green products—a consumer's favorable evaluation of eco-friendly alternatives—directly influences purchase intentions and behavior (Ajzen, 1991; Mostafa, 2007). Eco-labels can strengthen such attitudes by enhancing perceived product credibility, quality, and alignment with personal values (Chen, 2010).

The dual mediating role of environmental concern and green product attitude is in line with the Theory of Planned Behavior (TPB) (Ajzen, 1991), where it is argued that attitudes and perceived norms influence behavioral intentions, which further influence action. Yet, although TPB offers a helpful perspective, empirical research has scarcely studied both the mediators at the same time in the relationship between eco-label and purchase behavior, especially in emerging markets. This is a failure of importance because consumer awareness of eco-labels, confidence in certifying institutions, and environmental knowledge tend to be lower in developing nations than in developed economies (Bajar et al., 2024; Suhartanto et al., 2024). Additionally, socio-cultural considerations—e.g., collectivist values and economic limitations—can change the way eco-labels affect concern, attitudes, and ultimate purchase behavior (Di et al., 2024; Zhong & Peng, 2022).

Available literature has been geographically biased towards developed economies in Europe and North America, where consumers typically have higher sustainability consciousness and institutional confidence (Pathak et al., 2024; Rama & Susanto, 2024; Suhartanto et al., 2024; Van Hoang, 2024). In

rapidly emerging markets including Asia, Africa, and Latin America, eco-label uptake is comparatively in its infancy, and its behavioral impact is not well researched. In these contexts, it is necessary to examine the psychological mechanisms mediating eco-label effects in order to inform theory development and effective policy and marketing intervention design (Nguyen-Viet, 2022; Tiboni-Oschilewski et al., 2024; Zhan et al., 2025).

Against this background, this study investigates the influence of eco-labels on green consumption behavior via the mediating roles of environmental concern and green product attitude in an emerging market setting. By combining TPB with Signaling Theory (Spence, 1973), which describes how eco-labels serve as reliable signals that alleviate information asymmetry; this study advances knowledge about how informational cues are internalized into pro-environmental intentions and behavior. The research not only fills an important empirical void in the literature but also provides policy-relevant and actionable information to marketers, certification agencies, and policymakers interested in promoting the credibility, transparency, and behavioral influence of eco-labels in different market contexts.

Eco-Labels and Green Purchase Behavior

Sustainable consumption has become a core agenda in scholarship and policy discussion, spurred on by rising environmental deterioration, resource loss, and climate change issues (Ibrahim & Khan, 2025; Pathak et al., 2024; Patwary et al., 2023; Zeng et al., 2023). As consumers become more aware of the environmental implications of their actions, regulators and firms have looked for efficient policies to converge market demand with sustainability objectives. Of these strategies, information cues have been essential in channeling consumers towards eco-friendly products (Ibrahim, 2022; Sajid, Ibrahim, et al., 2025). Information cues assist in overcoming information asymmetries between manufacturers and consumers, allowing for more rational decision-making in uncertain markets (Donato & Adıgüzel, 2022; Galarraga Gallastegui, 2002; Nguyen-Viet, 2022). Eco-labels, standardized

labels or certifications conveying certified environmental characteristics of products, are one of the most popular and researched tools in this field.

Well-designed and reputable, eco-labels minimize uncertainty, decrease perceived purchase risk, and increase willingness to pay for green goods by serving as quality signals that distinguish environmentally friendly goods from traditional substitutes(Galati et al., 2022; Lou & Xu, 2024; Pathak et al., 2024). They are strategic market-based tools that trigger sustainable consumption habits and support the environmental positioning of goods within competitive markets. Practically, eco-labels tend to be cognitive heuristics that enable consumers to make effectively sustainability-driven choices under states of information overload (Donato & Adıgüzel, 2025; Galati et al., 2022). Their success, however, relies on variables including consumer familiarity, consumer trust in certifying organizations, and perceived credibility (Carrión-Bósquez et al., 2025; de Melo et al., 2024; Ghouse et al., 2024). If seen as deceptive, like in the instances of greenwashing or in the absence of independent third-party validation, eco-labels have the potential to erode consumer trust and lower purchase chances (Afridi, Asad, et al., 2023; Armutcu et al., 2024; Patwary et al., 2023; Sajid, Rooh, et al., 2025).

Empirical evidence on the effectiveness of eco-labels is varied. Various studies indicate significant positive impacts of exposure to eco-labels on purchase behavior and intentions (Panopoulos et al., 2022; Tiboni-Oschilewski et al., 2024), with especially significant outcomes in high-trust markets where consumers pay premiums for products that are sustainable (de Melo et al., 2024; Pathak et al., 2024). However, other studies uncover only weak or context-specific effects, and results are determined by variables like environmental awareness, price responsiveness, and perceived credibility of the label (Galati et al., 2022; Prieto-Sandoval et al., 2016; Țigan et al., 2021; Yokessa & Marette, 2019). This indicates that eco-labels tend to act indirectly in shaping behavior, mostly through psychological routes, and less as direct informational cues.

The TPB (Ajzen, 1991) provides a solid basis for filling these gaps, since it formally models the role of attitudes, subjective norms, and perceived behavioral control in determining intentions and then behavior. In the case of eco-labels, TPB implies that such information signals can influence attitudes to green products by conveying credible environmental advantages and raising perceived value, as well as by confirming environmental concern—an attitudinal and normative driver to sustainable behavior. These intermediaries feed into TPB's intention–behavior track. Signaling Theory (Spence, 1973) fills in the gap by describing the process by which eco-labels affect perceptions: credible labels function as signals that diminish information asymmetry, increase trust, and reinforce the tracks outlined in TPB. Thus, based on the above empirical and theoretical grounds, we propose the following,

H1: Eco-labels significantly enhance consumers' propensity to engage in green purchasing.

Mediating Role of Environmental Concern

Over the last few years, eco-labels have proven to be an essential facilitator in closing the gap between sustainable production and consumer choice, providing a trustworthy mechanism for distinguishing environmentally preferable products from mainstream counterparts (de Melo et al., 2024; Feuß et al., 2022; Lou & Xu, 2024). By communicating transparent, standardized data regarding a product's environmental characteristics, for example, carbon content, water consumption, or recyclability, eco-labels minimize the uncertainty that normally shrouds sustainable consumption decisions(Boström & Klintman, 2008; Kumar et al., 2021; Pathak et al., 2024). Such informational role is particularly important in consumer markets where customers become more aware of the environmental impact of their purchases but are not necessarily equipped with the knowledge or time to check the claims on their own (Donato & Adıgüzel, 2022; Nguyen-Viet, 2022; Tiboni-Oschilewski et al., 2024).

The success of eco-labels, however, depends not just on the transfer of factual information. They also act as symbolic signals that resonate with consumers' underlying moral and ecological values (Arora & Mishra, 2023; Patwary et al., 2023). When a label credibly signals that a product aligns with sustainability principles, it can activate deeper psychological processes, prompting individuals to reflect on the environmental consequences of their consumption choices. This reflection tends to come in the form of increased environmental concern, which then becomes a strong stimulus for behavior change (Armutcu et al., 2024; Arora & Mishra, 2023; Islam et al., 2024).

Environmental concern can be generally described as how much individuals know about environmental issues, how serious they see them, and how willing they are to make sacrifices that help towards protecting the environment (Afridi et al., 2021; Margariti et al., 2024). In green consumption situations, it operates as a central mediating vehicle associating eco-label exposure with purchase behavior (Margariti et al., 2024; Zeng et al., 2023). High environmental concern consumers are likely to perceive eco-labels as credible and personally meaningful, making them more likely to select eco-labeled products compared to lower sustainability options (Hoang & Tung, 2024; Shah et al., 2021). Furthermore, research demonstrates that exposure to ecolabels increases concern itself by making the environmental consequence of consumption more explicit and tangible (Cruz & Manata, 2020; Yu et al., 2023).

Empirical evidence supports this mediating role. For instance, Wirya and Syah (2022) established that eco-labels exerted an indirect effect on green purchase intention by facilitating environmental concern, serving as a cognitive and affective driver of pro-environmental behavior. Likewise, Hoang and Tung (2024) indicated that the effectiveness of eco-labels was greatly enhanced in the presence of high environmental concern among consumers, whereas concluded that such concern served as the psychological "bridge" connecting green marketing cues and resultant purchase behavior.

Nonetheless, this mediation influence is not equal in cultural and economic environments. In developing economies such as Pakistan, eco-label literacy, perceived credibility, and institutional trust are in the development process (Carrión-Bósquez et al., 2025; Feuß et al., 2022). In this case, environmental concern will be more likely to act as an effective mediator with the support of prior environmental education, pro-sustainability social norms, and specific awareness campaigns by governments or NGOs (Kanste et al., 2025; Lim et al., 2023; Yu et al., 2023). This implies that eco-labeling programs must be made part of wider societal programs that foster environmental concern as a precursor to sustainable consumption.

From a theoretical perspective, the TPB (Ajzen, 1991) which has a robust basis for explaining this mediation process. On the TPB side, environmental concern influences attitudes toward products labeled as eco-friendly, enhances subjective norms supporting sustainable alternatives, and promotes perceived behavioral control by making the environmental advantages of acting clear. Consequently, eco-labels, by raising concern, indirectly increase purchase intentions and behavior. Moreover, Signaling Theory (Spence, 1973) informs us why eco-labels can have this effect: by acting as credible signals that minimize information asymmetry, they guarantee consumers that the product truly satisfies sustainability claims, thereby confirming and reinforcing their concern-based purchasing behavior.

H2: Environmental concern serves as a mediating mechanism linking eco-labels to green purchasing behavior.

Mediating Role of Attitude Towards Green Product

Consumer attitudes towards green products are globally accepted as a critical driver of sustainable consumption behavior, a person's overall evaluative judgment—positive or negative, towards sustainable goods (Ajzen, 1991; Suhartanto et al., 2024; Zhong & Peng, 2022). Attitudes in the context of eco-labeling act as a cognitive-affective filter by which consumers make sense and react to sustainability signals. Instead of having a purely direct effect, eco-

labels tend to influence consumers indirectly by instilling positive attitudes, which in turn convert into purchase intentions and actual purchases (Rama & Susanto, 2024; Van Hoang, 2024).

Building a positive attitude toward green products is also often triggered when consumers are exposed to reputable eco-labels that provide both informational and symbolic value. Informationally, eco-labels reduce uncertainty and respond to information asymmetry by confirming that a product is actually meeting certain environmental criteria, usually certified by independent third parties (Chaihanchanchai & Anantachart, 2023; Li et al., 2024). Symbolically, green labels communicate identification with pro-environmental lifestyles and values, adding moral and social value to the purchase above functional product value (Di et al., 2024; Rama & Susanto, 2024). The combination supports more positive green product beliefs—e.g., perceived quality, safety, and ethical accountability, which in total reinforce attitudes (Ahmad & Wu, 2022; Farias et al., 2019).

Empirical studies consistently demonstrate this mediating pathway. For example, Chaihanchanchai and Anantachart (2023) established that customers who were exposed to eco-labels exhibited considerably more favorable attitudes toward green products, which in turn further developed their buying intentions. Likewise, Bajar et al. (2024) also established that attitudes indeed act as a necessary psychological link between eco-label awareness and green purchasing behavior, whereas Zhou et al. (2018) demonstrated that positive attitudes not only acted to mediate the eco-label–purchase relationship but also increased consumers' readiness to pay a premium for green substitutes. Furthermore, Baah et al. (2024) reported that attitude formation mediates the effect of green marketing stimuli, including eco-labels, on behavioral responses, reinforcing its role as a central mechanism in sustainable consumption.

From a theoretical standpoint, the TPB(Ajzen, 1991) explains the mediation process for this effect strongly since attitudes toward behavior are a key

determinant of behavioral intention. Eco-labels affect fundamental behavioral beliefs; for example, product quality, ethical value, and environmental benefit—these at last lead to improved attitudes and intentions for purchase. Furthermore, Signaling Theory (Spence, 1973) reinforces this view by delineating eco-labels as reliable market signals that communicate non-observable product characteristics (such as sustainability performance), thus diminishing consumer distrust and enhancing the judging process. Cumulatively, these theories account for how eco-labels indirectly but significantly act on green purchase behavior through attitude favorable shaping. Thus, the following hypothesis is developed,

H3: *Attitudes toward green products mediate the association between eco-labels and green purchasing behavior.*
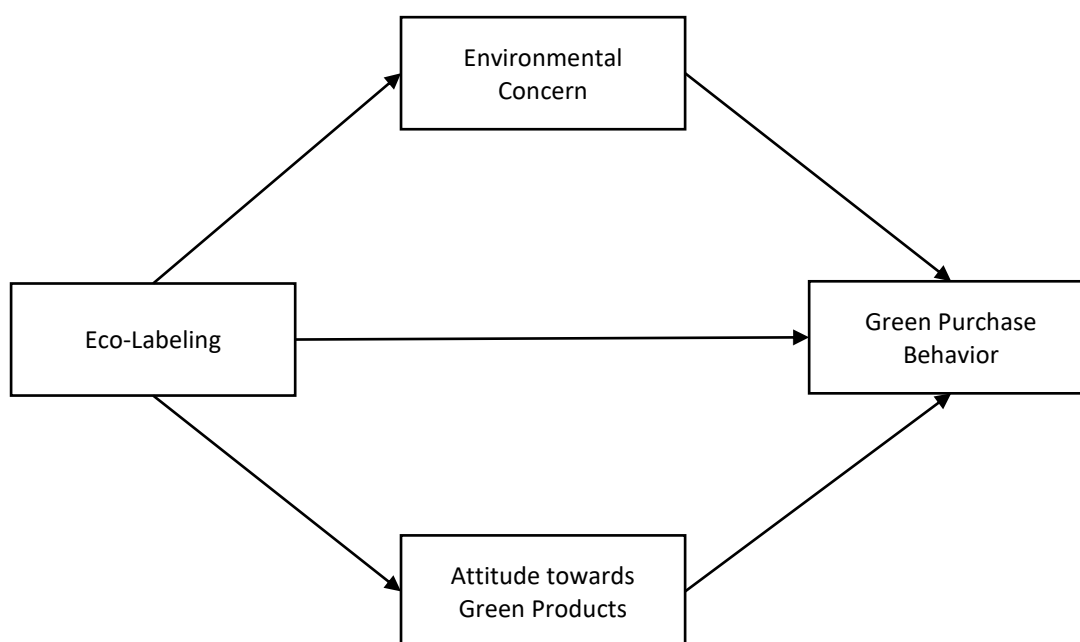

Figure No. 1: Conceptual Framework

Methodology

Research Design

This study employs a quantitative, cross-sectional survey design to investigate the impact of eco-labels on green purchase behavior, with environmental

concern and attitude toward green products serving as mediating variables. The research adopts a hypothesis-testing approach aligned with the positivist paradigm, enabling objective measurement and empirical validation of relationships within the proposed conceptual framework. Data analysis was conducted using structural equation modeling (SEM) to test direct and indirect effects simultaneously, ensuring a robust evaluation of the hypothesized model.

Population and Sampling

The target population comprised adult consumers (aged 18 and above) residing in major urban centers of Khyber Pakhtunkhwa, including Peshawar, Mansehra, Mardan and Abbottabad, who have prior experience purchasing eco-labeled products such as organic food, energy-efficient appliances, eco-friendly packaging, and environmentally responsible personal care items. This population was chosen because urban consumers are more likely to be exposed to eco-label marketing and have access to sustainable product alternatives.

A purposive sampling technique was employed to ensure that respondents were familiar with the concept of eco-labeling. In addition, screening questions were included at the start of the questionnaire to filter out individuals with no prior exposure to eco-labeled products.

The sample size was determined based on Hair Jr et al. (2019) recommendation of at least 10 respondents per observed variable, resulting in a minimum requirement of 300 participants for reliable SEM analysis. To enhance statistical power and generalizability, 500 questionnaires were distributed through both online and offline channels. After data cleaning (removal of incomplete and inconsistent responses), 412 valid responses were retained, representing an 82.4% valid response rate.

The demographic profile of the respondents reflected a diverse representation of urban Pakistani consumers. In terms of gender distribution, 56.3% of the participants were female, while 43.7% were male. The age

composition showed that 28.4% were between 18 and 25 years, 39.1% were aged 26–35 years, 21.6% fell within the 36–45 years range, and 10.9% were above 45 years of age. Educational attainment varied, with 24.8% having completed undergraduate studies, 42.5% holding a bachelor's degree, 27.2% possessing a master's degree, and 5.5% holding a doctorate or higher qualification. Regarding monthly income levels, 22.6% reported earning less than PKR 50,000, 35.4% earned between PKR 50,001 and 100,000, 27.9% fell within the PKR 100,001–150,000 bracket, and 14.1% reported earnings above PKR 150,000. This demographic diversity ensured that the sample captured a broad spectrum of consumers likely to be exposed to and engaged with eco-labeled products.

Measures

This study utilized well-established and validated measurement scales adapted from prior research. All items were measured on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Eco-Labels – Measured using a 5-item scale adapted from (Thøgersen et al., 2010) to assess consumers' recognition of and trust in eco-labels. A sample item is: "I trust products that carry an eco-label more than those without one." The Cronbach's alpha for this scale was 0.88, indicating high internal consistency.

Environmental Concern – Measured using a 6-item scale adapted from Dunlap et al. (2000), evaluating respondents' awareness of and concern for environmental issues. A sample item is: "I am very concerned about environmental problems." The Cronbach's alpha for this scale was 0.91, demonstrating excellent reliability.

Attitude Toward Green Products – Assessed using a 5-item scale adapted from Chen and Chai (2010), reflecting consumers' overall evaluation of green products. A sample item is: "Purchasing green products is beneficial for the environment." The Cronbach's alpha for this scale was 0.86, showing strong reliability.

Green Purchase Behavior – Measured with a 5-item scale adapted from Joshi and Rahman (2015), capturing the extent to which respondents engage in eco-friendly purchasing behaviors. A sample item is: "I often choose products that are environmentally friendly over regular products." The Cronbach's alpha for this scale was 0.89, indicating high internal consistency.

Descriptive Statistics and Inter-Construct Correlations

Descriptive statistics and inter-construct correlations were computed to examine the relationships among eco-labels, environmental concern, attitude toward green products, and green purchase behavior. Results (Table 1) show moderate to strong positive correlations, all significant at **p < 0.01**, indicating that greater trust in eco-labels is linked with higher environmental concern, more favorable attitudes, and stronger green purchasing intentions. No correlation exceeded 0.85, confirming the absence of multicollinearity and adequate discriminant validity.

Table No. 1

Descriptive Statistics and Correlation Matrix

Variable	Mean	SD	1	2	3	4
1. Eco-Labels (EL)	3.95	0.72	1			
2. Environmental Concern (EC)	4.12	0.68	0.62**	1		
3. Attitude Toward Green Products (AGP)	4.05	0.74	0.58**	0.65**	1	
4. Green Purchase Behavior (GPB)	3.89	0.70	0.55**	0.60**	0.67**	1

Model Fitness Explanation

The results of the model comparison show a clear improvement in fit as the number of factors increases. The one-factor and two-factor models demonstrated poor fit, with χ^2/df ratios well above 5.0, low CFI and TLI values, and high RMSEA and SRMR values, indicating that combining constructs into fewer factors failed to adequately capture the data structure.

The three-factor model showed moderate improvement, reaching acceptable fit thresholds but still falling short of optimal standards. The four-factor model—representing eco-labels, environmental concern, attitude toward green products, and green purchase behavior as distinct constructs—exhibited excellent fit across all indices, confirming the discriminant validity of the measurement model.

Table No. 2

Model Fit Indices

Model	χ^2/df	CFI	TLI	RMSEA	SRMR	Interpretation
One-Factor Model	6.42	0.61	0.55	0.148	0.121	Poor fit
Two-Factor Model	5.03	0.74	0.69	0.128	0.103	Poor fit
Three-Factor Model	3.48	0.86	0.83	0.094	0.072	Acceptable fit
Four-Factor Model	2.15	0.95	0.94	0.056	0.041	Excellent fit

Results

To examine the impact of eco-labeling on green purchase behavior, both directly and through the mediating roles of environmental concern and attitude towards green products, we employed Andrew Hayes' PROCESS Macro, Model 4. This model allowed us to test parallel mediation effects within a single analytical framework. The approach facilitated assessing the unique and combined indirect effects of both mediators. The result revealed that, the total effect of eco-labels on green purchase behavior was found to be significant (B = 0.523, p < 0.001). After including the mediators, the direct effect remained significant (B = 0.285, p < 0.001), indicating partial mediation. The indirect pathway through environmental concern was significant (B = 0.142, 95% CI [0.074, 0.225]), showing that eco-labels enhance green purchase behavior by increasing individuals' concern for the environment. Similarly, the indirect pathway through attitude toward green products was also significant (B = 0.096, 95% CI [0.044, 0.159]), suggesting that eco-labels foster positive attitudes toward green products, which in turn

encourage green purchasing. Since the 95% confidence intervals for both indirect effects did not include zero, these mediation effects are statistically significant, confirming that eco-labels influence green purchase behavior both directly and indirectly through these psychological mechanisms.

Table No. 3

Result Summary

Path	B	SE	t	p	95% CI (LL, UL)
Direct Effect					
Eco-labels → GPB	0.285	0.061	4.67	0.000	0.165, 0.404
Indirect Effects					
Eco-labels → EC → GPB	0.142	0.037	—	—	0.074, 0.225
Eco-labels → AGP → GPB	0.096	0.029	—	—	0.044, 0.159
Total Effect	0.523	0.058	9.02	0.000	0.408, 0.637

Discussion

The present study set out to examine the influence of eco-labels on GPB in Pakistan's urban consumer markets, with a specific focus on the mediating roles of environmental concern and attitude toward green products. The findings offer strong empirical support for all three proposed hypotheses. The direct positive impact of eco-labels on GPB validates the assumption that reliable environmental labeling acts as a strong informational and motivational signal, leading consumers toward more environmentally friendly purchasing behaviors. This is in agreement with prior evidence showing that eco-labels increase consumer trust, lower perceived risk, and convey product quality and environmental attributes (Bajar et al., 2024; Carrión-Bósquez et al., 2024; Lou & Xu, 2024; Van Hoang, 2024). By offering clear and verifiable environmental data, eco-labels serve as decision shortcuts that are both

affecting the cognitive assessment and emotional appeal of green products (Borah et al., 2024; Pathak et al., 2024).

The research also confirms that environmental awareness strongly mediates the relationship between GPB and eco-labels. This result provides further insight into the psychological process via which labeling affects sustainable consumption. Previous research has demonstrated that environmentalism is a predictor of environmentally friendly behaviors such as willingness to pay extra for environmentally friendly products, lower consumption of toxic products, and genuine engagement in recycling programs (Cruz & Manata, 2020; Stojanova et al., 2023; Wu et al., 2019). However, the present research adds conceptual value by demonstrating that eco-labels can actively cultivate such concern, especially in contexts where environmental awareness is still emerging. In Pakistan's urban markets, where consumers are increasingly exposed to sustainability discourse but may lack detailed product knowledge, eco-labels serve as an accessible and credible trigger for developing a personal sense of environmental responsibility (Sanchez-Sabate & Sabaté, 2019; Zeng et al., 2023).

Similarly, the strong mediating attitude toward green products supports the argument that eco-labels influence not only what consumers know but also how they feel about sustainable substitutes. This is in line with TPB positing that attitudes, along with subjective norms and perceived control, are critical determinants of behavioral intentions and actual behavior. Within this research, eco-labels are able to enhance positive attitudes toward green products by diminishing skepticism, simplifying product benefits, and improving their symbolic value. Existing research shows that positive attitudes toward green products enhance purchase intentions, loyalty, and advocacy, especially if these products are perceived as effective, high quality, and socially responsible (Chen & Chai, 2010; Putra et al., 2024; Suhartanto et al., 2024). Through attitude influence, eco-labels indirectly make consumers

more likely to buy green products and eventually push actual GPB, in line with TPB's postulation that intention is the strongest mediator of behavior.

This evidence is also corroborated by Signaling Theory, which holds that eco-labels are reliable market signals that distinguish green products from regular counterparts, alleviate information asymmetry, and create consumer confidence (Gupta & Singh, 2024; Putra et al., 2024). Within the TPB paradigm, such signals assist in molding both attitudinal and normative decision-making factors through the provision of concrete proof of a product's sustainability advantage. The effectiveness of this signaling process depends on the eco-label's credibility, clarity, and third-party verification—factors that directly affect the degree to which environmental concern and favorable attitudes are formed.

Compared to earlier research, which has predominantly focused on eco-label adoption in Western and highly industrialized economies (Ghouse et al., 2024; Nakaishi & Chapman, 2024), this study makes a contextually important contribution by investigating their influence in a developing economy with unique socio-cultural and market dynamics. In Pakistan, green marketing initiatives often face challenges related to consumer skepticism, limited product availability, and inconsistent regulatory enforcement (Thøgersen et al., 2010; Yang & Thøgersen, 2022). The present findings provide empirical evidence that, even in such contexts, eco-labels can effectively shape both attitudinal and behavioral outcomes, provided they are visible, credible, and culturally resonant.

Contributions

This study makes significant theoretical, methodological, and practical contributions to the literature on sustainable consumption, eco-labeling, and green consumer behavior, particularly in the context of developing economies such as Pakistan.

From a theoretical perspective, the research extends the TPB by empirically validating the mediating roles of environmental concern and attitude toward

green products in explaining how eco-labels influence GPB. While TPB traditionally emphasizes the roles of attitudes, subjective norms, and perceived behavioral control in shaping intentions and behavior, this study demonstrates that eco-labels can act as an upstream driver influencing these psychological determinants, particularly attitudes and environmental concern, thereby strengthening sustainable purchasing decisions. Additionally, by integrating Signaling Theory, the research offers a conceptual foundation for understanding eco-labels as credible market signals that reduce information asymmetry, enhance consumer trust, and communicate product authenticity. This dual theoretical approach provides a nuanced explanation of the cognitive (attitude) and affective (concern) pathways through which eco-labels affect behavior. Furthermore, the study addresses a contextual gap in eco-labeling research, which has predominantly focused on Western, industrialized markets, by examining their effectiveness in Pakistan's urban consumer markets—settings characterized by emerging environmental awareness, evolving regulatory structures, and distinct cultural dynamics. The findings reveal that eco-labels remain effective even where environmental literacy is still developing, serving as both educational and persuasive tools.

From a methodological standpoint, the study advances eco-label research by employing Andrew Hayes' PROCESS Macro (Model 4) to test parallel mediation, enabling a rigorous examination of both direct and indirect effects of eco-labels on GPB. This analytical approach enhances the robustness of the mediation results and offers a replicable framework for future sustainability and marketing research. Moreover, the research employs multiple measurement models—one-factor, two-factor, three-factor, and four-factor—to ensure construct validity, complemented by model fitness indices to confirm the appropriateness of the hypothesized relationships.

Practical Implications

The study's findings provide relevant and practical insights for marketers, policymakers, firms, and sustainability activists seeking to encourage green

consumption, particularly in Pakistan's fast-changing urban markets. For firms and marketers, the findings underscore the strategic significance of integrating credible, visible, and verifiable eco-labels in product development and also in marketing efforts. If done correctly, eco-labels can act as strong trust-building tools that extend beyond superficial aesthetic branding, they communicate authenticity, moral obligation, and environmental responsibility. By using eco-labels in advertising campaigns, packaging, and website product descriptions, businesses can project higher perceptions of product excellence, credibility, and green value among consumers. In extremely competitive markets, this distinction can lead to increased brand loyalty, premium pricing, and long-term consumer engagement. In addition, linking eco-label practices to corporate social responsibility (CSR) and sustainability efforts not only protects the reputation of the brand but also enhances resistance to reputational threats from greenwashing accusations.

For policymakers and regulators, the research highlights the imperative of having standardized eco-labeling systems that are either government-affiliated or third-party-approved. In the absence of a well-defined, consistent standard, consumers risk confusion or disbelief regarding the legitimacy of eco-labels, lessening their behavioral effect. Accordingly, regulatory actions must incorporate open criteria, compulsory testing procedures, and periodic audits to ensure credibility. Further, initiating countrywide awareness campaigns will contribute to filling the knowledge gap, making eco-labels more familiar and credible in the general populace. Such initiatives can be supplemented further by implementing incentive systems—for instance, granting tax incentives or subsidies to businesses that conform to accepted eco-labeling schemes.

The report also points out the educational value of the use of eco-labels as a means to encourage environmental awareness. Eco-labels not only inform but also, in a subtle way, instill a concern for the environment and develop positive attitudes towards "green" products. This presents possibilities for

NGOs, advocacy organizations, and educational institutions to incorporate eco-label consciousness into sustainability education programs. Workshops, community outreach, and school curricula can utilize eco-label instances to illustrate how consumer preference translates to environmental footprint, creating a culture where sustainable buying becomes a standard and not an exception. Lastly, the implications move to the global agenda of sustainability. As Pakistan's consumer markets become more integrated into international trade networks, globally recognized eco-labels can improve export competitiveness by conveying compliance with global environmental standards. Not only is this good business for companies, but it can also help Pakistan earn a reputation as a nation dedicated to sustainable development.

Conclusion

The present study is conclusive in asserting that eco-labels are an essential driver behind green purchase behavior, especially in the urban Pakistani consumer markets, where green awareness continues to pick up pace with growing exposure to sustainability discourse, climate change effects, and international green trends. The findings categorically show that eco-labels have both direct and indirect effects on purchasing, and environmental concern and green attitude serve as key mediators. This two-pronged mechanism suggests that eco-labels not only act as information and visual stimuli that strengthen trust, credibility, and awareness of environmentally sound products but also as powerful psychological impulses that foster greater responsibility in maintaining environmental stewardship.

By raising the environmental consciousness of consumers, eco-labels encourage consumers to deliberately incorporate sustainability values into their daily consumption behaviors, motivating them to look for products that cause less ecological damage. Simultaneously, eco-labels help form positive attitudes towards green products, raise their perceived value, authenticity, and desirability. These positive attitudes may lower skepticism, enhance willingness to pay a premium for sustainable goods, and strengthen the

perception that individual actions can make a significant contribution towards environmental protection. In the long run, these attitudinal and cognitive changes are reflected in stronger intentions and regular behavior supportive of sustainable purchasing habits.

The research further supports the fact that trustworthy, transparent, and visible eco-labels have the potential to be very effective behavioral nudges in influencing consumer choices toward environmental sustainability without necessitating coercive policy instruments. For business, it offers a chance to differentiate products in increasingly competitive markets by incorporating eco-labeling into overall brand stories around authenticity, corporate social responsibility, and long-term value creation. To policymakers, the findings emphasize the policy potential of eco-labeling to shape consumption, mitigate environmental damage, and achieve national sustainability objectives. Further, to sustainability campaigners, eco-labels can be an efficient connector between green awareness campaigns and concrete alteration of consumer behavior, converting intangible ecological issues into tangible shopping choices.

Notably, the research underscores the importance of ensuring that eco-labels are standardized, simple to comprehend, and supported by credible verification systems—like government-approved certifications or strong third-party audits—to prevent greenwashing and increase consumer confidence. This is especially applicable in new economies such as Pakistan, where consumer distrust of advertisements can be very high, and where regulatory enforcement of sustainability standards remains in the development stage.

In the end, this research reaffirms that eco-labels are not so much promotional symbols as strategic levers for promoting wider sustainability agendas. They have the potential to create environmentally responsible consumer cultures, drive demand for sustainable innovations, and underpin global action to reduce ecological degradation. By linking market incentives to environmental goals, eco-labels have the potential to institute a positive

feedback loop in which consumer demand stimulates corporate sustainability activities, which in turn result in more responsible production habits—helping to create a cleaner, healthier future for Pakistan and the world.

Limitations and Future Research

While this study offers valuable insights into the influence of eco-labels on green purchase behavior within Pakistan's urban markets, certain limitations should be acknowledged to contextualize the findings and guide future investigations. First, the use of a cross-sectional research design constrains the ability to establish definitive causal relationships between eco-labels, mediating factors (environmental concern and attitude toward green products), and purchase behavior. Future studies could adopt longitudinal or experimental designs to track behavioral changes over time or directly assess the causal impact of eco-label exposure. Second, the sample was drawn exclusively from urban centers in Pakistan, where awareness of eco-labels and access to eco-friendly products may be relatively higher compared to rural or semi-urban areas. This urban-centric approach limits the generalizability of findings to the broader population. Extending future research to rural and semi-urban contexts could reveal variations in eco-label perception and adoption influenced by socio-economic conditions, education levels, and infrastructure availability. Third, reliance on self-reported survey data introduces the possibility of social desirability bias and common method variance, as participants may overstate environmentally friendly behaviors to align with socially acceptable norms. Incorporating mixed-method approaches, such as integrating survey responses with observational purchase data, in-store experiments, or digital tracking; could enhance data validity and provide richer behavioral insights. Fourth, the study considered eco-labels in general terms, without distinguishing between types of eco-labels (e.g., government-certified, third-party verified, industry self-declared) or product categories (e.g., food, personal care, electronics). Future research could examine how label type, credibility source, and product category interact to shape consumer

trust, perceived authenticity, and purchase decisions. Fifth, the analysis did not account for potential moderating factors such as price sensitivity, product involvement, environmental knowledge, or cultural values, which may either amplify or diminish the impact of eco-labels on purchasing behavior. Including such moderators in future models would allow for a more context-sensitive and segmented understanding of eco-label effectiveness. Lastly, the rapidly evolving digital commerce landscape—where eco-labels are increasingly encountered in online marketplaces—was not explicitly addressed. With the growth of e-commerce, mobile shopping apps, and social media advertising, future studies could investigate the effects of digital eco-label visibility, interactive label features, and online credibility cues on consumer attitudes and sustainable purchase intentions.

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