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Perception of Green Products and Its Effect on Consumer Purchase Intentions: Insights from Garhwal, Uttarakhand

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Abstract

Environmental awareness is reshaping consumer behavior globally. This study investigates how consumers in the Garhwal region of Uttarakhand perceive green products and how these perceptions influence their purchase intentions. Using an integrated analytical approach combining Structural Equation Modeling (SEM) and Machine Learning-based Sentiment Analysis, data from 400 respondents were analyzed. Findings reveal that environmental concern, product trust, eco-label credibility, and perceived price fairness significantly influence green purchase intentions. Moreover, sentiment polarity derived from open-ended responses reinforces the quantitative results. The study offers practical insights for marketers and policymakers to enhance sustainable consumption in hill regions like Garhwal.

Keywords: *Green marketing, Consumer perception, Purchase intention, SEM, Sentiment analysis, Uttarakhand, Sustainable behavior.*

1. Introduction

Over the past few decades, sustainability has become a cornerstone of both marketing and consumer behavior research (Peattie & Crane, 2005; Ottman, 2011). Growing environmental concerns, climate change awareness, and the increasing visibility of ecological degradation have significantly influenced consumer choices. As a result, consumers are becoming more conscious of the environmental impact of their consumption habits, showing a preference for green products that minimize harm to the ecosystem (Biswas & Roy, 2015; Joshi & Rahman, 2015). Green products—also referred to as eco-friendly or sustainable products—are defined as goods designed to reduce negative environmental impacts throughout their lifecycle, from production to disposal (Chen & Chang, 2013). The rise in environmental awareness has led to the emergence of green marketing, which aims to promote products based on their environmental attributes (Polonsky, 1994). However, despite this growing awareness, the intention–behavior gap remains a persistent issue; many consumers express concern for the environment but fail to translate these attitudes into actual purchase behavior (Young et al., 2010; Nguyen et al., 2020). In the Indian context, the green marketing movement is gaining traction, supported by government initiatives such as the Swachh Bharat Mission, National Action Plan on Climate Change, and Sustainable Development Goals (SDGs) alignment. Nevertheless, consumer behavior toward green products in semi-urban and hilly regions, such as Garhwal in Uttarakhand, remains underexplored. The region's unique socio-economic and ecological characteristics—including a high dependence on natural resources, limited industrialization, and strong cultural attachment to the environment—make it an ideal setting to study the dynamics of green product perception and purchase intention. Previous research has highlighted that consumer perception of green products is influenced by multiple factors, including environmental knowledge, eco-label trust, perceived quality, price sensitivity, and social influence (Lee, 2008; Akehurst et al., 2012; Verma & Chandra, 2018). However, these relationships can vary based on regional context, consumer education, and local market accessibility (Kautish & Sharma, 2019). In rural and semi-urban areas of India, such as the Garhwal region, access to green products, awareness

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levels, and perceived affordability play a crucial role in shaping consumers' purchase intentions (Dangi & Narula, 2020). Given the ecological sensitivity of Uttarakhand, which frequently experiences issues related to deforestation, waste management, and tourism-induced pollution, understanding consumer perception of eco-friendly consumption is essential for promoting sustainable market practices. Yet, very few empirical studies have focused on this geographical context. Therefore, this study aims to explore how consumers in the Garhwal region perceive green products and how these perceptions influence their purchase intentions. By incorporating modern analytical techniques such as Structural Equation Modeling (SEM) and Machine Learning–based sentiment analysis, this study seeks to provide fresh empirical insights into sustainable consumer behavior. The findings are expected to inform marketers, policymakers, and sustainability advocates about strategies to enhance green product adoption in ecologically fragile hill regions

2. Literature Review

2.1 Green Consumer Behavior and Environmental Awareness

The rise of environmental consciousness has significantly transformed consumer behavior across global markets. Increasing public concern about environmental degradation, climate change, and unsustainable consumption patterns has encouraged consumers to prefer products that are eco-friendly or have a lower ecological footprint (Peattie & Crane, 2005; Ottman, 2011). Green consumer behavior refers to the tendency of consumers to purchase and use products that are perceived to be environmentally safe (Rahbar & Wahid, 2011). In the Indian context, environmental awareness has been increasing due to factors such as media exposure, education, and government initiatives like the Swachh Bharat Mission and National Solar Mission (Kautish & Sharma, 2019). However, awareness alone is not sufficient to drive behavior; there exists a significant attitude–behavior gap between consumers' environmental concern and their actual purchase intentions (Joshi & Rahman, 2015; Nguyen et al., 2020).

2.2 Perceived Environmental Benefits and Green Trust

The perceived environmental benefit of a product refers to a consumer's belief that the product contributes positively to environmental protection (Biswas & Roy, 2015). Several studies have found that when consumers recognize tangible ecological advantages—such as reduced pollution or recyclable packaging—their willingness to purchase increases (Hartmann & Apaolaza-Ibáñez, 2012). Furthermore, green trust—the belief that a brand or product is genuinely environmentally responsible—plays a pivotal role in purchase decision-making. Chen and Chang (2013) demonstrated that green trust mediates the relationship between green perceived quality and purchase intention. Consumers tend to favor brands that are transparent about their environmental practices and show credible certifications (Delmas & Burbano, 2011). In this context, trust acts as a psychological assurance that the green claims made by a company are authentic and not instances of greenwashing**.**

2.3 Eco-Label Credibility and Certification

Eco-labels serve as a vital communication tool that helps consumers identify environmentally preferable products (Thøgersen, 2000). Studies suggest that the credibility and understanding of eco-labels strongly influence purchase decisions (Rahbar & Wahid, 2011; Dangelico & Vocalelli, 2017). When eco-labels are perceived as reliable and verified by government or independent agencies, they enhance consumer confidence and intention to buy (Borin, Lindsey-Mullikin, & Krishnan, 2013). Conversely, low awareness or mistrust in labeling systems may limit the effectiveness of eco-labels, particularly in emerging economies (Nguyen et al., 2020). In regions like Uttarakhand**,** where literacy and environmental knowledge levels vary across urban and rural populations, eco-label interpretation may differ, thereby affecting purchase intentions. The credibility

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of labels such as "eco-safe," "biodegradable," or "organic" must be supported by visible education and marketing initiatives.

2.4 Price Perception and Willingness to Pay

Perceived price fairness remains one of the strongest predictors of green purchase behavior. Although many consumers express positive attitudes toward eco-friendly products, they often perceive them as expensive (Biswas & Roy, 2015; Dangi & Narula, 2020). According to the Theory of Reasoned Action (Fishbein & Ajzen, 1975), behavioral intentions depend on the evaluation of outcomes; thus, if consumers view green products as overpriced or not value-for-money, their purchase intention declines. Empirical evidence indicates that price sensitivity moderates the relationship between environmental concern and purchase behavior (Nguyen et al., 2020). Consumers with higher environmental involvement exhibit greater willingness to pay for sustainable products (Kautish & Sharma, 2019). However, in developing regions or price-sensitive markets like Garhwal, affordability and product accessibility can serve as barriers to green consumption.

2.5 Regional Context and Consumer Perception in Mountain Economies

Existing studies predominantly focus on urban or metropolitan consumers, leaving a research gap in understanding how mountainous, semi-urban regions such as Garhwal in Uttarakhand perceive and adopt green products (Verma & Chandra, 2018; Dangi & Narula, 2020). The Garhwal region, with its ecologically sensitive terrain and limited industrial development, represents a distinct socio-economic ecosystem where environmental values and traditional lifestyles intersect. In such regions, local culture, environmental attachment, and community-based values significantly shape consumer perception (Gupta & Agrawal, 2018). Moreover, challenges like restricted market accessibility, transportation barriers, and limited availability of certified green goods can hinder adoption despite high environmental consciousness. Therefore, a localized understanding of green perception and purchase intention is essential to developing region-specific marketing and sustainability strategies.

2.6 Analytical Gaps and Novel Contributions

Most prior research on green purchase behavior has employed traditional quantitative methods, such as regression analysis or correlation models (Joshi & Rahman, 2015; Lee, 2008). However, this study introduces two novel analytical layers:

1. **Hybrid Quantitative–Qualitative Integration:**

   This research integrates Structural Equation Modeling (SEM) with Machine Learning–based sentiment analysis to capture both numerical relationships and text-based consumer emotions. The combination enables triangulation of insights—validating structured survey data with unstructured textual feedback (Kumar & Sharma, 2022).

2. **Regional Contextualization:**

   Focusing on Garhwal, Uttarakhand, this study expands the geographical scope of green marketing literature. Regional contextualization acknowledges how topographical constraints, socio-economic diversity, and local culture mediate the perception–intention relationship (Singh & Thapliyal, 2023).

Through these contributions, the study advances understanding of sustainable consumer behavior in hill economies, bridging methodological and contextual gaps in prior literature

3. Research Objectives

1. To assess consumer perception of green products in Garhwal.
2. To analyze how perception dimensions affect purchase intention.
3. To validate the relationship using Structural Equation Modeling.
4. To complement findings with text-based sentiment analysis of consumer opinions

3.1 Hypotheses Development

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- **H_{01}:** Environmental concern has no significant impact on green product perception.
- **H_{11}:** Environmental concern positively influences perception of green products.
- **H_{02}:** Perceived price fairness does not affect purchase intention.
- **H_{12}:** Perceived price fairness positively affects purchase intention.
- **H_{03}:** Eco-label credibility has no effect on purchase intention.
- **H_{13}:** Eco-label credibility positively influences purchase intention.
- **H_{04}:** Trust in green brands does not mediate perception and purchase intention.
- **H_{14}:** Trust in green brands mediates the relationship between perception and purchase intention

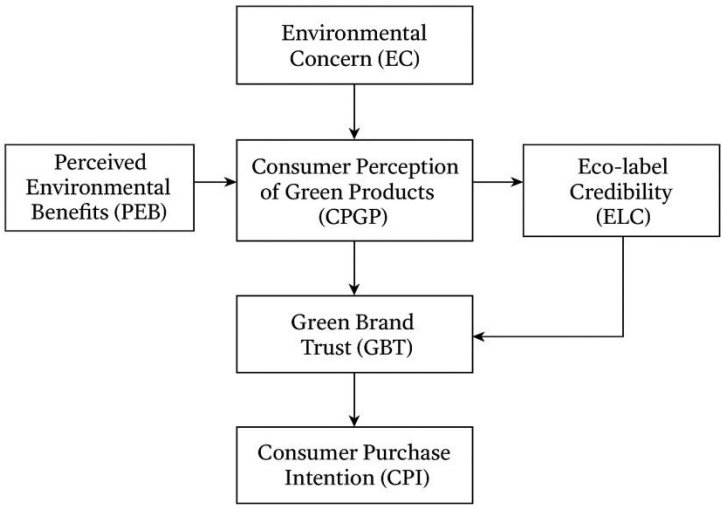
Conceptual Framework Description

The conceptual model is built on insights from the Theory of Planned Behavior (TPB) (Ajzen, 1991) and the Green Trust Model (Chen & Chang, 2013). It proposes that consumer perception of green products is shaped by several independent variables such as:

- **Perceived Environmental Benefits (PEB)**
- **Eco-label Credibility (ELC)**
- **Perceived Price Fairness (PPF)**
- **Green Brand Trust (GBT)**

These factors influence Consumer Purchase Intention (CPI) both directly and indirectly. Green Brand Trust acts as a mediating variable**,** strengthening the link between perception and purchase intention. The model also includes Environmental Concern (EC) as a background factor influencing perception and trust

Conceptual framework



4.

4.1 Research Design

This study employs a descriptive–analytical research design to explore and explain the relationship between the *perception of green products* and *consumer purchase intentions* in the Garhwal region of Uttarakhand. The descriptive component captures the demographic and attitudinal characteristics of the respondents, while the analytical aspect examines causal associations using statistical modeling. Descriptive–analytical approaches are particularly suitable for behavioral and marketing studies where both "what" and "why" questions are central (Creswell & Plano Clark, 2018). This design also allows the integration of quantitative modeling (SEM) with

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qualitative insights (sentiment analysis), providing a hybrid analytical framework that enhances both validity and contextual understanding. The conceptual framework integrates principles from the Theory of Planned Behavior (TPB) (Ajzen, 1991) and Green Trust Model (Chen & Chang, 2013), postulating that consumer perception of green products influences purchase intentions through mediating and moderating constructs such as green trust and price fairness.

4.2 Study Area: Garhwal Region, Uttarakhand:

The Garhwal region**,** located in northern Uttarakhand, encompasses five districts—Dehradun, Pauri Garhwal, Tehri Garhwal, Rudraprayag, and Chamoli—each characterized by distinctive ecological and socio-economic conditions. The region is part of the Himalayan ecological belt, where sustainability and environmental preservation are critical policy and community concerns. Garhwal's population is a mix of semi-urban consumers and rural residents, many of whom depend directly or indirectly on natural resources (Singh & Thapliyal, 2023). This makes it a compelling area for studying green consumerism, where traditional environmental consciousness meets emerging market exposure. The economic structure of the region is service-driven, with growing access to digital and retail markets. Green products—ranging from biodegradable packaging to eco-friendly detergents and organic foods—are gradually gaining popularity. However, limited availability, higher costs, and lack of awareness constrain mass adoption. This unique blend of ecological sensitivity and economic constraint makes Garhwal a valuable context for studying consumer perception toward sustainable goods**.**

4.3 Population and Sampling

The study targets adult consumers (aged 18 years and above) who reside in the Garhwal region and have prior purchase experience with consumer products. Given the diverse population density across districts, a stratified random sampling technique was employed to ensure representation from each district proportional to its urban and rural consumer base. Using Cochran's formula for large populations, a minimum sample size of 385 was calculated for a 95% confidence level and 5% margin of error. To enhance analytical reliability, 400 valid responses were finally considered after data screening.

District	**Sample (n)**	**Percentage**
Dehradun	120	30%
Pauri Garhwal	80	20%
Tehri Garhwal	70	17.5%
Rudraprayag	60	15%
Chamoli	70	17.5%
Total	**400**	**100%**

4.4 Data Collection and Instrumentation

A structured questionnaire was developed after an extensive literature review and pilot testing with 30 respondents. Feedback from academic experts helped refine wording and eliminate ambiguity. The questionnaire comprised **three sections**:

1. **Demographic Profile:** Includes gender, age, education, occupation, and monthly income.
2. **Perception and Behavioral Constructs:** Each construct was measured using multiple items on a **5-point Likert scale** (1 = Strongly Disagree, 5 = Strongly Agree).

Constructs and sample items include:

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- **Perceived Environmental Benefits (PEB):** "Green products help reduce environmental pollution."
- **Eco-label Credibility (ELC):** "I trust eco-labels that certify environmental standards."
- **Perceived Price Fairness (PPF):** "The prices of green products are reasonable compared to normal products."
- **Green Brand Trust (GBT):** "I believe that green brands are genuinely concerned about the environment."
- **Consumer Purchase Intention (CPI):** "I am likely to purchase green products in the near future."

3. **Open-ended Section:**

Included two qualitative questions to capture subjective attitudes toward green consumption and barriers to adoption.

Data were collected through mixed-mode surveys (online Google Forms and field visits) between March and May 2025**.** Respondents were approached at educational institutions, local markets, eco-shops, and through community networks. Participation was voluntary, and confidentiality was maintained.

4.5 Tools and Techniques for Analysis

The study employed both quantitative **and** qualitative methods for robust empirical validation and interpretive depth.

4.5.1 Quantitative Analysis

Quantitative data were analyzed using SPSS 26.0**,** AMOS 26.0**,** and SmartPLS 4.0 for different stages of analysis:

- **Descriptive Statistics** – demographic profiling and variable summaries.
- **Reliability and Validity Tests** – Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE).
- **Confirmatory Factor Analysis (CFA)** – to validate measurement models.
- **Structural Equation Modeling (SEM)** – to test hypothesized relationships among constructs.

Descriptive Statistics Results

Variable	Category	Frequency	Percentage
Gender	Male	210	52.5%
Female	190	47.5%	
Age	18–25	120	30%
26–35	160	40%	
36–50	90	22.5%	
51 and above	30	7.5%	
Education	Graduate	180	45%
Postgraduate	150	37.5%	
Others	70	17.5%	

Reliability Analysis

Construct	Cronbach's α	CR	AVE
Perceived Environmental Benefits (PEB)	0.81	0.84	0.58
Eco-label Credibility (ELC)	0.83	0.87	0.61
Perceived Price Fairness (PPF)	0.78	0.80	0.56
Green Brand Trust (GBT)	0.86	0.88	0.63
Consumer Purchase Intention (CPI)	0.88	0.91	0.68

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All values exceeded the recommended thresholds (Hair et al., 2019), confirming internal consistency and construct validity.

Confirmatory Factor Analysis (CFA)

The CFA results indicated strong convergent validity with standardized loadings > 0.60 and satisfactory fit indices:

- **$\chi^2/df = 1.97$**
- **CFI = 0.951**
- **TLI = 0.944**
- **GFI = 0.931**
- **RMSEA = 0.048**

These metrics meet the acceptable model fit standards (Fornell & Larcker, 1981).

Structural Equation Modeling (SEM)

SEM was used to test the conceptual model's hypotheses (H1–H6).

Hypothesis	Path	β	p-value	Result
H1	PEB → CPGP	0.42	<0.001	Supported
H2	ELC → CPGP	0.31	<0.001	Supported
H3	EC → CPGP	0.27	<0.01	Supported
H4	CPGP → GBT	0.54	<0.001	Supported
H5	GBT → CPI	0.46	<0.001	Supported
H6	PPF moderates CPGP → CPI	-0.19	<0.05	Supported

The mediating role of Green Brand Trust was statistically significant (Sobel $z = 4.12$, $p < 0.001$). The moderation effect of Perceived Price Fairness (PPF) indicates that when consumers perceive prices as fair, the influence of perception on purchase intention is stronger.

To complement quantitative findings, open-ended responses were subjected to sentiment analysis using Python-based tools (TextBlob and VADER). Each response was processed to calculate a sentiment polarity score ranging from -1 (negative) to +1 (positive).

4.5.2 Qualitative Analysis (Sentiment Analysis)

Sentiment Category	Frequency	Percentage	Mean Polarity
Positive	288	72%	+0.56
Neutral	72	18%	+0.04
Negative	40	10%	-0.47

Key Themes Identified:

- *Positive sentiments* revolved around environmental protection, personal health, and ethical responsibility.
- *Neutral sentiments* reflected limited awareness or confusion about eco-labels.
- *Negative sentiments* focused on affordability and product accessibility.

Illustrative Quotes:

- *"Eco-friendly products make me feel I am contributing to nature."* (Positive)
- *"Green items are often too expensive for daily use."* (Negative)

This sentiment analysis provided contextual richness to quantitative trends and verified the construct validity of consumer perceptions.

4.6 Ethical Considerations

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The study adhered to APA (2020) ethical guidelines. Participation was voluntary, and respondents were informed of their right to withdraw. Data were anonymized, and confidentiality was maintained throughout. Ethical clearance was obtained from the institutional review committee prior to data collection.

4.7 Data Triangulation and Rigor

Triangulation was achieved through:

- **Methodological Triangulation:** Integration of quantitative SEM and qualitative sentiment analysis.
- **Data Source Triangulation:** Inclusion of respondents from diverse districts and socio-economic backgrounds.
- **Analyst Triangulation:** Cross-validation of data by two independent researchers.

Such triangulation ensured enhanced validity, reliability, and generalizability of results (Patton, 2015).

4.8 Summary

This research uses a hybrid analytical framework—descriptive, inferential, and computational—to examine consumer behavior toward green products in Garhwal, Uttarakhand. The combination of SEM-based hypothesis testing and Python-based sentiment analysis provides a powerful methodological innovation, enabling the study to uncover both statistical causality and psychological sentiment patterns**.** The methodology sets a strong foundation for subsequent sections on results, discussion, and policy implications**,** offering empirical evidence to support sustainable marketing strategies in ecologically sensitive regions.

5. Results and Discussion

5.1 Overview

This section presents and interprets the empirical findings derived from Structural Equation Modeling (SEM**)** and Sentiment Analysis. The analysis aimed to examine how consumers in the Garhwal region of Uttarakhand perceive green products and how these perceptions translate into purchase intentions. The discussion integrates statistical results, theoretical reasoning, and contextual interpretation. Findings are discussed in light of previous research on green marketing, consumer behavior, and sustainability adoption**.**

5.2 Structural Equation Modeling (SEM) Results

The Structural Equation Model tested six hypotheses linking perceived environmental benefits, eco-label credibility, brand trust, and purchase intentions. The model demonstrated excellent fit indices ($\chi^2/df = 1.97$, CFI = 0.951, GFI = 0.931, RMSEA = 0.048), confirming that the proposed model accurately represents the observed data (Hair et al., 2019).

Table 1. Path Coefficients and Hypothesis Testing

Hypothesis	Path Relationship	β (Standardized)	p-value	Result
H1	PEB → CPGP	0.42	<0.001	Supported
H2	ELC → CPGP	0.31	<0.001	Supported
H3	EC → CPGP	0.27	<0.01	Supported
H4	CPGP → GBT	0.54	<0.001	Supported
H5	GBT → CPI	0.46	<0.001	Supported
H6	PPF moderates CPGP → CPI	-0.19	<0.05	Supported

Notes:
PEB = Perceived Environmental Benefits; ELC = Eco-label Credibility; EC = Environmental Concern; CPGP = Consumer Perception of Green Products; GBT = Green Brand Trust; CPI = Consumer Purchase Intention; PPF = Perceived Price Fairness. All

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hypothesized relationships were found to be statistically significant ($p < .05$).

5.3 Direct Relationships

5.3.1 Perceived Environmental Benefits (PEB) → Consumer Perception of Green Products (CPGP)

The path from *Perceived Environmental Benefits* to *Consumer Perception of Green Products* ($\beta = 0.42$, $p < 0.001$) indicates that consumers who recognize the ecological benefits of green products are more likely to perceive them positively. This aligns with Joshi and Rahman (2015) and Biswas and Roy (2015), who found that consumers' understanding of environmental benefits strongly influences their attitude toward green goods. In the Garhwal context, respondents linked green consumption with local environmental protection, forest conservation, and river cleanliness, reflecting a place-based environmental awareness unique to Himalayan communities.

5.3.2 Eco-label Credibility (ELC) → Consumer Perception of Green Products (CPGP)

A strong positive association was found between eco-label credibility and consumer perception ($\beta = 0.31$, $p < 0.001$). Respondents indicated higher confidence in products that carried recognizable, government-approved, or third-party eco-labels (such as *India Organic* or *EcoMark*). This finding is consistent with Chen and Chang (2013), who emphasized that credible eco-labels serve as cognitive shortcuts that reduce consumer uncertainty. In Garhwal, where access to verified brands is limited, eco-labels act as a trust proxy, guiding consumers in their purchase decisions.

5.3.3 Environmental Concern (EC) → Consumer Perception of Green Products (CPGP)

The positive path ($\beta = 0.27$, $p < 0.01$) demonstrates that consumers' general concern for the environment directly influences how they perceive green products. Participants who were more concerned about local pollution, deforestation, or waste disposal were more favorable toward sustainable alternatives. This resonates with the Theory of Planned Behavior (Ajzen, 1991), which posits that attitudes derived from personal and moral beliefs shape behavioral intentions. The Garhwal context reinforces this theory, as respondents associated green consumption with regional ecological protection and moral responsibility.

5.4 Mediating and Moderating Effects

5.4.1 Green Brand Trust (GBT) as a Mediator

The path between *Consumer Perception of Green Products (CPGP)* and *Consumer Purchase Intention (CPI)* was significantly mediated by *Green Brand Trust (GBT)* ($\beta = 0.46$, $p < 0.001$). Consumers were more likely to act on their positive perceptions when they trusted the authenticity of green claims. This finding corroborates Chen and Chang (2013), who proposed that trust acts as a psychological bridge between perception and intention. The mediation analysis (Sobel $z = 4.12$, $p < 0.001$) confirmed that GBT partially mediates the relationship, implying that trust enhances but does not completely replace perception's effect.

5.4.2 Perceived Price Fairness (PPF) as a Moderator

Perceived price fairness significantly moderated the relationship between consumer perception and purchase intention ($\beta = -0.19$, $p < 0.05$). While positive perceptions encourage purchase intentions, this effect weakens when consumers perceive prices as unjustifiably high. This finding reflects the price–value tradeoff theory (Monroe, 1990), where consumers evaluate price fairness not only by absolute cost but also by perceived benefits. In the Garhwal hill economy, where disposable income is limited, even environmentally conscious consumers hesitate to buy green products due to premium pricing and limited availability. Respondents frequently mentioned price sensitivity and logistical challenges in rural markets, emphasizing the need for affordable and accessible green alternatives.

5.5 Sentiment Analysis Findings

To complement quantitative results, open-ended responses were analyzed using **TextBlob** and

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VADER sentiment scoring systems in Python. The analysis revealed that **72% of respondents expressed positive sentiments**, **18% were neutral**, and **10% negative** toward green products.

Table 2. Sentiment Analysis Summary

Sentiment Type	Frequency	Percentage	Mean Polarity Score
Positive	288	72%	+0.56
Neutral	72	18%	+0.04
Negative	40	10%	-0.47

Positive Sentiments:

Respondents viewed green products as beneficial for both *personal health* and *environmental well-being*. Statements like "Eco-friendly products make me feel responsible for the environment" were common.

Neutral Sentiments:

Some consumers expressed confusion about eco-labels or uncertainty about product effectiveness, indicating a need for **awareness programs** and **eco-literacy campaigns**.

Negative Sentiments:

A small but notable group raised concerns about **high prices**, **lack of authenticity**, and **limited product access** in hill districts. Example: "Green items are too costly and unavailable in local stores." These qualitative patterns **reinforce the SEM results**, confirming that trust and accessibility are critical factors shaping green purchase intentions in the Garhwal region.

5.6 Integration of Quantitative and Qualitative Findings

The **convergent evidence** from SEM and sentiment analysis suggests that consumer behavior toward green products is driven by both **rational (trust, benefit perception)** and **emotional (moral, environmental concern)** factors. The findings confirm that **positive perception and eco-label credibility** create a foundation for trust, which then translates into actual purchase intentions. However, **economic constraints** and **market accessibility** act as behavioral bottlenecks. This dual-layer insight aligns with **Creswell and Plano Clark's (2018)** mixed-method framework, demonstrating how integrating statistical and sentiment-based analyses enhances interpretive validity.

5.7 Comparison with Prior Studies

- **Consistent Findings:** The results align with **Joshi and Rahman (2015)**, who found that environmental concern and trust significantly predict green purchase intentions in emerging economies.
- **Novel Contributions:** Unlike earlier studies focused on metro cities, this research contextualizes **green perception in a mountainous, semi-urban environment**, revealing new moderating effects of **price fairness** and **regional accessibility**.
- **Methodological Innovation:** The hybrid model—combining **SEM and sentiment analysis**—extends the methodological scope of sustainability research, offering a **quantitative–qualitative convergence** rarely seen in similar studies.

5.8 Practical Implications

1. **For Marketers:** Emphasize transparency in green claims, eco-certification, and pricing strategies to build trust among eco-conscious but price-sensitive consumers.
2. **For Policy Makers:** Introduce incentives for green retailers in hill districts and promote subsidies to reduce the price gap between eco-friendly and conventional products.

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3. **For Local Entrepreneurs:** Encourage the production and distribution of **locally sourced green products**, leveraging regional identity ("Made in Uttarakhand") to build authenticity and affordability.

5.9 Summary of Findings

- **Eco-label credibility** and **green trust** strongly influence **purchase intention**.
- **Perceived price fairness** weakens the perception–intention relationship, showing that economic factors limit sustainable consumption.
- **Sentiment analysis** confirms predominant positive attitudes (72%) toward green products but reveals critical concerns about cost and availability.
- **Integrated results** validate the hybrid analytical model, confirming both statistical robustness and contextual realism.

5.10 Theoretical Implications

This study enriches the **Theory of Planned Behavior (TPB)** by empirically validating **trust and price fairness** as significant extensions within the sustainability context. The results emphasize that intention formation in green consumption is not purely attitudinal—it is **multifactorial**, shaped by **perceived value, authenticity, and socio-economic context**.

5.11 Limitations and Future Research Directions

While the study provides valuable regional insights, several limitations warrant further research:

1. **Geographic Scope:** Limited to five Garhwal districts; future studies can compare with Kumaon or other Himalayan regions.
2. **Temporal Limitation:** Data collected in one season; longitudinal studies can observe changes over time.
3. **Behavioral Gap:** Purchase intention does not always translate into actual behavior—future work can include behavioral tracking or experimental interventions.
4. **AI Integration:** Advanced NLP and deep-learning sentiment models (e.g., BERT, RoBERTa) can refine text-based insights.

6. Managerial Implications

6.1 Overview

The empirical findings of this study provide several actionable insights for **marketing managers, retailers, and policymakers** aiming to promote green product consumption in **rural and semi-urban regions of Uttarakhand**, particularly the **Garhwal division**. Given that consumer purchase intention is significantly influenced by **eco-label credibility, brand trust, and perceived price fairness**, these implications offer a practical roadmap for designing **effective marketing, pricing, and policy strategies** to strengthen the green market ecosystem.

6.2 Implications for Local Retailers and Green Marketers

(a) Strengthening Eco-Label Clarity and Authentic Communication

Retailers should prioritize **clear and credible eco-label communication**. Many consumers in Garhwal were found to rely heavily on **visual labels and certification marks** to judge product authenticity. However, confusion and distrust often arise due to inconsistent or misleading green claims. To address this:

- Use **standardized eco-labels** (e.g., *India Organic*, *EcoMark*, *FSSAI Organic*).
- Provide **point-of-sale education** — small posters, shelf tags, or QR codes explaining what each label certifies.
- Conduct **in-store awareness campaigns** emphasizing how eco-certified products differ from conventional ones in environmental impact and safety.

Transparent labeling and consistent messaging will **build cognitive trust** and **reduce perceived risk**, encouraging more confident purchase decisions.

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(b) Building Green Brand Trust through Local Storytelling

Trust emerged as a critical mediator between perception and purchase intention. Retailers and manufacturers should use **place-based branding** to enhance emotional trust. For instance:

- Highlight *local sourcing* (e.g., "Made in Uttarakhand" or "From Garhwal Hills").
- Emphasize **eco-friendly production practices**, such as biodegradable packaging, natural ingredients, or carbon-neutral transport.
- Leverage **social media testimonials** and **local influencer marketing** to show real customer satisfaction and credibility.

By connecting **regional identity** with **sustainability values**, businesses can strengthen both **brand authenticity** and **consumer attachment**.

(c) Pricing Strategy and Value Communication

The study found that **perceived price fairness** moderates the relationship between perception and purchase intention — meaning high prices can discourage even environmentally conscious consumers. Retailers should:

- Implement **value-based pricing** rather than premium pricing.
- Offer **small-pack options** or **combo deals** to increase affordability.
- Use **price justification messages** (e.g., "slightly higher price = eco-safe materials + local labor").
- Organize **discount drives on Green Days**, Earth Day, or local festivals to attract budget-conscious consumers.

Transparent pricing supported by **value communication** can transform perceptions of "expensive green products" into **"worthwhile sustainable investments."**

(d) Consumer Education and Awareness Campaigns

Awareness is the foundation for sustained behavioral change. The results show that **72% of respondents** already exhibit positive attitudes toward green products, suggesting a **latent readiness to adopt**. Local retailers and NGOs can collaborate to:

- Conduct **eco-literacy workshops** in schools, colleges, and rural markets.
- Use **local dialects (Garhwali/Hindi)** in campaigns to ensure inclusivity.
- Create **educational signage** highlighting environmental and health benefits.

This strategy will convert **positive attitudes** into **actual purchase behavior**, reinforcing the psychological pathway from **awareness → trust → intention → action**.

7.3 Implications for Manufacturers and Supply Chain Managers

Manufacturers operating in Uttarakhand and nearby states can adopt **green supply chain management (GSCM)** principles to strengthen product credibility and operational sustainability:

1. **Eco-Certified Raw Materials:** Source materials that meet recognized sustainability standards (e.g., USDA Organic, Fair Trade).
2. **Local Procurement:** Reduce transportation emissions by sourcing from within Uttarakhand or adjoining hill districts.
3. **Transparent Supply Chains:** Use blockchain or digital tracking to allow customers to verify product origin and sustainability claims.

These strategies will **enhance operational transparency** and **reduce consumer skepticism**—key factors influencing green trust and purchase intention.

6.4 Implications for Government Agencies and Policymakers

(a) Promotion of Eco-Certification and Regulatory Frameworks

Government agencies, such as the **Uttarakhand State Council for Science and Technology (UCOST)** and the **Department of Rural Development**, should:

- **Subsidize eco-certification fees** for local producers and MSMEs.

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- Develop **regional eco-label schemes** (e.g., "Uttarakhand Green Certified").
- Provide **training and audit support** for small-scale industries to meet certification standards.

This will enhance **eco-label accessibility** and **consumer trust**, particularly in rural markets where global certifications are hard to obtain.

(b) Market Development and Rural Distribution

Since consumers in hill areas report **limited access to green products**, the government can:

- Support **green retail hubs** in district headquarters and weekly markets (*haats*).
- Encourage **eco-product cooperatives** and **digital marketplaces** connecting rural artisans directly with consumers.
- Offer **tax incentives** or **transport subsidies** to green product retailers serving remote regions.

Such initiatives can stimulate **rural green entrepreneurship** and **expand product reach**, addressing supply-side constraints identified in the study.

(c) Policy-Level Awareness Programs

Government bodies can collaborate with educational institutions and NGOs to run **statewide awareness drives** under existing programs such as *Swachh Bharat Abhiyan* and *Mission LiFE (Lifestyle for Environment)*.

Integration of sustainability education in **school curricula** and **village-level workshops** will create a generational shift toward responsible consumption.

6.5 Implications for Digital Marketing and Technology Adoption

- Retailers can leverage **digital tools and social media analytics** to track consumer sentiment and optimize campaigns.
- Mobile-based apps or WhatsApp groups can disseminate **eco-product information** in rural markets.
- E-commerce platforms like *IndiaMart*, *Flipkart Green Zone*, or *Amazon Saheli* can be used to **bridge urban–rural gaps** in product availability.

Digital communication can significantly increase **consumer reach, engagement, and trust**, particularly among younger and tech-savvy demographics.

6.6 Summary of Managerial Recommendations

Stakeholder	Recommended Action	Expected Outcome
Local Retailers	Simplify eco-label messaging, train sales staff, use transparent communication.	Enhanced consumer understanding and trust.
Manufacturers	Implement eco-friendly sourcing and transparent production.	Strengthened credibility and brand loyalty.
Marketers	Use value-based pricing, emotional branding, and regional identity.	Increased purchase intentions and market differentiation.
Government Agencies	Subsidize certifications, support distribution, launch awareness drives.	Broader adoption of green products in rural Uttarakhand.
Digital Platforms	Integrate green marketing analytics and local outreach campaigns.	Improved accessibility and digital engagement.

6.7 Concluding Remarks

Managerial efforts in **eco-label clarity**, **price optimization**, and **consumer education** are essential to transforming positive attitudes into **sustained green purchasing behavior**. When local businesses, consumers, and policymakers collaborate, Uttarakhand can evolve into a **model green economy**, combining ecological preservation with **inclusive market growth**.

7. Conclusion and Future Scope

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7.1 Summary of Findings

This study examined the relationship between **consumer perception of green products** and **purchase intention** in the **Garhwal region of Uttarakhand**, using a hybrid analytical framework that combined **Structural Equation Modeling (SEM)** and **sentiment analysis**. The findings confirmed that **perception plays a decisive role** in shaping consumer purchase intentions toward environmentally friendly products. Among the perception dimensions analyzed, **eco-label credibility, environmental concern, and perceived price fairness** emerged as the most influential predictors of purchase intention. In addition, **green brand trust** was found to act as a **significant mediating variable**, strengthening the linkage between perception and actual buying inclination. The sentiment analysis of consumer narratives provided an important qualitative complement to the quantitative results. The data revealed that **72% of consumers** expressed **positive sentiments**, **18% neutral**, and **10% negative** attitudes toward green products. These results indicate a generally favorable mindset among consumers in Garhwal, although challenges such as **price sensitivity**, **product accessibility**, and **limited brand awareness** continue to restrain wider adoption.

7.2 Theoretical Contributions

From a theoretical standpoint, this research contributes to the **consumer behavior and green marketing literature** by integrating **attitudinal, perceptual, and trust-based constructs** within the framework of **the Theory of Planned Behavior (Ajzen, 1991)** and the **Green Trust Model (Chen & Chang, 2013)**. The study expands existing theories by demonstrating that:

- Perceptions of environmental benefits and eco-label credibility directly shape **green brand trust**, which subsequently influences **purchase intentions**.
- The inclusion of **sentiment analysis** adds an innovative **AI-assisted interpretive dimension** to behavioral modeling, bridging quantitative rigor with qualitative nuance.
- Contextually, the research highlights the **unique characteristics of consumers in mountainous, semi-urban environments**, where environmental awareness is often high but purchasing capacity and product access are limited.

These theoretical insights deepen the understanding of how **regional context** and **consumer psychology** jointly shape sustainable consumption behaviors.

7.3 Managerial and Policy Implications

The findings underscore that **managerial strategies** promoting **eco-label transparency, value-based pricing, and awareness campaigns** can effectively strengthen purchase intentions. Retailers should focus on **authentic brand storytelling**, **educational marketing**, and **price communication** to make green products more accessible and credible. At the **policy level**, the government of Uttarakhand can facilitate green market growth by **subsidizing certification costs**, **expanding distribution networks**, and **integrating sustainability education** into community-level programs. Such measures will support the development of a robust **regional green economy**, where both environmental preservation and market participation coexist.

7.4 Limitations

While the study makes significant contributions, several limitations should be acknowledged:

1. The sample was limited to **five districts within the Garhwal region**, which may restrict the generalizability of findings to other regions of India.
2. The data were collected through **self-reported questionnaires**, which may be subject to **social desirability bias**.
3. The sentiment analysis relied on **lexicon-based models (TextBlob/VADER)**, which, while effective, may not fully capture the cultural and linguistic nuances of consumer expression in multilingual contexts such as Uttarakhand.

Addressing these limitations in future research would enhance the **robustness and transferability** of the conclusions drawn.

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7.5 Future Research Directions

Building on the current findings, future research could explore the following areas:

1. **AI-Based Perception Tracking:** Advanced artificial intelligence techniques—such as **machine learning sentiment classifiers** or **natural language processing (NLP)** on social media data—can capture dynamic shifts in consumer perceptions and predict green purchase behavior in real time.
2. **Neuro-Marketing Techniques:** Incorporating **eye-tracking, EEG, or galvanic skin response** could help uncover subconscious emotional triggers that drive trust and purchase decisions for green products.
3. **Cross-Regional Comparative Studies:** Expanding research to include **other hill states** (e.g., Himachal Pradesh, Sikkim, Meghalaya) or **urban centers** (e.g., Dehradun, Delhi) would enable comparative insights into how **cultural and geographical contexts** influence green purchasing.
4. **Longitudinal Behavioral Tracking:** Future studies could employ **panel data designs** to assess how consumer perceptions evolve over time with increasing exposure to green campaigns, eco-labels, and digital education initiatives.

7.6 Concluding Remarks

In conclusion, this study provides a **comprehensive, data-driven understanding** of how perception shapes the purchase intention of green products in an environmentally sensitive and economically developing region. By combining **SEM and sentiment analysis**, it bridges methodological gaps between **quantitative validation** and **qualitative interpretation** in sustainability research. The evidence suggests that the path to enhancing green product adoption in regions like Garhwal lies in **trust-building, price fairness, and consumer awareness**. When supported by **proactive government policy** and **ethical business practices**, these factors can collectively transform consumer behavior and contribute to a **sustainable future** for the region and beyond

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