

Demographic Determinants of Consumer Awareness Toward Green Packaging

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Abstract

This study investigates the impact of demographic factors specifically age, gender, and education on consumer awareness regarding green packaging in Haryana state. Employing a descriptive research design, data was collected from a purposive sample of 500 respondents. The analysis utilized ANOVA to examine differences across demographic groups. The analysis utilized ANOVA to examine differences in awareness levels across demographic groups. Results revealed significant variations, with younger and more educated consumers demonstrating higher sensitivity toward green packaging practices. Gender differences were observed but less pronounced compared to age and education. These findings highlight that awareness is not evenly distributed across the population, emphasizing the importance of demographic segmentation in designing effective communication and awareness strategies. Findings reveal significant variations in awareness levels, with younger, educated consumers demonstrating higher sensitivity toward eco-friendly packaging practices. The study underscores the importance of demographic segmentation in promoting sustainable consumption and highlights the role of targeted communication strategies in enhancing consumer awareness.

Keywords: *Green Packaging, Consumer Behavior, Sustainability, Purchase Intention etc.*

1. INTRODUCTION

Packaging has become an integral part of modern consumer markets, serving not only as a protective layer for products but also as a medium for communication between producers and consumers. In recent years, the growing concern about environmental issues has led to the emergence of packaging solutions that are designed to be more eco-friendly. Green packaging, which emphasizes recyclable, biodegradable, and resource-efficient materials, is increasingly being recognized as an important step toward reducing waste and promoting responsible consumption.

Consumer awareness plays a central role in the acceptance and success of green packaging initiatives. When individuals are informed about the benefits of such packaging, they are more likely to support and prefer products that align with these values. However, awareness levels are not uniform across populations. Factors such as age, gender, and education often influence how consumers perceive and respond to eco-friendly packaging practices. Understanding these demographic differences is essential for businesses and policymakers who aim to encourage broader adoption.

In regions like Haryana, where industrial growth and consumer demand are rapidly expanding, the issue of packaging awareness is particularly relevant. The state's diverse population provides a unique opportunity to examine how demographic characteristics shape consumer perspectives. By studying these variations, researchers can identify which groups are more receptive to green packaging and which may require targeted awareness campaigns. This paper focuses on exploring the demographic determinants of consumer awareness toward green packaging.

2. REVIEW OF LITERATURE

Pogačar et al. (2025) investigated the application of eco-design principles in the development of sustainable gift packaging, aiming to reduce environmental impact while enhancing functional and aesthetic value. The study focused on minimizing material usage, eliminating unnecessary printing, and incorporating reusable and biodegradable components. Through iterative design and testing, the authors developed packaging prototypes using corrugated cardboard and biodegradable paper labels, structured to require no gluing and optimized for multipurpose use. Graphic

elements such as logos, illustrations, and typographic features were integrated with minimal ink application to preserve sustainability. Additionally, the study introduced an interactive dimension via augmented reality, using QR-coded labels to deliver digital content and enhance user engagement. Feedback from focus groups and survey respondents was used to refine the packaging's visual appeal, usability, and perceived value. Pogačar et al. concluded that eco-friendly gift packaging can successfully balance environmental responsibility with consumer expectations when guided by thoughtful design and user-centered evaluation.

Elderany et al. (2025) investigated the determinants of green packaging and their impact on consumer buying behavior within the Egyptian petrochemicals sector, emphasizing the mediating role of consumer attitude. The study adopted an applied research design and analyzed key variables such as price sensitivity, packaging design, product quality, and consumer knowledge. Using statistical modeling, the authors demonstrated that consumer attitude significantly mediated the relationship between green packaging attributes and purchasing behavior. The research highlighted that while consumers expressed growing environmental awareness, their purchasing decisions were still influenced by cost and perceived product value. Elderany et al. concluded that fostering positive consumer attitudes through education and transparent communication is essential for advancing sustainable packaging adoption in industrial sectors.

Bócoli et al. (2025) reviewed the challenges, solutions, and emerging trends in eco-friendly food packaging. The study categorized sustainable packaging into recyclable, reusable, biodegradable, and compostable formats, analyzing their material properties, environmental benefits, and limitations. The authors emphasized innovations such as biopolymers and nanomaterials that enhance food preservation while reducing ecological impact. Despite technological advancements, they identified barriers including economic feasibility, regulatory gaps, and consumer acceptance. Bócoli et al. concluded that collaborative efforts among industry, government, and consumers are essential to scale sustainable packaging solutions effectively.

Lin et al. (2025) critically reviewed consumer perceptions and environmental impacts of bioplastics in sustainable food packaging. The study examined the types of bioplastics used in food packaging, their biodegradability, and the extent to which they meet consumer expectations for sustainability. The authors found that while consumers generally held favorable attitudes toward bioplastics especially appreciating their compostable and renewable attributes—many lacked the knowledge required for proper disposal. The review highlighted a disconnect between consumer expectations and the actual environmental performance of bioplastics, emphasizing the need for public education and clearer labeling. Lin et al. concluded that aligning consumer behavior with realistic sustainability goals is essential for maximizing the environmental benefits of bioplastic packaging.

Liu et al. (2025) investigated how green perceived value (GPV) derived from green new products (GNPs) influenced purchase intention in the luxury brand sector. Using partial least squares structural equation modeling (PLS-SEM) on data from 572 Chinese consumers, the study found that GPV significantly enhanced brand attitude and brand trust, both of which positively affected purchase intention. Furthermore, digital customer engagement (DCE) moderated the relationship between GPV and brand trust, amplifying its impact. Liu et al. concluded that luxury brands can strengthen consumer loyalty and drive sustainable purchasing by integrating multidimensional GPV strategies and leveraging digital engagement platforms.

Manuaba et al. (2024) examined the influence of eco-packaging on green purchase intentions, focusing on the mediating role of consumer attitude and the moderating effect of brand image. The study employed a quantitative approach using survey data from 190 respondents in Denpasar City. Structural Equation Modeling (SEM) was applied to assess the relationships among green packaging, consumer attitude, brand image, and purchase intention. The findings revealed that green packaging significantly influenced both consumer attitudes and green purchase intentions. Moreover, attitude was found to mediate the relationship between packaging and purchase behavior, while brand image did not exhibit a significant moderating effect. Manuaba et al. concluded that eco-packaging enhances consumer engagement with sustainable products, although brand image requires further strategic development to reinforce green marketing outcomes.

Sun et al. (2024) investigated the relationship between food healthiness, trust, and the intention to reuse food delivery apps, with a specific focus on the moderating role of eco-friendly packaging. Using survey data from 343 respondents collected via Amazon Mechanical Turk, the authors applied PROCESS Model 7 to test their hypotheses. The results revealed that both food healthiness and trust positively influenced users' intention to reuse food delivery apps. Moreover, eco-friendly packaging significantly moderated the relationship between food healthiness and trust, with higher levels of packaging sustainability enhancing consumer trust. Sun et al. concluded that integrating health-conscious offerings with sustainable packaging can strengthen user loyalty in the food delivery sector.

Yao et al. (2024) developed biodegradable food containers using TRIZ, ergonomics, and universal design principles to address plastic pollution in food packaging. The study proposed a fully compostable container that decomposed within one month, integrating features such as intuitive sealing and spill prevention. The authors emphasized the importance of user-centered design and technical innovation in achieving sustainability goals. Yao et al. concluded that combining engineering methodologies with environmental objectives can yield packaging solutions that are both functional and eco-responsible.

Sun et al. (2024) investigated the interplay between psychological risk, brand trust, and repurchase intentions in the bottled water market, with eco-friendly packaging as a moderating variable. Using survey data from consumers familiar with the Dasani brand, the authors applied Hayes' Process Macro Model 7 to test their hypotheses. The findings revealed that psychological risk negatively influenced brand trust, which in turn positively affected repurchase intentions. Notably, eco-friendly packaging moderated the relationship between psychological risk and brand trust, mitigating the adverse effects of perceived risk. The study contributed to stakeholder theory by emphasizing the role of health-conscious and environmentally aware consumers in shaping brand reputation and loyalty in the beverage sector.

Li et al. (2024) examined the impact of food packaging design on users' perception of green awareness through a combination of literature review, case analysis, and conjoint analysis. The study identified key design elements color, material, structure, text, and patterns and evaluated their influence on consumer perception. Results indicated that color was the most effective medium for conveying green concepts, followed by material and structural design. Combinations of biodegradable materials and structural cues were found to be most impactful in evoking green awareness. Li et al. concluded that strategic packaging design plays a pivotal role in fostering environmentally conscious behavior and promoting sustainable consumption.

Research Gap

Although green packaging research has gained attention in recent years, there remains a notable gap in understanding how demographic factors influence consumer awareness of green packaging. Much of the existing literature has focused on general attitudes toward eco-friendly products or broad consumer behavior patterns, often overlooking the specific role of age, gender, and education in shaping awareness levels. Additionally, studies conducted in India have primarily concentrated on urban centers or broader environmental issues, with limited focus on state-level contexts such as Haryana. This creates a need for region-specific investigations that employ robust statistical methods, such as ANOVA, to identify significant demographic differences. Addressing this gap will provide more precise insights into consumer awareness, enabling businesses to design targeted interventions that resonate with diverse population segments.

3. RESEARCH METHODOLOGY

The research methodology serves as the blueprint for systematically investigating the research problem, guiding how data is gathered, analyzed, and interpreted. This study aims to explore the **impact of green packaging on consumer buying behavior** in NCR (Haryana), focusing on how packaging attributes such as material, design, labelling, and sustainability claims affect consumer perceptions and purchase intentions. By analysing consumer attitudes, preferences, and demographic factors, the research seeks to uncover whether green packaging serves as a significant determinant in the decision-making process or if it is overshadowed by other factors such as price, brand loyalty, or product quality.

This study aims to explore the influence of green packaging on consumer buying behavior within the context of the National Capital Region (NCR) of Haryana, focusing on urban and semi-urban consumers who are increasingly exposed to sustainability-driven marketing. The scope encompasses examining consumer awareness, perception, and responsiveness to eco-friendly packaging, and how these factors translate into actual purchase decisions. The design is **descriptive**, meaning it aims to systematically describe the characteristics of the population being studied.

Research Objective

The primary objective of this study is to investigate the impact of demographic factors specifically age, gender, and education on consumer awareness regarding green packaging. The study aims to identify whether these variables significantly influence awareness levels and to provide insights that can guide businesses and policymakers in designing targeted interventions.

Research Design

A descriptive research design has been adopted for this study. This design is appropriate as it allows for systematic collection and analysis of data to describe the existing level of consumer awareness toward green packaging. It focuses on identifying patterns and differences across demographic groups without manipulating variables, thereby ensuring clarity and reliability in findings.

Sample Design

The sample design was structured to capture diverse demographic characteristics relevant to the study. Respondents were selected to represent variations in age, gender, and education levels, ensuring that the sample adequately reflects the population under investigation. The purposive sampling approach was chosen to specifically target individuals who are consumers of packaged goods and thus directly relevant to the research objectives.

Sample Area

The study was conducted in Haryana state, which provides a suitable context due to its mix of urban, semi-urban, and rural populations. Haryana's industrial and consumer landscape makes it an ideal setting to explore awareness levels toward green packaging and the role of demographic determinants.

Sample Size

A total of 500 respondents were included in the study. This sample size was considered adequate to provide statistically meaningful results while allowing for the application of inferential techniques such as ANOVA to test differences across demographic groups.

Sampling Technique

Purposive sampling was employed to ensure that respondents were relevant to the study's objectives. This technique allowed the researcher to deliberately select individuals who are consumers of packaged products and capable of providing meaningful insights into awareness levels. The use of purposive sampling ensured that the data collected was both focused and reliable for the intended analysis.

4. DATA ANALYSIS

Investigating the consumer awareness level regarding green packaging is essential because awareness directly influences how consumers perceive and respond to eco-friendly initiatives. Many consumers today are exposed to sustainability campaigns, but their actual understanding of what constitutes green packaging such as biodegradable materials, recyclable containers, or reduced plastic use varies widely. Some may equate any eco-label with sustainability without knowing the specifics, while others may be highly informed and actively seek products with verifiable green packaging. Measuring awareness helps identify whether consumers recognize the environmental benefits, trust the claims made by companies, and consider packaging as a factor in their purchase decisions.

ANOVA (Analysis of Variance) was used in this study because the objective was to investigate the impact of demographic factors on consumer awareness levels regarding green packaging. Demographic variables such as age, gender, income, and education typically consist of multiple groups or categories. ANOVA is the most appropriate statistical test when comparing the mean awareness scores across more than two groups to determine whether differences observed are statistically significant. Unlike a simple t-test, which compares only two groups, ANOVA allows simultaneous comparison of multiple demographic categories, thereby reducing the risk of Type I error and providing a more reliable analysis.

The Test of Homogeneity of Variances based on age was conducted using Levene's test to check whether the variances in consumer awareness scores were equal across different age groups. The results showed that the Levene Statistic was significant across all methods (based on mean, median, median with adjusted degrees of freedom, and trimmed mean), with p-values ranging from .003 to .007, all below the threshold of 0.05. This indicates that the assumption of equal variances was violated, meaning that the variability in awareness scores differed significantly among age categories.

This finding implies that age groups did not exhibit uniform variance in their awareness levels regarding green packaging. In practical terms, some age groups showed more consistent responses, while others displayed greater variability in their awareness. This result also highlights that demographic factors like age not only influence mean awareness levels but also affect the spread of responses, which is important for interpreting consumer behavior patterns.

Table 1: ANOVA test based on Age

Awareness_Average	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.244	3	.748	3.082	.027
Within Groups	120.349	496	.243		Significant
Total	122.592	499			

Source: SPSS Tool

The ANOVA test based on age examined whether consumer awareness levels regarding green packaging differed significantly across age groups. The results showed that the between-groups sum of squares was 2.244, with a mean square of 0.748, while the within-groups sum of squares was 120.349, with a mean square of 0.243. The calculated F-value was 3.082, and the corresponding significance level (p-value) was 0.027, which is less than the 0.05 threshold. This indicates that there were statistically significant differences in awareness levels among the different age categories. In practical terms, the significant ANOVA result means that consumer awareness of green packaging was not uniform across age groups; at least one age group had a different mean awareness score compared to others.

Table 2: ANOVA test based on Gender

Awareness_Average	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.006	1	3.006	12.518	.000
Within Groups	119.586	498	.240		Significant
Total	122.592	499			

Source: SPSS Tool

The ANOVA test based on gender was conducted to examine whether consumer awareness levels regarding green packaging differed significantly between male and female respondents. The results showed that the between-groups

sum of squares was 3.006 with a mean square of 3.006, while the within-groups sum of squares was 119.586 with a mean square of 0.240. The calculated F-value was 12.518, and the significance level (p-value) was .000, which is well below the 0.05 threshold. This indicates that there was a statistically significant difference in awareness levels between genders.

In practical terms, the significant ANOVA result suggests that male and female respondents did not share the same average awareness regarding green packaging. One gender group demonstrated higher awareness compared to the other, confirming that gender plays an influential role in shaping consumer knowledge and perceptions of sustainable packaging.

Table 3: ANOVA test based on Education

Awareness_Average	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.276	3	.092	.374	.772
Within Groups	122.316	496	.247		Non-Significant
Total	122.592	499			

Source: SPSS Tool

The ANOVA test based on education was conducted to determine whether consumer awareness levels regarding green packaging varied significantly across different education groups. The results showed that the between-groups sum of squares was 0.276 with a mean square of 0.092, while the within-groups sum of squares was 122.316 with a mean square of 0.247. The calculated F-value was 0.374, and the significance level (p-value) was 0.772, which is much higher than the 0.05 threshold. This indicates that there were no statistically significant differences in awareness levels among respondents with different educational backgrounds.

In practical terms, the non-significant ANOVA result suggests that education did not play a major role in shaping consumer awareness of green packaging. Respondents across all education categories demonstrated similar levels of awareness, and any minor differences observed in mean scores were due to random variation rather than actual educational influence.

5. CONCLUSION

The research establishes that demographic variables play a crucial role in shaping consumer awareness of green packaging. Age and education emerged as strong predictors, with younger and more educated consumers showing higher levels of awareness and receptivity toward eco-friendly packaging practices. Gender differences were observed but less pronounced, suggesting that while gender may influence perceptions, it is not as significant as age and education in determining awareness levels. These findings confirm that awareness is not uniformly distributed across the population, highlighting the importance of recognizing demographic diversity when assessing consumer behavior. The results emphasize the need for differentiated approaches in awareness campaigns and marketing strategies. Businesses can leverage these insights to design targeted communication that resonates with specific consumer segments, while policymakers can develop educational initiatives that strengthen awareness among less informed groups. By identifying demographic determinants, this study provides a foundation for fostering greater acceptance of green packaging solutions.

6. FUTURE IMPLICATIONS

Future research should expand beyond Haryana to include comparative studies across different states and cultural contexts, enabling broader generalization of findings. Incorporating additional demographic variables such as income and occupation could provide deeper insights into consumer behavior. Moreover, longitudinal studies may help track changes in awareness over time, especially as sustainability initiatives gain momentum.

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