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The Mediating Role of Label Trust in Shaping Green Purchase Attitudes Among Young Consumers: Sustainable Chemical Transparency in FMCG Packaging

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Abstract

This study looks at the function of Perceived Chemical Transparency (PCT) in influencing consumers' Green Purchase Attitude (GPA) in the Fast-Moving Consumer Goods (FMCG) sector, with Label Trust (LT) serving as a significant mediating factor and Environmental Concern (EC) acting as a direct predictor. Based on the Theory of Planned Behavior and Signaling Theory, the study hypothesizes that clear disclosure of chemical and polymer-related information increases trust in eco-labels and encourages ecologically responsible consumption. A structured online survey was used to collect data from 420 young Indian customers, which were then evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM) using Smart PLS 4.0. Results show that PCT substantially predicts LT ($\beta = 0.611$, $p < 0.001$), whereas both EC ($\beta = 0.469$, $p < 0.001$) and LT ($\beta = 0.387$, $p < 0.001$) have a high impact on GPA. Mediation study demonstrates that LT strongly mediates the relationship between PCT and GPA (VAF = 72%), implying that transparency promotes good attitudes mostly via trust. The model explains 62.3% of the variation in green buying attitudes, emphasizing the significance of credible chemical disclosure and trustworthy labeling in influencing sustainable consumer behavior. The findings provide theoretical and managerial perspectives into increasing chemical transparency, eco-labeling credibility, and consumer confidence regarding environmentally conscious FMCG branding.

Keywords: Environmental concern, FMCG packaging, green purchase attitude, label trust, perceived chemical transparency, PLS-SEM, polymer substance

INTRODUCTION

Sustainable consumption is becoming a key component of global growth schemes, affecting how consumers, corporations, and politicians conduct production and consumption systems [1, 2]. According to this theoretical framework, the Fast-Moving Consumer Goods (FMCG) industry draws special attention because of its widespread consumption of natural resources, high packaging volume, and limited lifespans of items, all of which substantially contribute to climate destruction and waste generation. As a result, both researchers and practitioners are focusing on strategies that encourage green consumer behavior, including product communication tactics that increase honesty, confidence, and healthy attitudes towards the environment.

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Young consumers are being recognized as a key group pushing sustainable transformation. They are paying closer attention to chemical and substance details, demanding not just ecological claims but also precise information about the chemical protection, recyclability, and decomposition of FMCG packing [3, 4]. These selections are based on larger sustainability ideals and perceptions of danger related to synthetic chemicals, compounds, and microplastics that have increased global concerns about the environmental impact of daily consumer items [5]. As a result, chemical transparency labels that genuinely disclose product contents, material composition, and recycling potential have emerged as an important tool for establishing trust and positive green attitudes among environmentally concerned customers [6, 7].

Polymer-based substances, including polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET), are popular in the FMCG packaging business because of their low cost, adaptability, and practical qualities. The chemical depolymerization of polyethylene terephthalate (PET) has emerged as a key component of polymer circularity, allowing for material recuperation while decreasing environmental effects from FMCG packaging scrap [8]. Polymer packaging represented about 62% of the whole market in 2022–23, highlighting its economic and operational importance. Polymeric plastics account for roughly 47% of FMCG packaging materials worldwide, indicating their extensive use across various categories of products [9]. However, this high dependence on polymers creates sustainability issues, such as chemical additives, recycling capacity, and post-use waste handling.

As per [10], the packaging segment solely contributes to 40–48% of global circular polymer demand, demonstrating the industry's importance in furthering the economy of circularity. Considering these worries, sustainable polymer maintenance and chemical openness regarding labeling are currently not just industrial or governmental issues; they have evolved into strategic communication instruments that influence customer perceptions and purchase decisions. FMCG companies can increase label trust and strengthen green purchasing attitudes by offering reputable knowledge regarding polymer types, recycling codes, and ingredient safety, particularly among younger demographics who connect transparency with moral accountability [11, 12]. According to examinations, when individuals regard chemical or materials data as legitimate and reliable, they have higher pro-environmental judgments and are more ready for involvement in sustainable procurement [13].

Furthermore, recent advances in bio-based intelligent substances emphasize the dual advantages of sustainability and functionality, providing packaging options that convey safety and ecological consciousness to customers [14]. Sustainable and biodegradable polymers are progressively being developed for closed-loop applications, reflecting the growing industrial trend towards circularity in FMCG packaging [15]. Sustainable packaging has emerged as an especially significant component of chemical disclosure in the food and consumer goods industry, as firms progressively address customer concerns about dangerous compounds, microplastics, and environmental contamination. Leading corporations, including Unilever, Nestlé, ITC Limited, Procter & Gamble, and Tetra Pak, have used innovative packaging solutions to limit the use of dangerous chemical additives and the reliance on virgin plastics.

Unilever's paper-based containers and concentrate refilling packets greatly reduce the consumption of synthetic polymers and plasticizers, whilst Nestlé's recycled paper and hybrid fiber-based packs seek to avoid multilayer plastic coatings which are tricky to recycle. ITC Limited's food-grade cardboard packing substitutes hazardous plastic coatings (VOCs) using more secure, biodegradable substitutes. Similarly, Procter & Gamble's transition to recyclable and biodegradable materials decreases exposure to possibly dangerous monomers and plastic remnants, while Tetra Pak's paper-based aseptic containers limit the usage of petroleum-based polymers. These projects show how decreasing chemical intensity and improving material honesty in packaging not simply promotes environmental sustainability but also additionally increases label trust across young consumers.

When businesses publicly express their determination to eradicate hazardous chemicals and decrease plastic waste, they gain credibility and develop favorable green purchasing attitudes, meeting consumer requirements for health-conscious and ecologically conscious products. Nevertheless, regardless of the growing popularity of eco-labels and ecological representations, many FMCG brands maintain that they undervalue their products' chemical composition and polymer recycling capabilities, alternatively focusing on generic "green" statements [16, 17]. This knowledge gap can erode confidence and inhibit the establishment of positive green attitudes, especially among informed customers seeking chemical transparency and scientifically supported sustainability advertising. To close this gap, the current study investigates the psychological process by which perceived chemical transparency promotes green buying attitude, including label trust functioning as the mediator factor.

Furthermore, environmental concern is included as an external component to explain the widespread ecological awareness that frequently supports pro-environmental sentiments [18]. In conclusion, this study analyzes whether chemical disclosure in FMCG labeling, specifically regarding polymer recyclability and chemical composition, might significantly improve young customers' green buying attitude via the mediating function of label trust. The study intends to add to the emerging discourse on sustainable consumer behavior and open discussion in green marketing by combining ideas spanning sustainability science, behavioral economics, and packing chemistry.

LITERATURE REVIEW

Perceived Chemical Transparency (PCT) in Packaging in Polymer Technology

Perceived chemical integrity is the degree to which customers perceive a firm delivers clear, credible, and intelligible information regarding the chemical composition, substances, and environmental effect of its goods and packaging [19]. Biochemical transparency has emerged as an important aspect of environmental education in the FMCG and packaging industries, including information on polymers, recyclability, and significant ecological dangers [5]. Developments in enzymatic depolymerization technology have increased the efficiency of PET recycling, confirming chemical transparency statements by proving polymer life-cycle mechanisms. Transparent chemical exchange improves perceived brand transparency and business responsibility, respectively, which are required to build customer trust and favorable green ratings [7, 4].

According to research, when enterprises honestly disclose material composition and environmental implications, customers perceive lesser risk and have greater opinions regarding sustainable choices [11]. In contrast, unclear or inaccurate chemical claims might raise green concerns and diminish purchasing intent [17]. Enzyme-catalyzed hydrolysis of high-crystallinity polymers is a viable green packaging breakthrough because it provides traceable chemical knowledge that meets consumer accessibility expectations [20]. As a result, perceived chemical accessibility is an important informational signal that influences pro-environmental consumer behavior, particularly in industries with high chemical usage, such as FMCG packaging as well as personal care.

Label Trust (LT) and Polymer

Label trust is customers' confidence in the correctness, integrity, and dependability of product labels, especially those including environmental or chemical information [21]. Throughout the setting of green marketing, label trust serves as a psychological bridge across sustainability facts and consumer attitudes or intents. Trust within sustainability labels minimizes perceived unpredictability, increases message credibility, and promotes positive sentiments towards environmentally responsible products [17]. Biopolymer composites generated from renewable sources have higher biodegradability and ecological protection, highlighting the importance of green polymers towards eco-labeling storylines [22].

According to recent research, comprehensive knowledge on polymer composition, recyclable regulations, and chemical safety increases label confidence by demonstrating business openness and ethical responsibility [23, 19]. Eco-conscious polymer solutions increasingly incorporate material science and life-cycle thinking, furthering the concept of chemical sustainability in package design [24]. Empirical research regarding sustainable goods marketplaces shows that customers with higher label

trust are more likely to choose environmentally friendly goods [18]. Subsequently, label trust is critical in addressing the gap between knowledge revelation (for example, chemical transparency) and the building of favorable green purchasing attitudes.

Environmental Concern (EC) for Natural Material and Composite Material

Environmental concern measures an individual's awareness, emotional participation, and desire to take action to address environmental issues [25]. It is an important concept for describing pro-environmental attitudes and behaviors, notably in the theory of planned behavior and value-belief-norm models [13]. According to research, people who are deeply concerned about the environment understand sustainability data more favorably and place greater confidence in eco-labels. Among younger customers, environmental concern frequently modifies the association across data indicators (such as chemical transparency) and attitudinal outcomes (such as trust and buying attitude) [26]. Yet, few studies have looked at this link in the setting of chemical or polymer transparency in FMCG labeling. Recognizing this relationship can contribute to existing theories about how cognitive attention combines with transparency-based systems of trust to create environmentally friendly buying habits.

Green Purchase Attitude (GPA)

Green purchase attitude refers to a consumer's favorable appraisal or tendency towards purchasing items that reduce environmental harm or enhance the ecological equilibrium [27]. Polylactic acid (PLA) is establishing itself as an important biodegradable polymer for ecologic packaging, integrating a renewable raw material with beneficial recyclable capability [28]. PLA is one of the most extensively researched biodegradable polymers due to its suitability with food as well as personal care packaging, which supports business targets for sustainability and customer confidence [29]. It is influenced by a mix of environmental ideals, product expertise, and belief in sustainability promises [27, 13]. Positive attitudes towards green purchases frequently precede desire and actual buying behavior, acting as an important precursor in sustainable marketing analysis [14].

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RESEARCH GAP AND HYPOTHESES DEVELOPMENT

Research Gap

Whereas environmental labeling and environmentally friendly packaging are receiving considerable research interest [17], the chemical structure dimension, which includes polymer type reliability, additive safety, and recycling potential, has been neglected in environmentally friendly consumption argumentation. Most research has examined eco-labels via a symbolic or graphic focus compared to a substantive chemical exposure lens [4]. However, consumers are increasingly demanding accurate information on the minerals and chemicals used in their regular FMCG items [5]. Current research is mostly concerned with how eco-labels affect purchase intentions, with little emphasis paid to the cognitive-affective mechanisms by which chemical disclosure changes green buying attitudes [6].

Label trust, or conviction in the reliability and integrity of sustainability promises, has been highlighted as an important psychological factor in bridging transparency and favorable consumer perceptions [7]. However, empirical research on this mediating mechanism in this setting of chemical or polymer transparency is limited. Furthermore, the Indian FMCG industry, among the world's fastest-growing businesses, has specific sustainability issues because of its dependency upon polymer-based packaging. Considering this, few empirical studies have focused on young Indian customers, who are simultaneously environmentally conscious and extremely vulnerable to commercial intelligence [1].

The impression of chemical transparency among this group, as well as the psychological consequences for green views, has received little attention. Overcoming this gap is critical for understanding how technological transparency indicators might lead to behavioral change through trust creation. Since consequently, the present investigation proposes a model that links Perceived Chemical Transparency (PCT), Label Trust (LT), Environmental Concern (EC), and Green Purchase Attitude (GPA), with label trust serving as an entire mediator through the association across chemical authenticity and green purchase attitude within young FMCG consumers.

Hypotheses Development

Perceived Chemical Transparency in packaging and Label Trust

Transparent information about product chemistry improves perceived honesty and dependability, increasing trust in product labeling [6, 11]. Whenever companies reveal polymer structure, chemical safety, and recyclability, companies minimize customer confusion and increase trust in environmental statements [23].

H1: There is a significant association between Perceived chemical transparency and label trust.

Environmental Concern and Green Purchase Attitude: Composite Substance

Environmental concern indicates people's sensitivity and emotional participation in ecological challenges [25]. Consumers exhibiting greater degrees of worry are inclined to choose items that are sustainable and consider sustainability indicators, which means chemical protection and recycling potential [4, 26].

H2: There is a significant association between Environmental concern and green purchase attitude.

Label Trust and Green Purchase Attitude

Trust is a significant psychological motivator in turning informative signals into favorable sentiments [7]. Label trust reduces skepticism and strengthens consumers' conviction in the veracity of sustainability promises [17]. As a result, when customers believe environmental labels are authentic and dependable, consumers are more inclined to have a favorable green purchasing attitude.

H3: There is a significant association between Label trust and green purchase attitude.

Mediating Role of Label Trust

Although perceived chemical transparency provides the factual framework for long-term assessments, the label trust also serves as an affective-cognitive bridge that converts transparency towards positive attitude construction [29]. The literature honesty is adequate unless it is mediated by trust mechanisms [4]. Thus, this study argues that label trust completely mediates the association between perceived chemical integrity and green purchasing behavior.

H4: Label trust has a significant mediating association between perceived chemical transparency and green purchase attitude.

CONCEPTUAL FRAMEWORK AND CONSTRUCT MEASUREMENT: SUSTAINABLE POLYMER

Conceptual Framework

Based on previous research, this investigation provides a conceptual model that incorporates perceived chemical transparency (PCT), label trust (LT), environmental concern (EC), and green purchasing attitude (GPA) into the setting of environmentally friendly consumption across the FMCG industry. The model posits that whenever brands explicitly declare chemical and polymer related facts, such as chemical safety, material recycling capability, and polymer origin, consumers experience increased honesty and genuineness [5, 6]. This view increases trust in product labeling because openness eliminates ambiguity and communicates business integrity [7]. As a result, label trust promotes positive green buying attitudes, reflecting consumers evaluative propensity towards ecologically ethical purchases [26].

Table 1. Construct measurement and scale sources.

Construct	Definition	Sample codes	Sources (adapted from)
Perceived Chemical Transparency (PCT)	The degree to which customers contend that a brand gives honest, transparent, and comprehensive details upon chemical compounds, polymers, and recyclable properties of packaging.	PCT1 PCT2 PCT3 PCT4	Kim & Oh (2021); Wang, Li, & Zhao (2023)
Label Trust (LT)	Consumers' trust revolves around the reliability, authenticity, and dependability of information offered on ecological labels and packaging.	LT1 LT2 LT3 LT4	Marin, Ruiz, & Rubio (2020); Sharma & Saha (2021); Taufique & Vaithianathan (2018)
Environmental Concern (EC)	The degree to which people are conscious of environmental issues and endorse approaches for conserving the environment.	EC1 EC2 EC3 EC4	Dunlap & Jones (2002); Maichum, Parichatnon, & Peng (2017); Mostafa (2007)
Green Purchase Attitude (GPA)	A consumer's favourable attitude and emotional tendency towards purchasing environmentally friendly or less damaging items.	GPA1 GPA2 GPA3 GPA4	Biswas & Roy (2015); Joshi & Rahman (2017); Joshi & Rahman (2017)

Further, environmental concern is included as a control variable impacting green buying attitude, since ecologically conscious people are more sensitive to environmentally friendly cues [25]. This structure proposes a comprehensive mediation path in this model, which states that label trust communicates the favorable impact of anticipated chemical integrity on green buying attitude.

Conceptual Description:

Perceived Chemical Transparency (PCT) → Label Trust (LT) → Green Purchase Attitude (GPA)
Environmental Concern (EC) → Green Purchase Attitude (GPA)

Construct Measurement and Scale Development: Polymer and Composites

The full construct items were analyzed by means of multi-item scales modified from recognized literature and adapted to fit the FMCG chemical authenticity framework. A 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) was adopted. Constructs and sample items are thoroughly presented in Table 1.

Theoretical Foundation

This research combines ideas from the Theory of Planned Behavior [30] and Signaling Theory [31]. TPB describes how attitudes form based on ideas about outcomes, whereas signaling theory emphasizes how companies transmit credibility through open communication. Perceived chemical transparency serves as an indicator for ecological responsibility while boosting label trust, the cognitive-affective bridge that eventually impacts green purchasing habits. This study expands earlier eco-labeling structures [17] towards the chemical and polymer accessibility space, a critical but unexplored domain in environmentally friendly usage research, through emphasizing data disclosure (transparency) with attitudinal opinions (trust and green attitude).

RESEARCH METHODOLOGY

Research Design

The present research uses a quantitative, cross-sectional methodology to examine the intermediary impact of Label Trust (LT) within the association across Perceived Chemical Transparency (PCT) and Green Purchase Attitude (GPA), although adjusting for Environmental Concern (EC). The approach to research is based on the Theory of Planned Behavior [30] and Signaling Theory [31], which suggest that explicit chemical labeling on FMCG packaging serves as a validity signal, impacting customer trust

and pro-environmental views. Regarding the level of complexity of the model and latent constructs, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used with SmartPLS 4.0. PLS-SEM is suitable for predictive purposes, unconventional data, and evaluation of mediation [32].

Sampling and Data Collection

The target demographic consisted of young Indian customers (aged 18–35) who frequently purchased FMCG items, such as personal care, cleaning chemicals, and packaged meals. Young consumers have been selected considering they tend to be more conscious of sustainability and make label-based decisions [4, 27]. Between December 2024 and May 2025, data was gathered via a structured web-based survey distributed via various social networks. A selective sample strategy guaranteed that only those respondents with previous knowledge of analyzing product components or ecological labels had been considered. Upon filtering the data for consistency and incomplete entries, 420 valid replies were preserved from the 457 initial reactions. This sample size goes beyond the minimal required for PLS-SEM, guaranteeing enough statistical accuracy and model resilience [32].

Measurement Instrument

Entire construct was thoroughly analyzed via a recognized multi-item measure adopted from previous research and tailored according to the FMCG packaging and chemical transparency sectors (refer to Table 1).

Each concept was assessed using a 5-point Likert scale, with 1 indicating severe disagreement and 5 indicating strong agreement. Several academic specialists of ecological sustainability and consumer behavior were referred for their review and feedback, and they assessed the items to confirm their content authenticity. A pilot test of 40 respondents validated item clarity and internal consistency, exhibiting Cronbach's α values exceeding 0.7 across the entire constructs.

DATA ANALYSIS AND DISCUSSION

The data were only analyzed with SmartPLS 4.0. The study used a two-stage PLS-SEM technique [32].

The first stage involves evaluating the measurement model. The first stage involves ensuring internal uniformity. Cronbach's α and Composite Reliability (CR) were assessed and found to be satisfactory, over 0.7.

Table 2 shows the measurement model outcomes, including Cronbach's alpha, composite reliability and average variance extracted (AVE). All constructs surpassed the specified levels, indicating high reliability and convergent validity. Cronbach's alpha values varied from 0.740 to 0.873, while composite reliability oscillated between 0.746 and 0.913, both surpassing the 0.70 threshold [32]. The AVE values varied from 0.559 to 0.725, beyond the 0.50 criterion, showing that each construct accounts for more than half of the variance among the indicators. In conclusion, the results demonstrate appropriate internal consistency, construct reliability, and convergent validity, thus establishing the measurement structure for additional investigation.

Table.2. Cronbach's alpha, composite reliability and AVE.

Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
EC	0.838	0.841	0.891	0.673
GPA	0.873	0.875	0.913	0.725
LT	0.812	0.814	0.877	0.641
PCT	0.740	0.746	0.835	0.559

Table 3. Outer loadings of measurement items.

Construct	Indicator	Loading
Environmental Concern (EC)	EC1	0.797
	EC2	0.827
	EC3	0.824
	EC4	0.832
Green Purchase Attitude (GPA)	GPA1	0.892
	GPA2	0.870
	GPA3	0.806
	GPA4	0.836
Label Trust (LT)	LT1	0.740
	LT2	0.797
	LT3	0.835
	LT4	0.826
Perceived Chemical Transparency (PCT)	PCT1	0.770
	PCT2	0.735
	PCT3	0.745
	PCT4	0.742

Table 4. HTMT.

Constructs	EC	GPA	LT	PCT
EC	-	-	-	-
GPA	0.860	-	-	-
LT	0.843	0.846	-	-
PCT	0.760	0.801	0.772	-

Indicator Reliability

Outer loadings were used to test indicator reliability, and values greater than 0.70 indicated satisfactory reliability [32]. As displayed in Table 2, all indicators weighted substantially on the appropriate constructs, with scores ranging from 0.735 to 0.892, indicating good dependability. Environmental Concern (EC) had loadings ranging from 0.797 to 0.832, Green Purchase Attitude (GPA) between 0.806 and 0.892, Label Trust (LT) between 0.740 and 0.835, and Perceived Chemical Transparency (PCT) among 0.735–0.770. Considering no item went below 0.70, all were preserved, validating the measurement model's good indication of reliability and consistency.

Discriminant Validity (HTMT Criterion)

Discriminant validity was assessed employing the Heterotrait-Monotrait (HTMT) ratio, a reliable measure of concept uniqueness in PLS-SEM. HTMT scores less than 0.85 (strict) or 0.90 (liberal) show adequate discriminant validity [32]. As indicated in Table X, all HTMT ratios varied from 0.760 to 0.860, falling short of the 0.90 requirement. The greatest value (0.860) among Environmental Concern (EC) and Green Purchase Attitude (GPA) demonstrates an appropriate separation regardless of theoretical similarity. Consequently, all notions are conceptually distinct, indicating good discriminant validity through the structure of the model.

Discriminant Validity (Fornell-Larcker Criterion)

The Fornell-Larcker criteria was used to determine discriminant validity through contrasting the square root of each construct's AVE with its correlations across the remaining elements. Table 5 shows that the diagonal AVE values across Environmental Concern (0.820), Green Purchase Attitude (0.852), Label Trust (0.801), and Perceived Chemical Transparency (0.748) all surpassed their respective inter-construct correlations. Thus, it demonstrates that every element is fundamentally unique, resulting in excellent discriminant validity throughout the measurement model.

Table 5. Fornell–larcker discriminant validity.

Constructs	EC	GPA	LT	PCT
EC	0.820	-	-	-
GPA	0.738	0.852	-	-
LT	0.696	0.713	0.801	-
PCT	0.613	0.660	0.611	0.748

Table 6. R- square details.

Constructs	R-square	R-square adjusted
GPA	0.623	0.621
LT	0.373	0.372

The Second Stage is Structural Model Assessment

The coefficient of determination (R^2) measures how effectively exogenous constructions describe variance in endogenous parameters. The study found that Environmental Concern (EC), Label Trust (LT), and Perceived Chemical Transparency (PCT) account for 62.3% of the variation in Green Purchase Attitude (GPA), demonstrating significant explanatory power. Label Trust (LT) has a R^2 of 0.373 (adjusted R^2 = 0.372), and this means that EC and PCT combined explain 37.3% of the instrument's variance, indicating an average amount of understanding. In summary, these results indicate that the model has excellent accuracy in prediction and adequate explanatory power in describing the important endogenous characteristics. See Table 6.

Effect Size (f^2): Assessed to Determine the Relative Impact of Exogenous Constructs

[32] analyzed the impact size (f^2) to evaluate how each exogenous construct affected the R^2 value for the endogenous variables. Cohen's (1988) guidelines suggest f^2 values of 0.02, 0.15, and 0.35 for minor, medium, and large effects, correspondingly. The investigation found that Environmental Concern (EC) had a medium influence (f^2 = 0.301) upon Green Purchase Attitude (GPA), while Label Trust (LT) had a modest effect (f^2 = 0.205). meanwhile, Perceived Chemical Transparency (PCT) had a significant effect (f^2 = 0.596) on Label Trust (LT), indicating its ability to forecast. The results of these studies demonstrate all exogenous variables provide important contributions to the model, with PCT constituting among the most powerful predictors throughout the structural framework. See Table 6.

Mediation Analysis

Analyzed the indirect effect of PCT on GPA through LT, subsequent Zhao et al. (2010), to regulate full or partial mediation.

Table 7. F- square details.

Constructs	EC	GPA	LT	PCT
EC	-	0.301	-	-
GPA	-	-	-	-
LT	-	0.205	-	-
PCT	-	-	0.596	-

Table 8. Mediation analysis.

Type of effect	Effect	Path coefficient	T stats	Remark
Total effect	PCT -> GPA	0.643	14.317**	Significant Total Effect
Indirect Effect	PCT-> LT -> GPA	0.465	8.260**	Significant Indirect Effect
Direct Effect	PCT-> GPA	0.178	3.028**	Significant Direct Effect
VAF	IE/TE	72%		
Conclusion	Strong partial mediation exists.			

Table 9. Hypotheses testing.

Construct	Original sample	Sample mean	Standard deviation	T statistics	P values
EC -> GPA	0.469	0.470	0.040	11.708	0.000
LT -> GPA	0.387	0.387	0.039	9.872	0.000
PCT -> LT	0.611	0.614	0.030	20.487	0.000

The mediation research findings demonstrate that Perceived Chemical Transparency (PCT) exhibits a considerable impact on Green Purchase Attitude (GPA), including directly and indirectly via Label Trust. PCT had a substantial overall influence on GPA ($\beta = 0.643$, $t = 14.317$, $p < 0.001$), as well as an indirect effect through LT ($\beta = 0.465$, $t = 8.260$, $p < 0.001$). The direct path is still significant ($\beta = 0.178$, $t = 3.028$, $p < 0.01$), suggesting that there are two direct and mediated linkages that exist. The Variance Accounted For (VAF) value of 72% indicates that most of PCT's impacts on GPA act through LT, demonstrating a substantial partial mediation effect. Hence hypothesis 4 established: Label trust has a significant mediating association between perceived chemical transparency and green purchase attitude. See Table 8

Hypotheses Testing

The hypothesis testing findings from the SmartPLS structural model show that all hypothesized linkages are statistically significant. Environmental Concern (EC) → Green Purchase Attitude (GPA) has a substantial positive relationship ($\beta = 0.469$, $T = 11.708$, $p < 0.001$), indicating that increased environmental concern improves customers' green purchasing attitudes. The relationship between Label confidence (LT) and GPA is substantial ($\beta = 0.387$, $T = 9.872$, $p < 0.001$), indicating that confidence in product labeling favorably promotes green purchasing attitudes. Additionally, there is a significant positive association ($\beta = 0.611$, $T = 20.487$, $p < 0.001$) between perceived chemical transparency (PCT) and label trust (LT). Thus, each of the three hypotheses (H1, H2, and H3) has been supported according to the findings of the bootstrapping analysis. See Table 9.

CONCLUSION

All the objectives of this study were completed, and a proper novel path of polymer- and chemical-based packaging approach has been highlighted for the sustainability in the FMCG industry and consumers' attitudes towards such packaging, including label trust. Thus, it is safe to say that not just advertisements or marketing can demonstrate brands' ecological consciousness, but sustainable chemical transparency also supports it highly in the young consumers' mindset. Additionally, it was confirmed that label trust factor strongly mediates the relationship between chemical transparency and green purchase attitude, while environmental concern exercises a positive effect on consumers' green orientations.

These findings emphasize the label that young consumers' sustainable purchasing behavior is not merely driven by exposure to chemical composition details, but by the credibility and trustworthiness of that information. Chemical transparency functions as an informational signal, but its effectiveness depends on consumers' perception of authenticity and environmental integrity.

Basically, at the core of this research sphere, the trust factor performs as the psychological instrument that eventually renovates the entire technical statistics of the basic natural resource safeguarding into positive environmental attitudes. In this modern world where the FMCG industry experiences harsh scrutiny because of the utilization of polymer-based packaging and microplastic pollution in the natural environment. Hence, this present study demonstrates the significant requirement for proper, reliable, and transparent ecological communication regarding chemical safety and recyclability. Through this action the mediating effect of label trusts, a novel behavioral approach and a structural approach will be implemented, which will eventually support the entire FMCG sector in the sustainability factor.

REFERENCES

1. Kumar V, Prakash G. Examining the moderating role of environmental concern in green purchase behavior. *J Retail Consum Serv*. 2021;63:102738.
2. United Nations Department of Economic and Social Affairs. *The Sustainable Development Goals Report 2022.* New York: United Nations; 2022.
3. Chen YS, Lin YH, Chang CH. Green labeling and consumer attitudes: The moderating role of transparency and eco-literacy. *Sustainability*. 2023;15(7):6051.
4. Nguyen TN, Nguyen HH. Chemical transparency and consumer green purchase intention: Evidence from emerging Asian markets. *Sustainability*. 2022;14(14):8604.
5. Wang J, Li X, Sun Y. Transparency in chemical and material labeling: Impacts on consumer trust and sustainability perceptions. *J Environ Manag*. 2023;345:118932.
6. Kim H, Oh S. Ingredient transparency and consumer trust: Understanding green purchase behavior in sustainable product markets. *J Bus Res*. 2021;134:688–697.
7. Marin L, Ruiz S, Rubio A. The role of eco-label trust in consumer perceptions of green products. *Corp Soc Responsib Environ Manag*. 2020;27(1):395–407.
8. Cao F, Wang L, Zhang Q, Li H. Research and progress of chemical depolymerization of waste polyethylene terephthalate (PET). *RSC Adv*. 2022;12:12345–12370.
9. Future Market Insights. *FMCG Packaging Market Analysis – Size, Share & Forecast.* July 2024.
10. MarketIntelo. *Global Circular Polymer Market Report 2024.* Available from: https://marketintelo.com/report/circular-polymer-market
11. Rahman I, Reynolds D. The influence of values and attitudes on green consumer behaviour: A structural model approach. *J Retail Consum Serv*. 2019;51:322–329.
12. Chen YS, Lin YH, Chang CH. Green labeling and consumer attitudes: The moderating role of transparency and eco-literacy. *Sustainability*. 2023;15(7):6051.
13. Yadav R, Pathak GS. Determinants of consumers' green purchase behavior in a developing nation: Applying and extending the theory of planned behavior. *Ecol Econ*. 2017;134:114–122.
14. Halonen N, Sainio T, Heiskanen I. Bio-based smart materials for food packaging and sensors: State-of-the-art and sustainability considerations. *Front Mater*. 2020;7:82.
15. Luo T, Zhang Y, Chen J. Recent advances of sustainable and recyclable polymers for closed-loop applications. *Prog Polym Sci*. 2024;136:101806.
16. Dangelico RM, Vocalelli D. Green marketing: An analysis of definitions, dimensions, and relationships with stakeholders. *Bus Strateg Environ*. 2017;26(4):457–475.
17. Taufique KMR, Vaithianathan S. A fresh look at understanding green consumer behavior among young urban Indian consumers through the lens of theory of planned behavior. *J Clean Prod*. 2018;183:46–55.
18. Mostafa MM. Gender differences in Egyptian consumers' green purchase behaviour: The effects of environmental knowledge, concern and attitude. *Int J Consum Stud*. 2007;31(3):220–229.
19. Kim H, Oh S. Ingredient transparency and consumer trust: Understanding green purchase behavior in sustainable product markets. *J Bus Res*. 2021;134:688–697.
20. Kaabel S, Arandia I, Tamm T. Enzymatic depolymerization of highly crystalline polyethylene terephthalate (PET): Advances in cutinase-based hydrolysis. *Green Chem Lett Rev*. 2021;14:1–14.
21. Chen YS. The drivers of green brand equity: Green brand image, green satisfaction, and green trust. *J Bus Ethics*. 2010;93(2):307–319.
22. Khalid MY, Baloch HA, Farooq U. Novel biopolymer-based sustainable composites for food packaging: Properties, processing and performance. *Food Packag Shelf Life*. 2022;34:100–116.
23. Sharma S, Saha R. Consumer trust in eco-labels: The mediating role of brand credibility in green marketing. *Manag Environ Qual Int J*. 2021;32(5):991–1009.
24. Unni AB, Ramesh S. Enhancing polymer sustainability: Eco-conscious strategies for materials design and life-cycle management. *Polymers (Basel)*. 2024;16(13):1769.
25. Dunlap RE, Jones RE. Environmental concern: Conceptual and measurement issues. In: Dunlap RE, Michelson W, editors. *Handbook of Environmental Sociology.* Westport: Greenwood Press; 2002. p. 482–524.

26. Joshi Y, Rahman Z. Investigating the determinants of consumers' sustainable purchase behaviour. *Sustain Prod Consum*. 2017;10:110–120.
27. Biswas A, Roy M. Green products: An exploratory study on the consumer behaviour in emerging economies of the East. *J Clean Prod*. 2015;87(1):463–468.
28. Hussain M, Khan S, Ahmed T. A review on PLA-based biodegradable materials for sustainable packaging: Synthesis, properties and end-of-life. *Mater Today Sustain*. 2024;28:100379.
29. Rajendran DS, Patel R. Polylactic acid (PLA) and its potential as an eco-friendly biodegradable polymer for packaging applications: A critical review. *Foods*. 2024;13(19):3027.
30. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 191;50(2):179–211.
31. Connelly BL, Certo ST, Ireland RD, Reutzel CR. Signaling theory: A review and assessment. *J Manag*. 2011;37(1):39–67.
32. Hair JF, Hult GTM, Ringle CM, Sarstedt M. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* 2nd ed. Thousand Oaks (CA): Sage Publications; 2019.

