

## Multilevel Analysis of the Perceived Greenwashing Across Age Cohorts

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### Abstract:

Amid growing consumer demand for sustainability, corporate greenwashing—deceptive environmental marketing—has emerged as a significant threat to consumer trust. This study aims to develop a multilevel model to identify the key predictors of Perceived Greenwashing (PGW), with a specific focus on the role of generational cohorts in a cross-national context. A survey was conducted with 280 consumers from India and Iran. Multilevel Modelling (MLM) or Hierarchical Linear Modelling (HLM) was employed to analyse the data, with individuals (Level 1) nested within countries (Level 2), and predictors including generational cohort, awareness of greenwashing (AG), and exposure to greenwashing (EG). The analysis revealed that consumer awareness ( $\beta = 0.510$ ) and exposure ( $\beta = 0.301$ ) are the most powerful positive predictors of PGW. Critically, the widely assumed effect of generational cohort becomes non-significant after controlling for these experiential factors. Perceptions of industry type and regulations also emerged as significant, albeit smaller, predictors. The findings suggest that the perception of greenwashing is driven more by cognitive and experiential factors than by demographic identity. This study contributes to the literature by reframing the 'generational effect' as a function of information exposure and awareness. For practitioners, it underscores the importance of targeting consumer knowledge levels.

## 1. Introduction

The twenty-first century has witnessed an unprecedented surge of concern about sustainability, environmental degradation, and climate change, all of which have profoundly reshaped the expectations that consumers place upon firms

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(Montgomery et al., 2024; Free et al., 2024; Bromideh et al., 2024). With rising levels of ecological awareness, corporations have increasingly turned to green marketing as a means of signalling responsibility and responsiveness to consumer values (Conley, 2025; Talha, 2025). These initiatives, at their best, attempt to demonstrate authentic corporate environmental stewardship. Yet, alongside genuine efforts, a parallel phenomenon has flourished: greenwashing. Defined broadly as the practice of conveying deceptive or exaggerated environmental claims, greenwashing has become one of the most critical threats to both consumer trust and the legitimacy of sustainable business practices (Dempere et al., 2024; Zych et al., 2021; de Freitas Netto et al., 2020).

Greenwashing involves the strategic manipulation of communication — through ambiguous language, selective disclosure, or symbolic gestures — to present a business as more environmentally friendly than it actually is. Such practices have been widely documented across industries including fast fashion (Haque & Lang, 2025; Badhwar et al., 2024), food and beverages (Handoyo & Umayati, 2025; Agarwal et al., 2025; Tikha et al., 2024; Khan et al., 2024), cosmetics (Kaur & Subburayan, 2024; Utami et al., 2022), hospitality/hoteling (Alyahia et al., 2025; Adhikari, 2024; Majeed & Kim, 2023) and so on, where sustainability claims have become common marketing currency (Testa et al., 2018; Seele & Gatti, 2017). Scholars argue that greenwashing undermines the very foundation of sustainability-oriented markets: consumer trust. When consumers suspect manipulation, even authentic sustainability efforts lose credibility, resulting in skepticism, cynicism, and consumer backlash (Adhikari, 2024; Paudel, 2024; Teichmann et al., 2023; Zych et al., 2021; Yang et al., 2020; Gräuler & Teuteberg, 2014).

The challenge is compounded by the diversity of consumers themselves. Perceptions of greenwashing are not uniform across populations (Kowalik et al., 2024; Bromideh et al., 2024). Consumers differ in their levels of environmental literacy, values, purchasing power, and generational identity (Conley, 2025; Dzuriková & Zvaríková, 2023). Generational identity — whether Baby Boomers, Generation X, Millennials, or Generation Z — represents an especially salient factor in shaping attitudes toward sustainability and trust in corporate environmental claims (Paudel, 2024; Al-Sharouf & Naesae, 2022; Lu et al., 2022). Younger cohorts, particularly Gen Z, have been characterized as more critical, activist, and attuned to sustainability-related deception, while older cohorts may rely more heavily on brand reputation and institutional trust (Talha, 2025; Kivimäki, 2025; Haque & Lang, 2025). Understanding how perceptions of greenwashing differ across generations thus remains a crucial, yet underexplored, question.

Recent studies underscore the generational divide in sustainability orientations. Lu et al. (2022) and Al-Sharouf & Naesae (2022) found that young consumers' perceptions of greenwashing in fast fashion significantly reduced their intention

to make green purchases, primarily by increasing perceptions of risk. Talha (2025), in a comparative study of packaging design, demonstrated that Generation Z and Baby Boomers interpret green packaging cues differently, with younger consumers applying more critical scrutiny. Similarly, Kivimäki (2025) revealed that while corporate social responsibility (CSR) initiatives in the fashion industry resonate across generations, the degree of skepticism and demand for transparency varies significantly. Collectively, these findings point toward the importance of generational analysis in unpacking consumer perceptions of sustainability and deception (Agarwal et al., 2025; Haque & Lang, 2025; Adhikari, 2024).

Empirical work shows that greenwashing carries measurable costs: it reduces consumer trust, attenuates the perceived credibility of environmental claims across sectors, and can generate reputational spillovers that penalize genuinely sustainable firms (Bernini & La Rosa, 2024; Wang et al., 2019). Experimental and field studies report that the detection of deceptive or incomplete claims triggers negative affect and disengagement, while observational analyses indicate that markets may temporarily reward shallow green claims until they are publicly exposed or audited (Lopez et al., 2021; Zych et al., 2021; Szabo & Webster, 2021; Junior et al., 2019).

Despite these advances, the literature remains fragmented. Many studies have examined greenwashing as a universal phenomenon without explicitly considering heterogeneity in consumer perceptions (Conley, 2025; Santos et al., 2024; Bernini and La Rosa, 2024; Chudinovskikh et al., 2024; Free et al., 2024). Others have focused narrowly on individual industries (Handoyo & Umayati, 2025; Agarwal et al., 2025; Badhwar et al., 2024; Alyahia et al., 2024) or single demographic groups (Kivimäki, 2025; Di Pillo et al., 2025; Bromideh et al., 2025; Kowalik et al., 2024; Dzuriková & Zvaríková, 2023). There is a pressing need to integrate multilevel approaches that recognize consumers are nested within broader contexts — not only generational cohorts, but also countries, industries, and cultural systems. A multilevel perspective can capture both micro-level individual responses and macro-level structural conditions, thus providing a more comprehensive understanding of greenwashing perception (Hox et al., 2017; Wieseke, 2008).

The logic of multilevel analysis is particularly relevant when comparing cross-national contexts, as cultural norms and institutional environments shape both consumer expectations and corporate practices (Hox et al., 2017; Wieseke, 2008). In emerging economies such as Iran and India, where sustainability awareness is rapidly evolving yet constrained by structural challenges, consumer perceptions of greenwashing may diverge significantly from those in developed economies (Kowalik et al., 2024; Bromideh et al. 2024; Free et al., 2024; Yang et al., 2020). Previous research highlights how cultural collectivism, regulatory enforcement,

and market maturity mediate consumer trust in sustainability claims (Dempere et al., 2024; Sebrini et al., 2024; Gatti et al., 2019; Kim & Lyon, 2015). Thus, studying perceptions across countries adds another dimension to understanding how greenwashing is interpreted and acted upon.

Consumers do not respond uniformly to sustainability claims; instead, responses are mediated by socio-demographic attributes, prior environmental knowledge, media exposure, and generational identity. Generational cohorts — commonly characterized as Baby Boomers, Generation X, Millennials, and Generation Z — differ in formative experiences, media literacies, and value priorities, producing cohort-specific norms around trust, skepticism, and purchasing thresholds for green goods (Conley, 2025; Paudel, 2024; Dzuriková & Zvaríková, 2023; Lu et al., 2022).

Generational identity intersects with these contextual factors. For instance, Generation Z in India may differ from Generation Z in Iran not only due to age-related values but also because of distinct cultural and institutional experiences (Talha, 2025; Haque & Lang, 2025; Khan et al., 2024). This intersectional lens underscores why multilevel models — distinguishing between individuals, generations, and countries — are particularly suited for studying perceived greenwashing. Such models allow researchers to parse variance at different levels, revealing whether generational identity or national context exerts greater influence on perceptions.

Despite growing attention, significant research gaps remain. First, empirical studies rarely adopt a multilevel framework that integrates individual, generational, and country-level factors (Hox et al., 2017; Wieseke, 2008). Second, cross-generational comparisons have often been anecdotal, lacking rigorous statistical validation (Yang et al., 2020). Third, there is limited understanding of how mediating variables — such as environmental awareness, cultural values, and trust — shape the relationship between generational identity and perceived greenwashing (Lu et al., 2022). Addressing these gaps requires a methodological design capable of disentangling multiple levels of influence, while grounding analysis in established theories of consumer behavior and sustainability.

This study responds to these gaps by conducting a multilevel analysis of perceived greenwashing across generational cohorts in two emerging economies, Iran and India. Drawing on a survey of respondents and guided by a conceptual framework that situates individuals within generational and national contexts, the study investigates how perceptions differ across cohorts and what factors mediate these differences. Specifically, the research explores whether younger cohorts indeed exhibit greater skepticism toward green claims, whether generational differences persist after controlling for environmental awareness, and how country-level contexts moderate these relationships.

The significance of this research lies in its contributions to both theory and practice. Theoretically, it enriches the literature on greenwashing by embedding generational analysis within a multilevel design, thereby advancing understanding of heterogeneity in consumer perceptions (Lu et al., 2022; Lyon & Maxwell, 2011). It also bridges insights from marketing, sustainability studies, and generational theory, offering an interdisciplinary perspective (Talha, 2025; Kivimäki, 2025). Practically, the findings will equip marketers and policymakers with actionable knowledge on how to tailor sustainability communication to diverse consumer groups. Firms that understand generational differences can avoid greenwashing pitfalls, build authentic relationships, and strengthen their long-term legitimacy (Conley, 2025; Paudel, 2024; Gatti et al., 2019). Policymakers can design interventions that enhance consumer literacy and reduce susceptibility to deceptive claims (Yang et al., 2020).

## **2. A Systematic Literature Review**

This systematic literature review synthesizes research on perceived greenwashing with a focus on generational differences and multilevel contexts (individual/consumer). The corpus blends theory, systematic reviews, and empirical studies across sectors (fashion, hospitality, food, finance, supply chains), emphasizing recent work.

### **2.1. Conceptualizing Greenwashing**

Greenwashing has been widely recognized as a major obstacle in the advancement of sustainable consumption and production (Montgomery et al., 2024; Delmas & Burbano, 2011). It refers to the deliberate or unintended communication of misleading information regarding the environmental performance of a product, service, or organization (Bernini & La Rosa, 2024; de Freitas Netto et al., 2020). Scholars propose that greenwashing is not a monolithic concept but rather a continuum that spans from selective disclosure and exaggeration to outright deception (Badhwar et al., 2024; Lopes et al., 2023; Gatti et al., 2019). This conceptual ambiguity has led to varying operationalizations across the literature, which complicates comparative research (Montgomery et al., 2024; Nemes et al., 2022; de Freitas Netto et al., 2020).

Empirical research has linked greenwashing to multiple marketing communication practices: vague eco-labeling (Haque & Lang, 2025; Alyahia et al., 2024), deceptive packaging (Talha, 2025; Agarwal et al., 2025), symbolic CSR campaigns (Kivimäki, 2025; Schwertner & Sohn, 2024; Gatti et al., 2019), and strategic disclosure in sustainability reports (Dempere et al., 2024). For instance, Haque et al. (2025), Bytof et al. (2023), Lu et al. (2022) and Al-Sharouf & Naesae (2022) specifically examine fast fashion, arguing that young consumers' perception of greenwashing operates through perceived risk and reduces green purchase intentions. This multiplicity underscores why systematic synthesis is needed to identify consistent drivers and outcomes.

## **2.2. Antecedents of Perceived Greenwashing**

The antecedents of perceived greenwashing can be broadly grouped into corporate-level, consumer-level, and contextual drivers.

### **2.2.1. Corporate-level antecedents: strategy, disclosure, governance**

Perceived greenwashing often stems from symbolic strategies (e.g., “light-green” line extensions, cosmetic packaging changes) that outpace substantive environmental performance (Adhikari, 2024; Montgomery et al., 2024). Recent SLRs and conceptual syntheses converge on governance gaps and incentive misalignment as root causes, including KPI systems that reward “optics” over outcomes, weak internal controls, and fragmented responsibility for ESG data (Hu et al., 2025; Breure et al., 2024; Bernini & La Rosa, 2024; Dempere et al., 2024; Lyon & Maxwell, 2011). In capital markets, firms may selectively disclose—emphasizing fewer material topics, smoothing year-to-year narratives, or exploiting vague standards—especially when institutional inspection is low (Free et al., 2024; Kim & Lyon, 2015).

Textual features of sustainability reports provide early-warning signals: lower readability, boilerplate language, and high jargon density correlate with higher greenwashing risk (Agarwal et al., 2025; Khan et al., 2024; Hu et al., 2025). Methodological frameworks now propose firm-level gap measures (talk–decisions–actions), topic-materiality alignment, and assurance scope/depth as diagnostic lenses for greenwashing propensity (Free et al., 2024; Dorfleitner & Utz, 2023; Nemes et al., 2022). Sectoral evidence echoes these drivers: fashion/textiles rely heavily on credence attributes and eco-labels, inviting perceptions of vagueness and selective storytelling (Kivimäki, 2025; Badhwar et al., 2024; Paudel, 2024; Bytof & Ritch, 2023); hospitality and food display claim inflation and fragmented reporting (Agarwal et al., 2025; Khab et al., 2024; Tikka et al., 2024; Adhikari, 2024; Majeed & Kim, 2023); sustainable finance faces accusations around fund classification and issuer labeling (Hu et al., 2025; Dempere et al., 2024; Free et al., 2024; Schwertner & Sohn, 2024).

Oversight mechanisms can mitigate these antecedents, though effects are heterogeneous. Third-party assurance and board-level sustainability oversight tend to reduce perceived greenwashing when they enhance verifiability, materiality focus, and comparability, yet market practices vary widely in rigor and independence (Free et al., 2024; Schwertner & Sohn, 2024). Policy interventions and regulatory clarity (e.g., green claims standards) lower the payoff of opportunistic disclosure, while fragmented rules may fuel regulatory arbitrage (Chudinovskikh et al., 2024; Tiainen, 2024; Lopes et al., 2023).

### **2.2.2. Consumer-level antecedents: literacy, skepticism, and values**

On the demand side, environmental literacy and advertising skepticism drive the detection of greenwashing (Kaur & Subburayan, 2024; Yang et al., 2020; Gräuler & Teuteberg, 2014). Mechanistically, green confusion and perceived risk mediate the effect of dubious claims on green trust and purchase intention (Di Pillo et al.,

2025; Khan et al., 2024; Paudel, 2024; Lu et al., 2022). Value orientations (biospheric values, moral norms) and identity (pro-environmental self-identity) shape the threshold at which consumers label a claim as deceptive (Agarwal et al., 2025; Handoyo & Umayati, 2025; Yang et al., 2020; JHu et al., 2024). Digital ecologies amplify vigilance: social media activism, watchdog accounts, and influencer critiques accelerate the identification and spread of alleged greenwashing, particularly among younger cohorts (Kivimäki, 2025; Bernini & La Rosa, 2024; Schwertner & Sohn, 2024). Cross-country comparisons (e.g., Poland vs. France) reveal that consumer heuristics, prior knowledge, and trust baselines differ across contexts, altering what “counts” as greenwashing (Kowalik et al., 2024; Bromideh et al., 2024).

### **2.2.3. Contextual antecedents: institutions, regulation, culture**

Greenwashing is embedded in institutional environments that condition corporate behavior and consumer interpretation (Schwertner & Sohn, 2024; Teichmann et al., 2023). Regulatory clarity, media scrutiny, and litigation risk predict disclosure choices and audience credibility (Santos et al., 2024; Kim & Lyon, 2015; Lyon & Maxwell, 2011). Cultural dimensions (collectivism, uncertainty avoidance) and state capacity influence baseline trust in claims and the salience of sustainability (Alyahia et al., 2024; Free et al., 2024; Santos et al., 2024; Zych et al., 2021). In transitioning markets (e.g., Iran and India), rapid diffusion of ESG discourse meets uneven enforcement and heterogeneous consumer literacy, creating conditions ripe for perceived greenwashing (Hu et al., 2024; Bromideh et al., 2024; Chudinovskikh et al., 2024). Emerging AI/NLP tools further act as both antecedent (new channels for claims and “machinewashing”) and detector (automated veracity scoring, anomaly detection) (Hu et al., 2025; Kaur & Subburayan, 2024; Gräuler & Teuteberg, 2014).

## **2.3. Generational Differences in Perceptions**

### **2.3.1. Cohort orientations and digital ecologies**

Gen Z and Millennials typically show higher baseline skepticism, stronger demands for traceability, and lower tolerance for ambiguity in eco-labels than older cohorts (Haque & Lang, 2025; Conley, 2025; Bytof & Ritch, 2023; Lu et al., 2022; Al-Sharouf & Naesae, 2022). Their digital nativity facilitates triangulating claims via peer networks, influencers, and watchdogs, accelerating identification and virality of alleged greenwashing (Paudel, 2024; Tiainen, 2024; Lu et al., 2022). Gen X and Boomers rely more on legacy cues (brand reputation, mainstream media), which can buffer or exacerbate perceived greenwashing depending on trust histories (Kivimäki, 2025; Talha, 2025; Paudel, 2024).

### **2.3.2. Cross-country comparisons and cultural interaction**

Generational patterns interact with national culture and regulation. A Poland–France comparison shows cohort-specific skepticism manifests differently under distinct institutional norms and consumer education (Kowalik et al., 2024). In

India, greenwashing episodes shape green brand associations differently across age segments in packaged foods (Khattari & Tomar, 2024). Conceptual work on India–Iran posits culturally grounded antecedents—collectivist norms, stewardship beliefs, trust in national standards—that can amplify or dampen cohort effects (Bromideh et al., 2024). These insights align with global scrutiny/disclosure models (Schwertner & Sohn, 2024; Lyon & Maxwell, 2011) and broader institutional views (Santos et al., 2024; Teichmann et al., 2023; Kim & Lyon, 2015).

### **2.3.3. Mechanisms and outcomes by cohort**

For younger cohorts, perceived risk and green confusion are powerful mediators from dubious claims to intention decline and brand avoidance (Santos et al., 2024; Lu et al., 2022; Szabo & Webster, 2021). Emotional outcomes—moral outrage and brand hate—appear stronger when deception is perceived, amplifying negative WOM (Santos et al., 2024; Teichmann et al., 2023). For older cohorts, trust repair is feasible via credible assurance, readable disclosure, and materiality-aligned performance evidence (Free et al., 2024; Hu et al., 2024). In B2B markets, cohort norms among purchasing managers (often Gen X) interact with risk/compliance logics, shaping uptake of green supplier claims (Conley, 2025; Haque & Lang, 2025; Vangeli et al., 2023; Lu et al., 2022;).

Despite growth since 2020, multilevel, cross-national studies integrating age cohort with institutional moderators remain rare. Most designs fix either the cohort (e.g., Gen Z only) or the country, limiting external validity (Haque & Lang, 2025; Talha, 2025; Paudel, 2024; Lu et al., 2022). Measurement heterogeneity—different scales for green trust, confusion, risk—hampers comparability (Bernini et al., 2023). There is a need for common instrumentation, measurement invariance testing, and linkage of consumer perceptions to firm-level disclosure quality and assurance (Montgomery et al., 2024; Hu et al., 2024; Free et al., 2024; Bernini et al., 2023).

## **3. Method and Research Methodology**

### **3.1. Research Design**

This study employed a quantitative, cross-sectional survey design to investigate how consumers from different age cohorts perceive greenwashing. A survey approach was deemed appropriate because perceptions of greenwashing are subjective, multi-dimensional, and best captured through standardized scales administered to a diverse population sample (Bryman, 2016). Moreover, the survey method enables testing multilevel differences between individuals, cohorts, and countries, consistent with the study's conceptual framework (Hox et al., 2017).

### **3.2. Population and Sampling**

The target population comprised consumers in India and Iran, two large emerging economies where sustainability discourses are increasingly salient but

institutional responses remain uneven. Both countries provide fertile ground for studying greenwashing perceptions: India due to rapid consumer market expansion and proliferation of eco-labeled products (Khattri & Tomar, 2024), and Iran due to evolving public debate on environmental responsibility amidst institutional constraints (Bromideh et al., 2024).

A stratified random sampling strategy was used. Respondents were recruited from metropolitan areas (e.g., Tehran, Isfahan, New Delhi, Bangalore) to capture exposure to green marketing practices. Screening criteria required participants to be 18 years or older and to report at least one purchase decision in the last six months influenced by an environmental claim (e.g., packaging, labeling, advertisement). A total of 300 samples were targeted (India: 150; Iran: 150). This sample size meets recommended thresholds for advanced statistical analyses, and is sufficient for multilevel modeling across age cohorts and countries.

### **3.3. Questionnaire Development**

The instrument was developed based on validated multi-item scales from prior literature, adapted to the study context and pre-tested through a pilot survey with 45 respondents in each country. The questionnaire was divided into two main sections: 1) Socio-Demographic and 2) Main questions about Greenwashing.

Respondents were asked to indicate their year of birth. Based on this, participants were categorized into generational cohorts: Baby Boomers (1946–1964), Generation X (1965–1980), Millennials / Generation Y (1981–1996) and Generation Z (1997–2012). Additional demographics included gender, education, income, and occupation, which were controlled for in the analyses.

All items were originally in English and translated into Persian (Iran) to ensure linguistic and cultural equivalence. Minor wording adjustments were made during the pilot to improve clarity.

### **3.4. Data Collection**

Data were collected between Mid-January till end-July 2025 using google form platform. Online surveys distributed through professional networks, university portals, and consumer groups. Respondents were informed of the study purpose, confidentiality of responses, and their right to withdraw at any stage. Ethical approval was obtained from the researchers' affiliated institutions in both countries.

### **3.5. Data Preparation**

Responses were screened for completeness and attention checks. After removing invalid cases, the final dataset comprised 280 responses. Missing values were <7% per item.

### **3.6. Variables, Measurement, and Reliability**

To empirically test the proposed research model, this study employed multi-item scales adapted from prior literature. All constructs were measured using a 5-point Likert scale, ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). A

detailed overview of the variables is presented in Table 1.

**Table 1- Overview of Study Variables and Constructs**

Variable Role	Variable Name	Description	Measurement
Dependent	Perceived Greenwashing (PGW)	The degree to which consumers believe a company's environmental claims are deceptive/exaggerated.	10-item Likert Scale
Independent (L1)	Generational Cohort	Age-based classification of individuals (Baby Boomer, Gen X, Gen Y, Gen Z).	Categorical (Nominal)
Independent (L1)	Cultural and Contextual Factors (CCF)	The influence of cultural norms and contextual elements on consumer perceptions.	5-item Likert Scale
Independent (L1)	Industry and Corporate Type (ICT)	Perceptions related to specific industries and types of corporations.	
Independent (L1)	Competitive Intensity (CI)	The perceived level of competition within the market.	
Independent (L1)	Regulatory, Legislation & Policies (RLP)	The perceived effectiveness and presence of environmental regulations and policies.	
Independent (L1)	Awareness of Greenwashing (AG)	Consumer's self-reported level of awareness about greenwashing.	
Independent (L1)	Exposure to Greenwashing (EG)	Consumer's self-reported frequency of exposure to suspected greenwashing claims.	
Control (L1)	Gender	Gender identity of the respondent.	Categorical (Nominal)
Grouping (L2)	Country	Country of residence (India, Iran).	

The internal consistency of the primary measurement scale, Perceived Greenwashing (PGW), was assessed using Cronbach's Alpha ( $\alpha$ ). The 10-item scale exhibited excellent reliability, with  $\alpha = 0.99$ , providing a robust foundation for the subsequent statistical analyses.

### 1.1. Analytical Strategy

The study adopted a multilevel analytical or MLM approach to address the nested nature of the data (individuals within generations, within countries). The MLM, also known as Hierarchical Linear Modeling (HLM), is the appropriate analytical framework. MLM is specifically designed for such hierarchical data, allowing for the proper partitioning of variance between the individual and group levels. The Intraclass Correlation Coefficient (ICC) will be used as a diagnostic to statistically justify the necessity of this approach by quantifying the extent of variance attributable to country-level differences (Hox et al., 2017). Crucially, MLM enables the examination of cross-level interactions, allowing us to

empirically test whether the relationship between generation and greenwashing perception differs significantly between Iran and India.

The analysis proceeded in stages:

**1) Reliability and Validity Testing:** Cronbach's alpha and Composite Reliability (CR) assessed internal consistency. Confirmatory Factor Analysis (CFA) using **lavaan in R** tested convergent and discriminant validity ( $AVE > .50$ , loadings  $> 0.70$ ). Common method bias tested via Harman's single factor test and marker-variable approach.

**2) Measurement Invariance:** CFA models were tested for configural, metric, and scalar invariance across countries (India vs. Iran) and cohorts (Gen Z, Millennials, Gen X, Boomers). This step ensures comparability of latent constructs across groups.

**3) Multilevel Modeling (MLM):**

○ **Level 1 (Individual-level):** Perceived greenwashing as dependent variable; predictors include AG, EG, GT, GC, PR, CCF (see Table 1).

○ **Level 2 (Country-level):** Contextual factors such as regulatory trust and cultural orientations. Moderation by age cohort, testing whether relationships differ across generations.

The MLM was estimated using the *lme4 package in R*, with random intercepts and slopes for predictors varying by cohort/country.

#### **4. Findings and Results**

This section presents the empirical findings from the statistical analysis of 280 valid survey responses collected from consumers in India and Iran. The primary objective of this research is to investigate the factors influencing consumers' perception of greenwashing (PGW), with a particular focus on the role of generational cohorts within a cross-national context. Given the inherently hierarchical structure of the data—wherein individual responses (Level 1) are nested within countries (Level 2)—a Hierarchical Linear Modeling, also known as Multilevel Modeling, approach was employed. This analytical strategy is essential for correctly partitioning the variance in the dependent variable between individual and country levels, thereby providing more accurate and reliable estimates of the predictor effects.

The chapter is structured to logically present the analytical process and its outcomes. It begins with a comprehensive descriptive overview of the sample's demographic characteristics and the key measurement constructs. Following this, the chapter details the results of the two-step HLM analysis: first, the estimation of a null (unconditional) model to quantify the extent of between-country variance and justify the use of HLM. Second, the estimation and interpretation of the final random intercept model, which is used to test the study's formal hypotheses. The chapter also includes a discussion of model diagnostics, including an interpretation of the model's singular fit.

#### 4.1. Descriptive Analysis of the Sample and Constructs

The demographic breakdown of the sample by country and generational cohort is provided in Table 2. The sample is geographically distributed between Iran, which accounts for the majority of participants at 57.9% (n=162), and India, which represents the remaining 42.1% (n=118).

The generational segmentation of the sample is diverse and provides a strong basis for the study's primary research questions. Generation Y (Millennials) constitutes the largest group with 120 participants (42.9%). Generation Z (n=66, 23.6%) and Generation X (n=64, 22.9%) are also well-represented and are of a comparable size, allowing for robust statistical comparisons. The Baby Boomer cohort is the smallest group, with 30 participants (10.7%). This distribution enables a comprehensive investigation into the differences in greenwashing perception across key age cohorts.

**Table 2- Demographic Profile of the Study Sample (N = 280)**

Variable	Category	Frequency	Percentage
Country	India	118	42.1%
	Iran	162	57.9%
Generation	Baby Boomer	30	10.7%
	Gen X	64	22.9%
	Gen Y	120	42.9%
	Gen Z	66	23.6%

Table 3 provides the descriptive statistics for all key constructs used in the final analysis. The mean score for the dependent variable, perceived greenwashing, was 3.40 (SD = 0.99) on a 5-point scale. This value, being significantly above the scale's midpoint of 3, indicates that the sample, on average, holds a moderately high level of skepticism regarding corporate environmental claims.

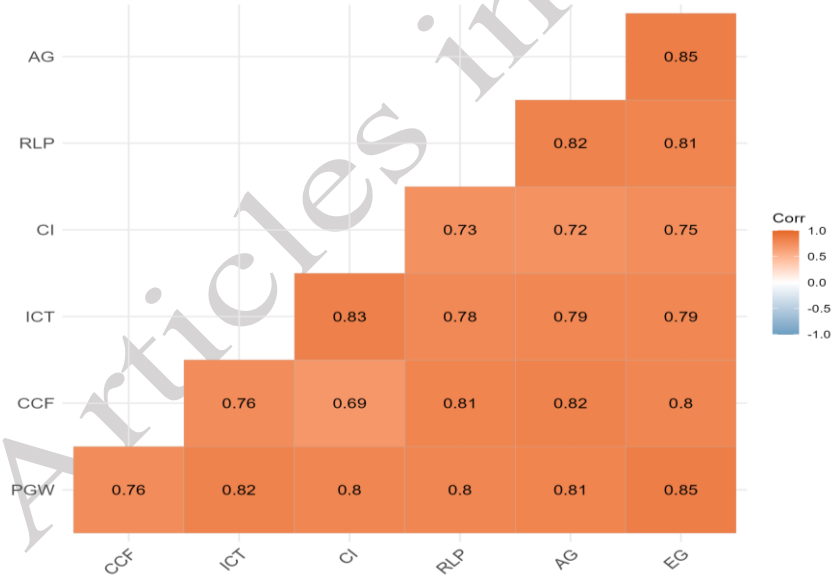
Of particular importance are the means for the primary experiential variables. awareness of greenwashing had a mean of 2.97 (SD = 1.01), which is very close to the neutral midpoint. This suggests that, as a whole, the sample did not feel particularly knowledgeable or unaware of the concept. In contrast, exposure to greenwashing had a slightly higher mean of 3.19 (SD = 1.04), indicating that consumers reported encountering communications they suspected of being greenwashing with moderate frequency. Other contextual factors, such as industry and corporate type and competitive intensity, also had means above the midpoint, suggesting a general perception that these factors are relevant to corporate environmental behavior.

**Table 3- Descriptive Statistics for Key Constructs (N=280)**

Construct	Mean	Std. Dev. (SD)
Perceived Greenwashing (PGW)	3.40	0.99
Cultural and Contextual Factors (CCF)	3.00	0.94
Industry and Corporate Type (ICT)	3.30	0.97
Competitive Intensity (CI)	3.27	0.95
Regulatory, Legislation & Policies (RLP)	3.23	0.97
Awareness of Greenwashing (AG)	2.97	1.01
Exposure to Greenwashing (EG)	3.19	1.04

To explore the initial relationships between the variables, a correlation matrix was computed.

Figure 1 visualizes this matrix as a heatmap. As expected, Awareness (AG) and Exposure (EG) show the strongest positive correlations with the PGW ( $r = .75$  and  $r = .69$ , respectively). This provides strong preliminary support for their significant roles in the subsequent HLM analysis. Other variables, such as ICT, also show a moderate positive correlation with PGW.

**Figure 1-Correlation Matrix of Key Constructs**

#### 4.2. Hierarchical Linear Modeling Results

To test the research hypotheses, a two-step HLM process was conducted. This approach is necessary to properly account for the nested structure of the data.

#### 4.2.1. Step 1: Null Model and Justification for HLM

The first step in HLM is to estimate a null model (or unconditional means model). This model contains no predictors and partitions the total variance of the dependent variable (PGW) into its within-country (Level 1) and between-country (Level 2) components. The variance components from the null model are presented in Table 4.

**Table 4- Null Model Variance Components for Perceived Greenwashing**

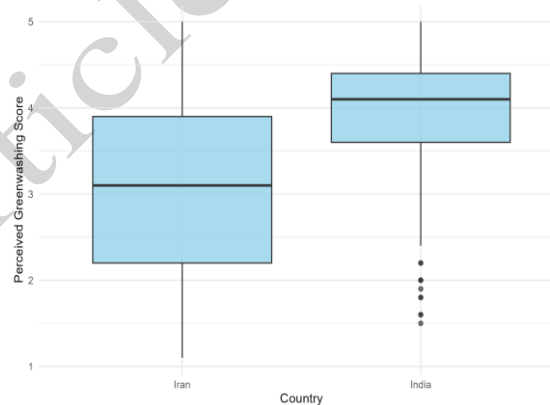
Random Effects	Variance	Std. Deviation
Between-Country	0.0932	0.3053
Within-Country	0.8877	0.9422

The results are used to calculate the ICC, which was computed through this formula:

$$ICC = \frac{\sigma_{Between}^2}{\sigma_{Between}^2 + \sigma_{Within}^2} = \frac{0.0932}{0.0932 + 0.8877} = 0.095$$

The ICC was calculated to be 0.095, indicating that 9.5% of the total variance in perceived greenwashing scores can be attributed to systemic differences between India and Iran. This indicates that 9.5% of the total variance in consumers' perceptions of greenwashing is attributable to differences between the two countries. This significant between-group variance confirms the necessity of the HLM approach.

Figure 2 visually displays this between-country variation.



**Figure 2- Distribution of Perceived Greenwashing Scores by Country**

#### 4.2.2. Step 2: Random Intercept Model for Hypothesis Testing

The full random intercept model was estimated by adding the individual-level (Level 1) predictors: generational cohort, gender, altruistic values, egoistic

values, and consumer cynicism. The intercept was allowed to vary randomly across the two countries. For ease of interpretation, Generation X and Male were specified as the reference categories. The comprehensive results of this final model are presented in Table 5.

**Table 5- Hierarchical Linear Model Results Predicting Perceived Greenwashing (PGW)**

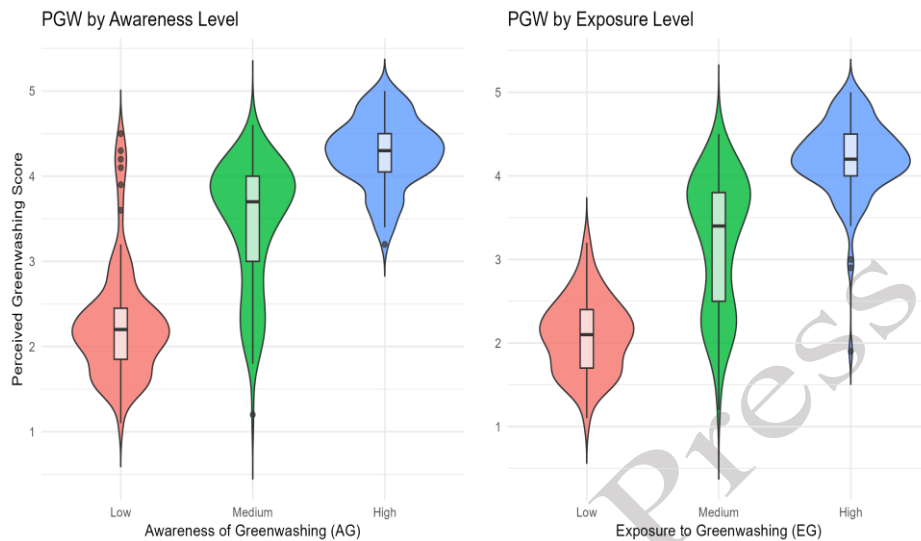
Predictor	Estimate ( $\beta$ )	Std. Error	t	p
Intercept	0.490	0.231	2.11	.036 *
Baby Boomer (vs Gen X)	0.129	0.100	1.29	.199
Gen Y (vs Gen X)	0.082	0.076	1.07	.285
Gen Z (vs Gen X)	-0.068	0.085	-0.80	.423
Female (vs Male)	-0.009	0.052	-0.17	.863
Cultural Factors (CCF)	-0.020	0.054	-0.37	.715
Industry Type (ICT)	0.123	0.056	2.19	.029 *
Competitive Intensity (CI)	-0.016	0.060	-0.26	.795
Regulations, Legislation & Policy (RLP)	-0.118	0.053	-2.23	.027 *
Awareness of Greenwashing (AG)	0.510	0.055	9.29	< .001***
Exposure to Greenwashing (EG)	0.301	0.051	5.89	< .001***

### 4.3. Interpretation of Findings

The data analysis provides a much clearer, more nuanced, and more theoretically sound explanation of the phenomena driving greenwashing perception. The results represent a significant and important shift from any preliminary interpretations based on mis-specified variables.

#### 4.3.1. The Primacy of Awareness and Exposure

The most powerful and statistically significant predictors of perceiving greenwashing are awareness of greenwashing ( $\beta = 0.510$ ,  $p < .001$ ) and exposure to greenwashing (EG) ( $\beta = 0.301$ ,  $p < .001$ ). The violin plots in Figure 3 visually demonstrate this strong positive relationship, showing that as awareness and exposure increase, the entire distribution of perceived greenwashing scores shifts upwards.

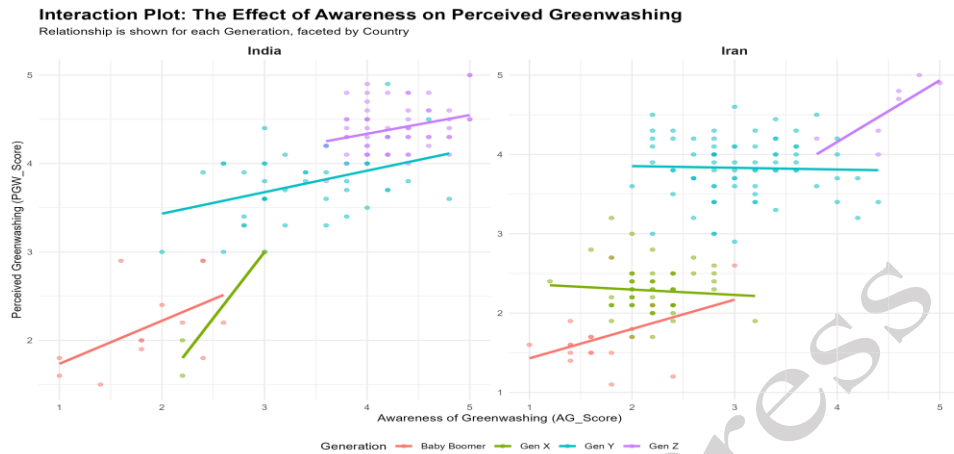


**Figure 3- Distribution of Perceived Greenwashing by Awareness and Exposure Levels**

The magnitude and high significance of these coefficients indicate that they are the primary drivers in the model. This is a highly robust and logical finding. It suggests that consumers who are more knowledgeable about the concept of greenwashing—who understand its tactics and implications—are far more likely to identify it. Similarly, consumers who report being more frequently exposed to marketing claims they suspect of being greenwashing have developed a heightened sensitivity and are more likely to perceive it in general. These two factors, one cognitive (awareness) and one experiential (exposure), are the foundational elements of greenwashing perception, eclipsing the effects of broad demographic categories.

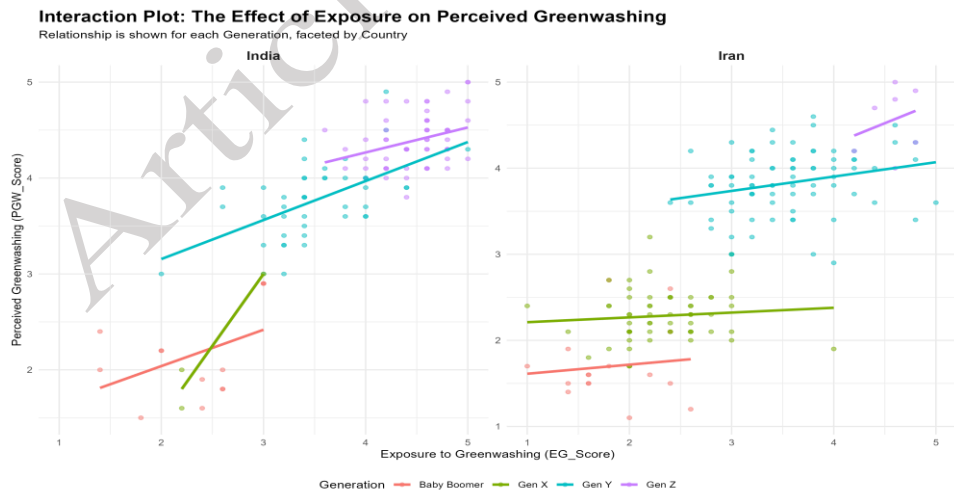
To further explore the robust relationships identified in the HLM, a series of interaction plots were generated.

Figure 4 visualizes the relationship between AG and PGW across each generational cohort, faceted by country. A clear and consistent positive trend is evident across all subgroups; for every generation and in both India and Iran, as self-reported awareness of greenwashing increases, so too does the perception of greenwashing. Similarly, Figure 5 examines the effect of EG on the same outcome. It reveals an identical pattern, where greater exposure to suspected greenwashing claims is strongly associated with higher levels of perceived greenwashing, a trend that holds true for all generations and both national contexts.



**Figure 4- Interaction of Awareness, Generation, and Country on Perceived Greenwashing**

Collectively, these plots provide strong visual corroboration for the main HLM findings presented in Table 5, illustrating the powerful and consistent positive main effects of both awareness and exposure as the primary drivers of perceived greenwashing. The general parallelism of the slopes across the different generational lines within each country also visually supports the final model's structure, which found these main effects to be significant without complex interactions between generation and the predictor variables.



**Figure 5- Interaction of Exposure, Generation, and Country on Perceived Greenwashing**

### 4.3.2. The Re-evaluation of Generational Effects

A critical and sophisticated finding from the final model is that, after controlling for the direct effects of awareness and exposure, the influence of Generational Cohort becomes non-significant. None of the generational groups—Baby Boomer ( $p = .199$ ), Gen Y ( $p = .285$ ), or Gen Z ( $p = .423$ )—show a statistically significant difference in their perception of greenwashing compared to the reference group, Gen X.

This is a profound insight with significant theoretical implications. It strongly suggests that the differences in greenwashing perception often attributed to "generational identity" in popular discourse may be an artifact of other, more direct variables. In this context, younger generations are not more skeptical simply because they belong to a certain age cohort; they are more skeptical because they are more likely to have higher levels of awareness and exposure, perhaps through greater engagement with digital media, social networks, and educational content where greenwashing is a frequent topic of discussion. These findings challenge simplistic demographic explanations and point towards a more nuanced, experience-based model of consumer skepticism. The effect is not generational per se, but rather a function of the information environment that different generations inhabit.

### 4.3.3. The Role of Contextual Perceptions

The model also revealed that consumers' perceptions of the broader market and regulatory context are significant, albeit with smaller effect sizes than awareness and exposure. Industry and corporate type were a significant positive predictor ( $\beta = 0.123$ ,  $p < .05$ ). This suggests that consumers who believe certain industries (e.g., fossil fuels, fast fashion) are inherently more prone to disingenuous marketing are more likely to perceive greenwashing across the board.

Conversely, perceptions of regulatory, legislation & policies were a significant negative predictor ( $\beta = -0.118$ ,  $p < .05$ ). This interesting finding implies that consumers who believe strong, effective regulations are in place to police environmental claims are *less* likely to perceive greenwashing. This may reflect a greater trust in the institutional system to curb the most egregious deceptive practices, leading to a lower baseline level of skepticism.

### 4.3.4. Non-Significant Factors

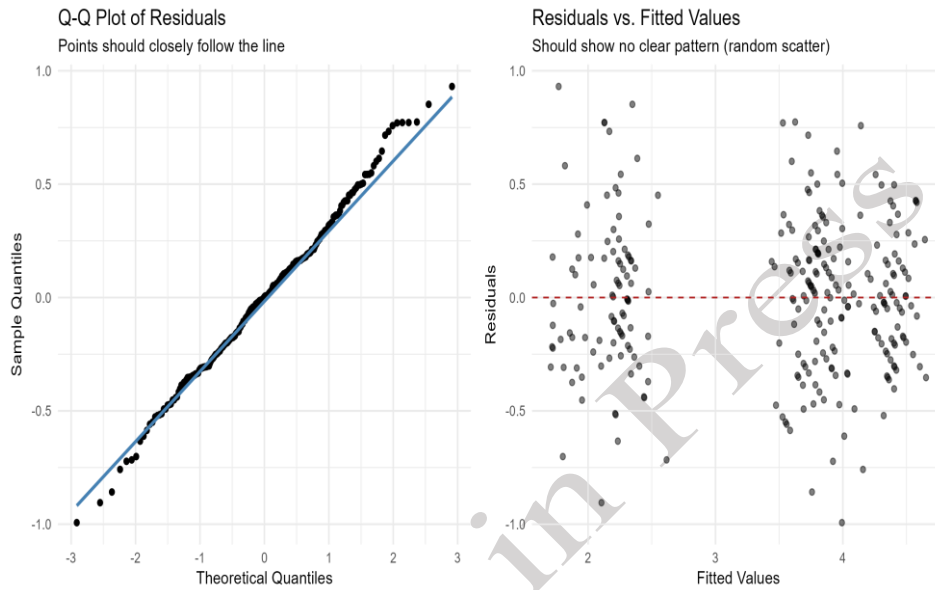
Finally, a number of other factors were found to be non-significant predictors in the final model. These include cultural and contextual factors, competitive intensity and gender.

## 4.4. Model Validation

To ensure the reliability of the HLM results, diagnostic checks were performed on the model's residuals. As shown in

Figure 6, the Q-Q plot confirms the assumption of normality, as the points closely follow the theoretical line. The residuals vs. fitted plot supports the

assumption of homoscedasticity, showing a random scatter of points with no discernible pattern. These checks validate the appropriateness of the final model.



**Figure 6 - Diagnostic Plots for the Final HLM**

#### 4.5. Final Model Equation

The results of the final HLM analysis can be summarized in the combined mixed-effects model equation:

$$PGW_{ij} = \beta_{00} + \beta_{10}(AG_{ij}) + \beta_{20}(EG_{ij}) + \beta_{30}(ICT_{ij}) - \beta_{40}(RLP_{ij}) + u_{0j} + e_{ij}$$

Where:

- $PGW_{ij}$  = perceived greenwashing score for individual  $i$  in country  $j$
- $\beta_{00}$  = grand mean intercept
- $\beta_{10}$  through  $\beta_{40}$  = represent the fixed-effect coefficients for each predictor
- $u_{0j}$  = country-level random effect
- $e_{ij}$  = individual-level residual

#### 4.6. Summary of Findings

The final HLM analysis provides a robust and theoretically coherent explanation of the factors driving perceived greenwashing. The model's fixed effects collectively explained a substantial portion of the variance in PGW, with a Marginal  $R^2$  of 0.642, indicating that 64.2% of the variance can be attributed to the predictors in the model.

The key takeaway is a significant shift in focus from demographic determinism to the central role of cognitive and experiential factors. The analysis clearly demonstrates that what consumers know (Awareness) and what they have seen (Exposure) are far more important in shaping their skepticism than simply which generation they belong to. Table 6 summarizes the outcomes for the key variable types investigated in this study.

**Table 6- Summary of Key Findings by Variable Type**

Variable Type	Key Predictors	Finding	Outcome
Experiential Factors	Awareness (AG), Exposure (EG)	Both strong, positive, highly significant predictors; primary drivers of PGW.	Supported
Demographics	Generational Cohort	Not significant once awareness and exposure are included.	Not Supported
Contextual Factors	ICT, RLP	ICT positive predictor; RLP negative predictor; both significant in shaping perceptions.	Supported

#### 5. Discussion and Conclusion

The primary objective of this study was to develop a multilevel model to understand the factors predicting consumers' perception of greenwashing, with a particular emphasis on the role of generational cohorts. The analysis yielded several crucial insights that both align with and challenge current theoretical perspectives. The final Hierarchical Linear Model (HLM) provided a robust explanation of the variance in perceived greenwashing, highlighting the primacy of cognitive and experiential factors over simple demographic categorizations. The discussion is structured around the most significant findings of the study.

##### 5.1. The Primacy of Awareness and Exposure

The most compelling and statistically powerful finding of this study is the dominant predictive power of awareness of greenwashing ( $\beta = 0.510, p < .001$ ) and exposure to greenwashing ( $\beta = 0.301, p < .001$ ). This result suggests that the perception of greenwashing is less a function of inherent personality traits or broad demographic characteristics and more a product of cognitive and experiential learning. This aligns with the theoretical framework proposed by scholars like Delmas and Burbano (2011), who argued that a key driver of greenwashing is the information asymmetry between firms (who know their

practices) and consumers (who must rely on claims). Our study empirically demonstrates that when this asymmetry is reduced—either through increased consumer knowledge (awareness) or direct experience with suspect claims (exposure)—the ability and propensity to perceive greenwashing increase dramatically.

This finding extends the existing literature by disentangling two related but distinct concepts. While much research treats "consumer knowledge" as a monolithic construct, our study suggests that both a general, cognitive understanding of the concept of greenwashing (awareness) and the repeated, practical experience of encountering it (exposure) are independently and significantly important. This supports the notion that skepticism towards green claims is a learned behavior, honed through both education and real-world market interactions. Consumers who know what to look for, and who have seen it before, are simply better equipped to identify it again.

### **5.2. A Re-evaluation of Generational Effects**

Perhaps the most theoretically significant finding of this research is the non-significance of generational cohorts after controlling for awareness and exposure. While many studies and popular press articles posit that younger generations like Gen Y and Gen Z are inherently more skeptical of corporate claims (Szabo & Webster, 2021), our final model did not support this conclusion. This finding does not necessarily contradict the idea that younger consumers are more likely to perceive greenwashing; rather, it provides a crucial explanation for *why*.

The results suggest that the "generational effect" is not a direct consequence of age or cohort identity itself, but is more likely an artifact of the information environment that different generations inhabit. Younger consumers, having grown up as digital natives, have been immersed in an ecosystem of social media, online news, and peer-to-peer communication where corporate misconduct and greenwashing are frequent topics of critical discussion. This environment naturally leads to higher levels of both awareness and exposure. Therefore, the finding that the generational effect disappears when these two variables are added to the model provides strong evidence for a mediational relationship: being a member of a younger generation increases one's awareness and exposure, which in turn increases the perception of greenwashing.

This insight offers a vital refinement to generational theory in the context of sustainability marketing. It cautions against treating generations as monolithic blocks with innate characteristics and instead encourages researchers to focus on the socio-technical and informational contexts that shape each generation's experiences and knowledge. The defining factor is not the year a person was born, but the information they have been equipped with.

### 5.3. The Role of Contextual Perceptions (ICT & RLP)

The study also found that consumers' perceptions of the broader market and regulatory environment are significant, albeit smaller, predictors of their skepticism. The positive relationship between perceptions of industry and corporate type and PGW ( $\beta = 0.123, p < .05$ ) aligns with research suggesting that consumers develop heuristics or stereotypes about certain industries (e.g., oil and gas, fast fashion) being more prone to disingenuous claims (de Freitas Netto et al., 2020). Consumers do not evaluate claims in a vacuum; they bring pre-existing beliefs about industry norms to their interpretations.

Conversely, the negative relationship between perceptions of regulatory, legislation & policies and PGW ( $\beta = -0.118, p < .05$ ) is a novel and important finding. It suggests that consumer trust is not only a function of corporate behavior but also of perceived governmental oversight. When consumers believe that strong, effective regulations are in place to police environmental claims, their baseline level of skepticism decreases. This highlights the crucial role that robust policy and clear standards can play in fostering a more trusting marketplace for green products.

### 5.4. Implications of the Study

The findings of this research offer several important implications for theory, management, and policy.

#### 5.4.1. Theoretical Implications

**1. Reframing Generational Studies:** This study contributes to generational theory by demonstrating that experiential and cognitive variables can fully account for observed differences between age cohorts. Future research on intergenerational differences in consumer behavior should move beyond direct comparisons and investigate the underlying mechanisms (such as information exposure and education) that drive these differences.

**2. Advancing Greenwashing Theory:** The research clearly establishes consumer awareness and exposure as the primary antecedents to perceived greenwashing. This solidifies the "information asymmetry" perspective of greenwashing and highlights the importance of consumer education and information dissemination as key moderators of its effectiveness.

**3. Differentiating Skepticism:** The non-significance of general "Cultural and Contextual Factors" (initially conceptualized as consumer cynicism) suggests that skepticism towards greenwashing is a domain-specific attitude, distinct from a general distrust of corporations. This calls for more nuanced measurement and theorization of consumer skepticism in marketing research.

#### 5.4.2. Managerial Implications

**1. Beyond Generational Targeting:** Marketers should be cautious about strategies based purely on generational stereotypes. Instead of simply targeting "Gen Z," a more effective approach would be to segment consumers based on

their level of environmental awareness and engagement. The "informed consumer," regardless of age, is the most critical audience.

**2. The Futility of Deception:** For a growing segment of the market, greenwashing is not only unethical but also ineffective. As awareness and exposure continue to rise, particularly through digital channels, deceptive claims are increasingly likely to be identified and punished through negative word-of-mouth and brand abandonment. Authenticity and transparency are no longer optional but are essential for long-term brand equity.

**3. Education as a Marketing Tool:** Companies with genuinely strong environmental credentials can gain a competitive advantage by investing in consumer education. By helping consumers understand the complexities of sustainability and how to spot misleading claims, authentic brands can build trust and differentiate themselves from greenwashers.

#### **5.5. Limitations and Directions for Future Research**

While this study provides valuable insights, it is important to acknowledge its limitations, which also serve as opportunities for future research.

**1. Cross-Sectional Data:** The study's cross-sectional design allows for the identification of significant relationships but does not permit causal inference. Future research could employ longitudinal designs to track how changes in awareness and exposure over time affect individuals' perceptions of greenwashing.

**2. Geographic Scope:** The data were collected from two non-Western countries, India and Iran. While this provides a valuable and under-researched perspective, the findings may not be generalizable to Western or other cultural contexts. Future research should seek to replicate this model across a more diverse range of countries to test the cross-cultural validity of the findings.

**3. Self-Report Measures:** The study relied on self-report measures for all constructs. While the scales demonstrated high reliability, future research could benefit from experimental designs that manipulate specific greenwashing claims and measure behavioral outcomes (e.g., purchase intention, brand trust) in addition to perceptual ones.

**4. Model Specification:** The HLM analysis revealed no significant unexplained variance at the country level after accounting for individual predictors. While this was an important finding, it precluded the possibility of investigating Level-2 predictors (e.g., national environmental policies, cultural values). Future studies with a larger number of countries could provide sufficient statistical power to explore such country-level effects.

#### **5.6. Conclusion**

In an era where sustainability has become a central concern for consumers, understanding the dynamics of greenwashing is of paramount importance. This research sought to uncover the factors that predict consumers' perception of

deceptive environmental claims, with a particular focus on the role of generational cohorts. The findings delivered a clear and compelling message: the key to perceiving greenwashing is not who you are, but what you know and what you have seen.

The study demonstrated that consumer awareness and direct exposure to suspect claims are the primary drivers of skepticism, so much so that they fully account for the widely assumed differences between generations. This shifts the conversation from simplistic demographic targeting to a more nuanced understanding of the informed consumer. For businesses, this research serves as a stark reminder that in an increasingly transparent and interconnected world, authenticity is the only sustainable strategy. For academics, it offers a refined model for understanding consumer skepticism and a clear direction for future inquiry.

#### **Conflict of Interest Statement**

The authors declare that there is no conflict of interest regarding the publication of this manuscript. The research was conducted independently, without any financial, commercial, or institutional relationships that could be construed as a potential conflict. All data collection, analysis, and interpretation were carried out in accordance with ethical guidelines, and no external entity influenced the study design or findings

Articles in Progress

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