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Research Article

The "Eco-Chameleon" Effect in Fast Fashion: Assessing Consumer Deception Risks via a Multi-Criteria Approach

Mahmut Selami Akın[a] & Serkan Eti[b]

Abstract

Introduction: Sustainability has emerged as a central concern in marketing science. In the fast fashion industry, however, it is complicated by widespread greenwashing practices. Although existing literature primarily evaluates greenwashing through linguistic ambiguities and corporate motivations, a deeper understanding of its perceptual dynamics remains necessary. The present study integrates marketing analytics with greenwashing tactics to investigate the mechanisms underlying manipulative environmental claims and their effects on consumer deception.

Method: A quantitative and updated multi-criteria approach was employed using the Simple Weight Calculation (SIWEC) method. Seven distinct greenwashing tactics were evaluated by marketing experts and ranked through SIWEC, systematically assessing their relative influence on consumer perception and the associated risks of consumer deception.

Results or Findings: The results indicate that "False Labeling" and "Visual Manipulation" are the most influential tactics used to mislead consumers. The analysis demonstrates that, instead of relying exclusively on text-based claims, companies are increasingly employing non-verbal, nature-themed visual fabrications, referred to as "Eco-Chameleon" strategies, to manipulate consumer perceptions.

Discussion or Conclusion: In contrast to traditional research that primarily emphasizes linguistic deception, the study highlights the influential manipulative role of visual imitation on the consumer decision-making process.The findings have substantial implications for marketing practitioners and policymakers, indicating that regulatory frameworks should be updated to explicitly address visual semiotics in addition to reported sustainability claims to enhance market transparency and protect consumer welfare.

Keywords: consumer behavior, greenwashing, fast fashion, sustainability, marketing ethics, SIWEC method.

JEL Codes: M30, M31, M39

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Araştırma Makalesi

Hızlı Modada 'Eko-Bukalemun' Etkisi: Tüketici Aldatma Risklerinin Çok Kriterli Bir Yaklaşımla Değerlendirilmesi

Mahmut Selami Akın[a] & Serkan Eti[b]

Öz

Giriş: Sürdürülebilirlik, pazarlama biliminde temel bir odak noktası olarak öne çıkmaktadır. Ancak hızlı moda endüstrisinde bu durum, yaygın yeşil aklama (greenwashing) uygulamaları nedeniyle karmaşık bir hal almaktadır. Mevcut literatür yeşil aklamayı ağırlıklı olarak dilsel belirsizlikler ve kurumsal motivasyonlar üzerinden değerlendirse de, bu kavramın algısal dinamiklerinin daha derinlemesine anlaşılmasına halen ihtiyaç duyulmaktadır. Bu çalışma, manipülatif çevresel iddiaların altında yatan mekanizmaları ve bunların tüketicinin aldatılması üzerindeki etkilerini incelemek amacıyla pazarlama analitiği ile yeşil aklama taktiklerini entegre etmektedir.

Yöntem: Basit Ağırlık Hesaplama (SIWEC) yöntemi kullanılarak nicel ve güncel çok kriterli bir yaklaşım benimsenmiştir. Yedi farklı yeşil aklama taktiği pazarlama uzmanları tarafından değerlendirilmiş ve SIWEC aracılığıyla sıralanarak; bu taktiklerin tüketici algısı üzerindeki göreceli etkileri ile barındırdıkları tüketiciyi aldatma riskleri sistematik olarak ölçülmüştür.

Sonuçlar ya da Bulgular: Sonuçlar, "Sahte Etiketleme" ve "Görsel Manipülasyon"un tüketicileri yanıltmak için kullanılan en etkili taktikler olduğunu göstermektedir. Analiz, şirketlerin yalnızca metin tabanlı iddialara dayanmak yerine, tüketici algılarını manipüle etmek için giderek artan bir oranda "Eko-Bukalemun" stratejileri olarak adlandırılan sözsüz ve doğa temalı görsel kurgulara başvurduğunu ortaya koymaktadır.

Tartışma ya da Yapılan Çıkarımlar: Araştırma, ağırlıklı olarak dilsel belirsizliğe odaklanan geleneksel çalışmaların aksine, görsel kurgunun tüketicilerin karar verme süreçleri üzerindeki manipülatif rolüne dikkat çekmiştir. Bulgular ise pazar şeffaflığını yeniden sağlamak ve tüketici refahını korumak için yasal düzenlemelerin görsel göstergeleri de kapsaması gerektiğini önererek sosyal politika ve pazarlama etiği alanlarına önemli katkılar sunmaktadır.

Anahtar Kelimeler: tüketici davranışı, yeşil aklama, hızlı moda, sürdürülebilirlik, pazarlama etiği, SIWEC yöntemi.

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Introduction

The global fashion industry constitutes one of the most dominant sectors in the world economy, with the apparel market revenue reaching approximately 1.79 trillion USD in 2024 and projected to exceed 2.26 trillion USD by 2030. Within this expansive landscape, the fast fashion segment has demonstrated remarkable momentum, valued at approximately $148 billion USD in 2024, showing a rapid increase to 150.82 billion USD. It is expected to grow at a compound annual growth rate (CAGR) of over 10% in the coming decade, driven largely by consumption trends in the Asia-Pacific and North American regions. This industrial expansion is mirrored by a massive surge in production volume, which has effectively doubled since 2000, now exceeding 100 billion garments annually worldwide (Tcholakova, 2025; Thuy, 2025). However, parallel to this mass production, the sustainable fashion market is witnessing an unprecedented rise. Valued at approximately 7.9 billion USD in 2024, this niche market is projected to expand at a CAGR of 23.5%, reaching nearly 33 billion USD by 2033, reflecting a structural shift in consumer paradigms toward ethical consumption (Tcholakova, 2024). Shein dominates the fast fashion market in the United States with a 50% share, followed by H&M (16%) and Zara (13%) (Cardona, 2025).

Despite its economic contributions, the fashion industry, particularly fast fashion, is widely seen as a major contributor to global environmental degradation. The sector uses excessive water, causes chemical pollution, and generates large amounts of textile waste. It creates a paradox between industrial growth and ecological preservation (Mousavi et al., 2024). Meanwhile, consumer environmental awareness is rising. Modern consumers now scrutinize the ecological footprint of their purchases and increasingly support brands that share their environmental values. The growing sustainability awareness pressures firms to disclose their environmental performance. As a result, "greenness" has become a significant competitive advantage in the crowded marketplace (Badhwar et al., 2024). However, consumers who aim for sustainable consumption often face complex informational barriers (Testa et al., 2018). In fashion, these barriers are worsened by deceptive marketing that exploits consumers' inability to verify environmental claims.

The lucrative nature of the green market has incentivized some firms to manipulate consumer demand through deceptive marketing strategies, a phenomenon known as greenwashing. Grounded in Signaling Theory, greenwashing can be understood as a strategic abuse of information asymmetry, where firms transmit false or exaggerated positive signals about their environmental performance to consumers who lack the expertise to verify these claims (Santos et al., 2024b). In the context of fast fashion, where supply chains are complex and opaque, brands frequently exploit this asymmetry to gain unwarranted legitimacy. By presenting products as more environmentally friendly than they actually are, firms aim to capitalize on the green trend without incurring the actual costs of sustainable production, thereby misleading stakeholders and distorting market competition (Alizadeh et al., 2024).

As greenwashing tactics become more sophisticated, fast fashion companies are increasingly adopting an “Eco-Chameleon” strategy. This approach involves manipulating semiotic codes, including fake certifications, ambiguous eco-friendly terminology, and nature-inspired aesthetics, to circumvent consumer skepticism and superficially integrate into the sustainable market. Analogous to the historical evolution of discursive strategies in the fossil fuel industry that delayed energy transitions (Gentile & Gupta, 2025), fast fashion brands may employ these deceptive visual and linguistic cues to preserve market dominance without implementing substantive environmental improvements.

Moreover, the landscape of greenwashing has evolved from simple false claims to more sophisticated and covert tactics, challenging the consumer's ability to distinguish between genuine and fake sustainability. Brands utilize a diverse array of strategies, ranging from vague terminology (e.g., conscious, eco-friendly) and visual manipulation (e.g., using green themes or nature imagery) to hiding trade-offs and price-based deception (Ende et al., 2023; Mathew & Spinelli, 2025). According to Perceived Risk Theory, this proliferation of misleading tactics significantly increases the perceived risk and confusion among consumers, fostering a deep-seated skepticism toward all green claims (Lu et al., 2022). As consumers struggle to decipher the validity of environmental assertions, their trust in the industry erodes, leading to a phenomenon where even genuinely sustainable brands face scrutiny and skepticism (Nguyen et al., 2019).

Although the existing literature has extensively documented the existence of greenwashing and its general negative impact on consumer trust and brand equity (Munir & Mohan, 2022; Xiao et al., 2022), there remains a notable gap regarding the comparative risk analysis of specific greenwashing tactics in the fashion industry. Most prior studies have focused on the binary presence of greenwashing or its broad classification, yet there is a lack of quantitative research that prioritizes these tactics based on their potential to deceive consumers. Specifically, it is not sufficiently clear which specific tactic, such as false labeling versus vague claims, poses the highest risk of consumer deception in the fast fashion context. Understanding the hierarchy of these risks is crucial for developing targeted interventions. Therefore, multi-criteria decision-making (MCDM) approaches should be highly effective in uncovering the greenwashing implementations causing consumer deception.

Recent studies have increasingly adopted quantitative and multi-criteria decision-making MCDM methods to dissect the complex mechanisms of greenwashing across various high-impact industries. Daga et al. (2025) utilized TISM and MICMAC analyses to model the interaction of factors discouraging ESG greenwashing, highlighting the systemic relationships between regulatory pressures and internal corporate drivers. In the construction sector, Li et al. (2025) employed agent-based modeling integrating new institutionalism theory to demonstrate how government regulation and public scrutiny synergistically curb greenwashing behaviors, while an earlier study by Li et al. (2023) used the Grey-DEMATEL method to map the causal relationships of these influencing factors, identifying environmental regulation as a critical determinant. Focusing on corporate governance in the financial sector, Poiriazi et al. (2025) integrated Entropy Weight and TOPSIS methods to rank the influence of board characteristics on greenwashing mitigation, finding that specific board attributes significantly affect transparency.

Moreover, Sklavos et al. (2025) assessed the eco-efficiency of European financial institutions using a hybrid DEA-CRITIC-TOPSIS approach, establishing a performance ranking based on green accounting and ESG indicators. Furthermore, within the context of digital transformation, Xu et al. (2025) applied a multi-period difference-in-differences (DID) model to reveal that digital-driven mergers and acquisitions significantly reduce corporate greenwashing among Chinese listed firms by enhancing governance mechanisms. Despite the growing application of MCDM techniques to evaluate greenwashing drivers in the finance and construction sectors, there remains a significant scarcity of research applying these robust decision-making tools to the fast fashion industry, specifically to prioritize consumer deception tactics. This study addresses this gap by employing the Simple Weight Calculation (SIWEC) method to establish a risk hierarchy of specific greenwashing tactics, thereby offering a novel quantitative perspective on consumer deception in the fashion context.

Expanding upon previous methodologies, the present study applies the Simple Weight Calculation (SIWEC) method, a robust MCDM approach, to consumer deception tactics, thereby complementing existing research and redirecting the focus from corporate causalities to market outcomes. By ranking these tactics according to their deceptive impact, the study offers a clearer understanding of the role of greenwashing on consumer decision-making and market dynamics. Consequently, the study aims to fill the gap by prioritizing greenwashing tactics according to the risk of consumer deception. To address this critical gap, the central research question of the study is below.

> RQ: How do different greenwashing tactics in the fast fashion industry compare in their potential to generate consumer deception risk, and which specific non-verbal or textual strategies present the greatest threat to sustainable consumption?

Furthermore, several criteria were defined in the research through a comprehensive literature review, enabling a novel quantitative ranking of greenwashing practices. The greenwashing criteria derived from the comprehensive literature review were subsequently evaluated and prioritized by a panel consisting of academic and sectoral experts. On the other hand, the findings should provide actionable insights for policymakers to regulate the most detrimental practices and for comprehending sustainable consumer behavior to improve green literacy, thereby supporting a more transparent and trustworthy sustainable fashion ecosystem. Additionally, for fast fashion brands, these insights offer strategic guidance to align marketing communications with authentic sustainability initiatives, reducing reputational risks and promoting consumer trust and long-term brand loyalty in a market characterized by increasing consumer skepticism. Ultimately, adopting research recommendations positions all stakeholders to drive meaningful progress toward a genuinely sustainable fashion industry.

Literature Review

Theoretical Framework

To understand the dynamics of greenwashing in the fast fashion industry and its impact on consumers, this study draws upon two complementary theories: Signaling Theory and Perceived Risk Theory. These theoretical lenses provide a robust basis for explaining why firms engage in deceptive practices and how consumers process and react to these misleading environmental claims.

Signalling Theory, initially developed within economics and finance (Spence, 1973) to clarify the resolution of information asymmetry in labour and financial markets, addresses challenges that arise when two parties, such as sellers and buyers, possess unequal information. The foundational theory has been widely adopted in marketing literature to explain how brands communicate in sustainable marketing strategy (Taoketao et al., 2018) and unobservable product attributes (Wang et al., 2020), including eco-labels (Sigurdsson et al., 2022) and environmental friendliness (Cao & Zhang, 2024). In the fashion industry, information asymmetry is particularly prevalent; brands have comprehensive knowledge of their supply chains and production processes, whereas consumers typically lack the expertise or resources to verify a product's environmental attributes prior to purchase (Alizadeh et al., 2024). To address this disparity, firms employ signals such as eco-labels, sustainability reports, and green marketing campaigns to communicate these otherwise unobservable quality attributes to buyers.

However, greenwashing emerges when these signals are manipulated. According to recent literature, dishonest firms in the fast fashion sector exploit information asymmetry by transmitting false or exaggerated signals to gain a competitive advantage without incurring the cost of genuine sustainable practices (Santos et al., 2024a). For instance, a conscious collection tag acts as a positive signal, suggesting environmental responsibility. When this signal does not correspond to the actual environmental performance, it transforms into a deceptive mechanism that distorts market efficiency and misleads stakeholders (Badhwar et al., 2024).

Within the context of manipulated signals, the study introduces and highlights the 'Eco-Chameleon' concept. The 'Eco-Chameleon' effect describes the highly adaptive and deceptive strategies that corporations use to superficially integrate into the sustainable market without implementing substantive operational changes. Analogous to a chameleon changing its colours to blend into its surroundings, fast fashion brands manipulate external semiotic codes (Ertürk, 2024), including visual aesthetics (Basso et al., 2023), packaging (Boncinelli et al., 2023), and marketing rhetoric (Siew et al., 2024), to create an illusion of ecological responsibility (Roos, 2025). This phenomenon extends beyond traditional false advertising; it constitutes a systemic adaptation in which firms continually refine deceptive cues to circumvent growing consumer skepticism and regulatory oversight, resulting in a significant disconnect between brand image and actual environmental performance (Gallas et al., 2025; Ha et al., 2022; Tu et al., 2024).

While Signaling Theory and the Eco-Chameleon effect explains the firm's behavior, Perceived Risk Theory elucidates the consumer's reaction. First introduced by Bauer (1960), this theory posits that consumer behavior is driven by the desire to minimize the uncertainty and potential negative consequences associated with a purchase. In the realm of sustainable fashion, greenwashing significantly amplifies consumers' perceived risk, specifically the risk of being deceived or making an unethical choice despite good intentions (Lu et al., 2022).

When consumers are exposed to inconsistent or vague green claims (e.g., eco-friendly without certification), their skepticism increases, and they perceive a higher risk of psychological loss and functional loss such as buying a product that does not perform as promised (Wang & Jung, 2025). Consequently, the prevalence of greenwashing tactics in the fast fashion industry not only erodes trust in specific brands but also creates a generalized green skepticism, making it difficult for genuinely sustainable brands to signal their legitimacy effectively (Akturan, 2018). Moreover, recent research emphasize that misleading environmental information does not merely cause confusion but triggers a sense of brand betrayal among consumers, directly leading to boycotts and reputational damage (Zhong & Kim, 2025). Therefore, identifying the specific tactics that create this deception is crucial for market stability. The present study utilizes these theories to categorize and prioritize specific greenwashing tactics based on the magnitude of the risk they pose to the consumer.

Taxonomy of Greenwashing Tactics

To systematically analyze the risk of consumer deception in the fast fashion industry, this study synthesizes the dispersed tactics identified in recent literature into two distinct cognitive categories: (1) *Claim and Evidence-Based Tactics*, which rely on explicit textual misinformation and unverifiable assertions; and (2) *Associative and Structural Manipulations*, which exploit psychological heuristics through visual cues and pricing strategies.

Consequently, seven specific greenwashing tactics emerged through the literature review. These were not determined arbitrarily; rather, they were systematically derived from a comprehensive review of the current sustainability and marketing literature. Additionally, they represent the most prevalent and impactful deceptive tactics specifically utilized within the fast

fashion industry. Other potential greenwashing criteria were excluded from the scope of this study to maintain a focused evaluation on the tactics that most directly manipulate consumer perception and visual semiotics in the fast fashion industry.

Claim and Evidence-Based Tactics

This category encompasses tactics where brands manipulate the direct information provided to consumers. These practices exploit the consumer's reliance on linguistic cues and certifications to assess environmental legitimacy.

- False Labeling: False labeling represents the most explicit and legally risky form of greenwashing. It involves the use of fake labels, counterfeit certificates, or misleading text that claims third-party endorsement where none exists. In the fast fashion sector, this often manifests as brands self-declaring a product as "Certified Organic" or "100% Recycled" without valid verification from recognized bodies such as the Global Organic Textile Standard (GOTS) (Mousavi et al., 2024). Wang and Jung (2025) argue that false labeling poses a severe cognitive risk because consumers utilize labels as primary heuristic cues to reduce decision-making effort; when these cues are fabricated, the fundamental trust mechanism is breached. Furthermore, recent literature highlights the need for technological interventions to address greenwashing and false labeling. The use of Digital Product Passports (DPP) and blockchain-based traceability is seen as essential to reducing information asymmetry in supply chains. Scholars argue these decentralized technologies can verify market signals, increase transparency, and help regain consumer trust in sustainability claims (Acciai & Pérez-Bou, 2025; Guo et al., 2020).
- Vague Claims: Unlike false labeling, which relies on falsifiable lies, vague claims utilize semantic ambiguity to create a positive impression without legal accountability. This tactic involves the use of broad, undefined, and non-regulated terms such as "eco-friendly," "conscious," "green," or "nature-inspired" (Badhwar et al., 2024; Simão et al., 2022). Since these terms lack standardized metrics in the textile industry, brands can interpret them subjectively. For instance, a product may be labeled sustainable simply for using slightly less water than the industry average, creating a gap between the literal meaning and the consumer's interpretation of environmentally harmless (Alizadeh et al., 2024).
- Lack of Proof: This criterion refers to environmental claims that cannot be substantiated by accessible evidence. According to Mousavi et al. (2024), while brands frequently emphasize transparency in their marketing rhetoric, they often fail to provide verifiable data, such as supplier lists, carbon footprint calculations, or valid certification codes (e.g., a QR code linking to a report), at the point of purchase. The absence of proof forces consumers to rely on blind trust. When claims are not backed by accessible verification, information asymmetry widens, leaving the consumer unable to validate the product's actual environmental impact (Santos et al., 2024a).

Associative and Structural Manipulations

This category includes tactics that do not necessarily rely on explicit verbal claims but rather exploit consumers' psychological heuristics and lack of technical knowledge through visual cues, pricing strategies, and selective disclosure.

- Visual and Atmospheric Manipulation (Green Sheen): Often termed "green sheen," this tactic involves the strategic use of non-verbal cues—such as nature-related imagery

(e.g., leaves, forests) and a specific color palette dominated by greens, browns, and soft earthy tones—to evoke a false perception of sustainability. Ende et al. (2023) demonstrate that fast fashion brands use these visual heuristics to trigger an automatic eco-friendly association in the consumer's mind. Even without explicit claims, this atmospheric illusion masks the synthetic nature of the garments, leading consumers to perceive the brand as environmentally responsible based solely on aesthetic codes (Alizadeh et al., 2024). Moreover, recent methodological discussions emphasize the need to move beyond traditional self-report measures to better understand the latent psychological impacts of visual manipulation and the 'Eco-Chameleon' effect. Researchers recommend incorporating neuroscientific methods, including neuromarketing techniques such as eye-tracking and electroencephalography (EEG), to objectively assess unconscious cognitive processing related to greenwashing. These advanced approaches are considered essential for elucidating how nature-inspired visual stimuli and green aesthetics may circumvent consumers' rational evaluation (Ćirović et al., 2024; Liu et al., 2023).

- Price-Based Perception Management (Price Deception): This tactic exploits the consumer heuristic that higher price implies higher ethical quality. In the fast fashion context, consumers often equate ultra-low prices with exploitation and poor environmental standards, conversely if higher-priced items (e.g., a Premium Sustainable Line) are genuinely eco-friendly (Ende et al., 2023). Brands manipulate this perception by artificially inflating the prices of their green collections to signal legitimacy. This price-based signaling creates a false sense of ethical consumption, where the consumer pays a premium not for verified environmental benefits, but for the alleviation of guilt (Wang & Jung, 2025).

- Hidden Trade-off (The Capsule Collection Paradox): Uniquely prevalent in the fashion industry, this tactic involves promoting a small, exclusive collection made from sustainable materials (e.g., organic cotton) as the face of the brand's identity, while the vast majority of production continues to rely on resource-intensive conventional materials (Munir & Mohan, 2022). By disproportionately advertising this niche capsule collection, brands create a "halo effect" that greenwashes the entire organization (Hora & Subramanian, 2019). This distracts stakeholders from the unsustainable reality of the brand's core business model (Santos et al., 2024a).

- Downsizing Negative Aspects: This tactic involves highlighting a minor positive environmental attribute while deliberately concealing significant negative impacts (Wang & Jung, 2025). For example, a brand may promote a garment made from recycled polyester to appeal to circular economy trends, while omitting the fact that the dyeing process releases toxic chemicals into water systems (Rashid & Arshad, 2023). By focusing attention on a single hero attribute, brands successfully divert scrutiny from their carbon-intensive supply chains.

Given the sophisticated nature of the mentioned greenwashing tactics, consumer behavior in sustainable fashion reveals a notable paradox within the generational context. Although current research demonstrates that Gen Z exhibits high environmental awareness and climate sensitivity, they frequently display a significant intention-behavior gap, primarily influenced by the attractiveness of low-cost, trend-driven fast fashion (Kang & Badal, 2025). This paradox indicates that younger consumers may be particularly susceptible to advanced greenwashing strategies, which complicates their capacity to make authentically sustainable purchasing decisions (Bytof & Ritch, 2023; Williams & Hodges, 2022).

The next section explains the methodology of the research.

Methodology

The present study utilizes a quantitative research design grounded in the Simple Weight Calculation (SIWEC) method, a multi-criteria decision-making (MCDM) approach developed by Puška et al. (2023). The application of the SIWEC method to consumer deception tactics shifts the analytical focus from corporate origins to market consequences. The primary aim of the methodology is to determine the relative importance weights of identified greenwashing tactics according to the risk of consumer deception. In contrast to previous research that has focused on internal firm dynamics or the existence of greenwashing, the mentioned multi-criteria approach offers a quantitative framework for assessing the hierarchical impact of various deceptive strategies on consumer decision-making in the marketplace.

The SIWEC Method

The SIWEC method was selected for this study due to its distinct advantages over traditional MCDM methods such as AHP or ANP. Unlike methods that require complex pairwise comparisons, which can lead to inconsistency and high cognitive burden for experts, SIWEC allows decision-makers to evaluate criteria directly using a defined scale. This approach ensures high consistency in results while effectively capturing expert judgements in environments characterized by subjective uncertainty (Puška et al., 2024). In addition, its use of standard deviation differentiates it from other methods. It allows experts to conduct a broader evaluation, thus leading to more realistic results. Unlike methods such as Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP), SIWEC differs in this respect and also uses less data because it does not rely on pairwise comparisons in the evaluation process. While the number of items increases exponentially with increasing criteria in methods like AHP, ANP, and DEMATEL, it increases linearly in SIWEC (Özçalıcı et al., 2025). It positively impacts the process when there are many criteria (Puška et al., 2023; Pamucar et al., 2018). The method is particularly suitable for this study as it facilitates the prioritization of seven distinct greenwashing criteria without the mathematical complexity that often obscures practical insights.

Moreover, comparative studies in the literature highlight a significant limitation of traditional methods such as AHP and ANP. These methods are vulnerable to the rank reversal phenomenon and depend on enforced matrix consistency (Cinelli et al., 2020; Wang & Luo, 2009). When evaluating deceptive marketing practices, the relative eigenvector calculations in AHP frequently smooth out divergent expert opinions. This process aims to achieve an acceptable consistency ratio, yet it should result in misclassification of greenwashing risks. Evidence from the literature demonstrates that methods emphasizing absolute evaluation and direct variance, such as SIWEC, yield fundamentally different and more robust outcomes. Instead of imposing a relative trade-off between essential criteria such as 'False Labeling' and 'Visual Manipulation', SIWEC maintains genuine divergence in expert risk assessments. This approach ensures final rankings more accurately represent the complexities of real-world markets, rather than reflecting mathematical compromises imposed by matrix normalization (Munier & Hontoria, 2021).

The next section is about the formulation of methodology, including the Fermatean fuzzy SIWEC for calculating the importance of criteria.

Fermatean Fuzzy Sets

Under uncertainty, fuzzy logic is used to perform calculations with words. Within the scope of fuzzy logic, the membership and non-membership degrees of an object to a set, along with hesitancy, are considered. In Fermatean fuzzy sets, the third powers of membership (μ) and non-membership (ϑ) degrees are used. This definition offers a unique approach to expressing unreliable, imprecise, and ambiguous information in a fuzzy environment.

A Fermatean fuzzy set $(\tilde{F})$ in a set S is represented in Equation (1).

$$\tilde{F} = \{u, \mu_{\tilde{F}}(u), \vartheta_{\tilde{F}}(u) : u \in S\} \quad (1)$$

Where μ and ϑ are between zero and one. The condition in Fermatean fuzzy sets is shown in Equation (2).

$$0 \leq \mu_{\tilde{F}}(u)^3 + \vartheta_{\tilde{F}}(u)^3 \leq 1 \quad (2)$$

The hesitancy function is obtained Equation (3).

$$\pi_{\tilde{F}}(u) = \sqrt[3]{1 - (\mu_{\tilde{F}}(u)^3 + \vartheta_{\tilde{F}}(u)^3)} \quad (3)$$

Let $\tilde{F} = (\mu_{\tilde{F}}, \vartheta_{\tilde{F}})$ be a Fermatean fuzzy number. The score and accuracy values are defined in Equations (4) and (5), respectively.

$$S(\tilde{F}) = 1 + \mu_{\tilde{F}}^3 - \vartheta_{\tilde{F}}^3 \quad (4)$$

$$A(\tilde{F}) = \mu_{\tilde{F}}^3 + \vartheta_{\tilde{F}}^3 \quad (5)$$

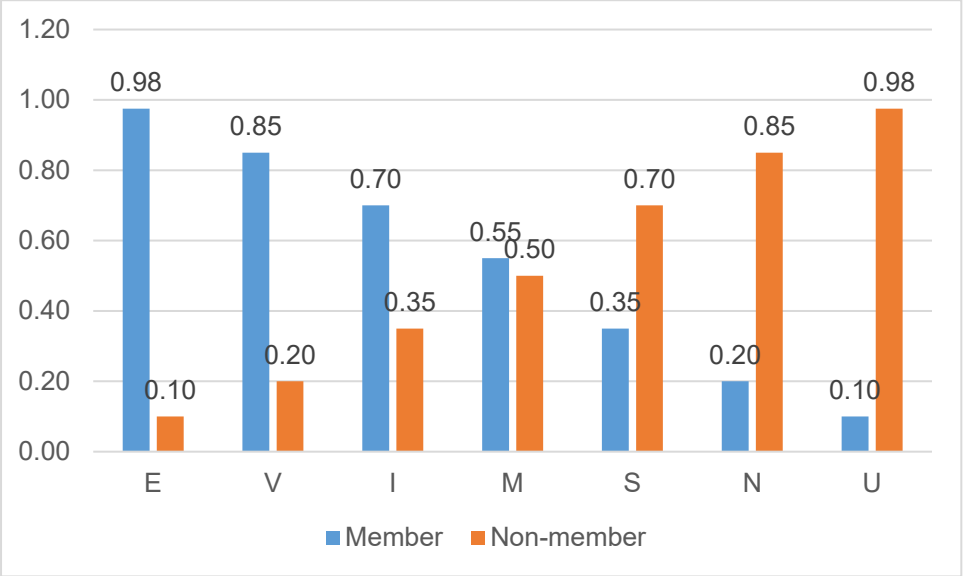
FF-SIWEC

The SIWEC method uses the standard deviation of expert ratings to determine the importance of criteria. This allows for more realistic and accurate ratings from experts. The calculation of the method using Fermatean fuzzy numbers is as follows.

Once n criteria are determined, e experts evaluate the importance of each criterion individually using linguistic variables in Figure 1.

Figure 1

Linguistic Variables



Note. Created by the authors using MS Excel.

Then these evaluations are converted into Fermatean fuzzy numbers to create the initial decision-making matrix shown in Equation (6).

$$\tilde{X} = [\tilde{x}_{ij}]_{e\times n} \tag{6}$$

Afterwards, the values are defuzzified using score function. Next, defuzzified values are normalized with Equation (7).

$$\mathfrak{n}_{ij} = \frac{S(\tilde{x}_{ij})}{\max S(\tilde{x}_{ij})} \tag{7}$$

The standard deviations of experts' normalized values are calculated via Equations (8) and (9).

$$\bar{\mathfrak{n}}_i = \frac{1}{n}\sum_{j=1}^{n} \mathfrak{n}_{ij} \tag{8}$$

$$\sigma_i = \sqrt{\frac{1}{n}\sum_{j=1}^{n}\left(\mathfrak{n}_{ij} - \bar{\mathfrak{n}}_j\right)^2} \tag{9}$$

Next, the expert-weighted normalized values are computed with the help of Equation (10).

$$p_{ij} = \pi_{ij}\sigma_i \tag{10}$$

Finally, the expert-weighted normalized values for each criterion are summed by Equation (11), and then, the weights of criteria are estimated using Equation (12).

$$s_j = \sum_{i=1}^{e} p_{ij} \tag{11}$$

$$w_j = \frac{s_j}{\sum_{j=1}^{n} s_j} \tag{12}$$

Data Collection

The data were collected directly by the researchers through a structured online expert consultation process using Microsoft Forms, without the involvement of a third-party research company. The data collection process was conducted between December 8, 2025, and December 31, 2025. To ensure validity and reliability, strict selection criteria were used: the panel consisted of academicians specializing in sustainable marketing, sustainable fashion, and consumer behavior, each with at least 10 years of sector experience. Rigorous panel criteria are essential for reliable qualitative-to-quantitative evaluations (Langfeldt, 2002). Initially, 17 academicians responded; 3 were excluded due to insufficient experience. Thus, data from 14 highly qualified experts were analyzed.

The experts were presented with the seven greenwashing criteria identified in the literature review: False Labeling (C1), Vague Claims (C2), Lack of Proof (C3), Visual Manipulation (C4), Price Deception (C5), Hidden Trade-off (C6), and Downsizing Negative Aspects (C7). They were asked to rank these criteria based on their potential to deceive consumers, using a 7-point scale where 1 represents extremely important and 7 represents extremely unimportant. To ensure conceptual clarity, a detailed definition table for each criterion was provided to the experts prior to the evaluation.

In the SIWEC method, capturing expert judgments directly through this scale ensures high consistency; unlike traditional MCDM models (e.g., AHP) that require Consistency Ratio (CR) calculations, SIWEC inherently handles evaluation variance by utilizing the standard deviation of the responses, thereby providing a reliable ranking without the need for additional validity coefficients.

Findings

This section includes the results of the expert evaluations of greenwashing tactics. Initially, the criteria are demonstrated in Table 1 with short codes.

Table 1

Criteria List

Criterion	Definition	Short Code
False Labeling	involving creating fake third-party certification marks—meaning counterfeit badges from organizations that usually review product compliance—or using self-assigned labels to mislead consumers into believing a product meets legal or regulatory requirements.	FSLBL
Vague Claims	using broad, ill-defined terminology, such as all-natural or eco-friendly, which lacks clear scientific parameters or legal definitions.	AMBST
Lack of Proof	including environmental claims made by firms that cannot be substantiated by accessible evidence or independent verification at the point of purchase.	LKEVD
Visual Manipulation	employing non-verbal cues, such as nature-inspired imagery and green color palettes, to psychologically influence consumers to perceive a product as sustainable, irrespective of its actual environmental impact.	VSMNP
Price Deception	including artificially inflating product prices to exploit the consumer heuristic that associates higher costs with ethical production standards.	PRBPR
Hidden Trade-off	emphasizing a single positive environmental feature, such as packaging labeled 'sustainable,' to obscure more significant negative impacts elsewhere in the supply chain (the processes and steps involved in making and delivering a product).	SBCCL
Downsizing Negative Aspects	involving deliberate efforts to minimize, omit, or obscure information about the harmful environmental footprint of the company's broader operations.	HDNGT

Note. Created by the authors using MS Excel.

The evaluations are collected from 14 academics with an average of 17 years of experience. The findings are presented in Table 2.

Table 2

Evaluations

	FSLBL	AMBST	LKEVD	VSMNP	PRBPR	SBCCL	HDNGT
Academician_1	E	S	M	E	E	M	E
Academician_2	V	I	M	E	E	E	I
Academician_3	V	M	S	E	E	V	V
Academician_4	E	E	V	E	E	E	E
Academician_5	E	V	S	I	M	E	E
Academician_6	E	I	M	E	S	S	I
Academician_7	E	E	E	E	E	E	E
Academician_8	V	I	M	I	I	V	V

Academician_9	E	V	E	V	V	V	E
Academician_10	E	E	V	E	E	E	E
Academician_11	I	V	V	E	S	V	E
Academician_12	E	E	V	E	E	E	E
Academician_13	E	S	S	I	V	V	I
Academician_14	E	E	E	E	E	E	E

E=Extremely Important, V=Very Important, I=Important, M=Moderately Important, S=Slightly Important, N=Not Important, U=Extremely Unimportant

Note. Created by the authors using MS Excel.

The fuzzy numbers corresponding to the linguistic expressions in Table 2 are derived using the methodology illustrated in Figure 2. Accordingly, the linguistic evaluations are transformed into fuzzy numbers as shown in Figure 2. The resulting fuzzy-to-numerical mixtures of the evaluations are presented in Table 3.

Table 3

Initial Decision-Making Matrix

	FSLBL	**AMBST**	**LKEVD**	**VSMNP**	**PRBPR**	**SBCCL**	**HDNGT**
Academician_1	(.975,.1)	(.35,.7)	(.55,.5)	(.975,.1)	(.975,.1)	(.55,.5)	(.975,.1)
Academician_2	(.85,.2)	(.7,.35)	(.55,.5)	(.975,.1)	(.975,.1)	(.975,.1)	(.7,.35)
Academician_3	(.85,.2)	(.55,.5)	(.35,.7)	(.975,.1)	(.975,.1)	(.85,.2)	(.85,.2)
Academician_4	(.975,.1)	(.975,.1)	(.85,.2)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)
Academician_5	(.975,.1)	(.85,.2)	(.35,.7)	(.7,.35)	(.55,.5)	(.975,.1)	(.975,.1)
Academician_6	(.975,.1)	(.7,.35)	(.55,.5)	(.975,.1)	(.35,.7)	(.35,.7)	(.7,.35)
Academician_7	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)
Academician_8	(.85,.2)	(.7,.35)	(.55,.5)	(.7,.35)	(.7,.35)	(.85,.2)	(.85,.2)
Academician_9	(.975,.1)	(.85,.2)	(.975,.1)	(.85,.2)	(.85,.2)	(.85,.2)	(.975,.1)
Academician_10	(.975,.1)	(.975,.1)	(.85,.2)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)
Academician_11	(.7,.35)	(.85,.2)	(.85,.2)	(.975,.1)	(.35,.7)	(.85,.2)	(.975,.1)
Academician_12	(.975,.1)	(.975,.1)	(.85,.2)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)
Academician_13	(.975,.1)	(.35,.7)	(.35,.7)	(.7,.35)	(.85,.2)	(.85,.2)	(.7,.35)
Academician_14	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)	(.975,.1)

Note. Created by the authors using MS Excel.

Afterwards, the initial decision-making values are defuzzified using score function. Next, defuzzified values are normalized with Equation (7). The normalized matrix is shown in Table 4.

Table 4

Normalized Matrix

	FSLBL	AMBST	LKEVD	VSMNP	PRBPR	SBCCL	HDNGT
Academician_1	1.000	.363	.541	1.000	1.000	.541	1.000
Academician_2	.834	.675	.541	1.000	1.000	1.000	.675
Academician_3	.834	.541	.363	1.000	1.000	.834	.834
Academician_4	1.000	1.000	.834	1.000	1.000	1.000	1.000
Academician_5	1.000	.834	.363	.675	.541	1.000	1.000
Academician_6	1.000	.675	.541	1.000	.363	.363	.675
Academician_7	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Academician_8	.834	.675	.541	.675	.675	.834	.834
Academician_9	1.000	.834	1.000	.834	.834	.834	1.000
Academician_10	1.000	1.000	.834	1.000	1.000	1.000	1.000
Academician_11	.675	.834	.834	1.000	.363	.834	1.000
Academician_12	1.000	1.000	.834	1.000	1.000	1.000	1.000
Academician_13	1.000	.363	.363	.675	.834	.834	.675
Academician_14	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Note. Created by the authors using MS Excel.

The standard deviations of experts' normalized values are calculated via Equations (8) and (9). The standard deviation values are equal to 0.262, 0.176, 0.219, 0.058, 0.236, 0.245, 0.000, 0.105, 0.082, 0.058, 0.203, 0.058, 0.203, 0.058, 0.224, and 0.000, respectively. Then, the expert-weighted normalized values are computed with the help of Equation (10). The expert-weighted normalized matrix is demonstrated in Table 5.

Table 5

Expert-Weighted Normalized Matrix

	FSLBL	AMBST	LKEVD	VSMNP	PRBPR	SBCCL	HDNGT
Academician_1	.262	.095	.142	.262	.262	.142	.262
Academician_2	.147	.119	.095	.176	.176	.176	.119
Academician_3	.183	.118	.080	.219	.219	.183	.183
Academician_4	.058	.058	.048	.058	.058	.058	.058
Academician_5	.236	.197	.086	.159	.128	.236	.236
Academician_6	.245	.166	.133	.245	.089	.089	.166
Academician_7	.000	.000	.000	.000	.000	.000	.000
Academician_8	.087	.071	.057	.071	.071	.087	.087
Academician_9	.082	.069	.082	.069	.069	.069	.082

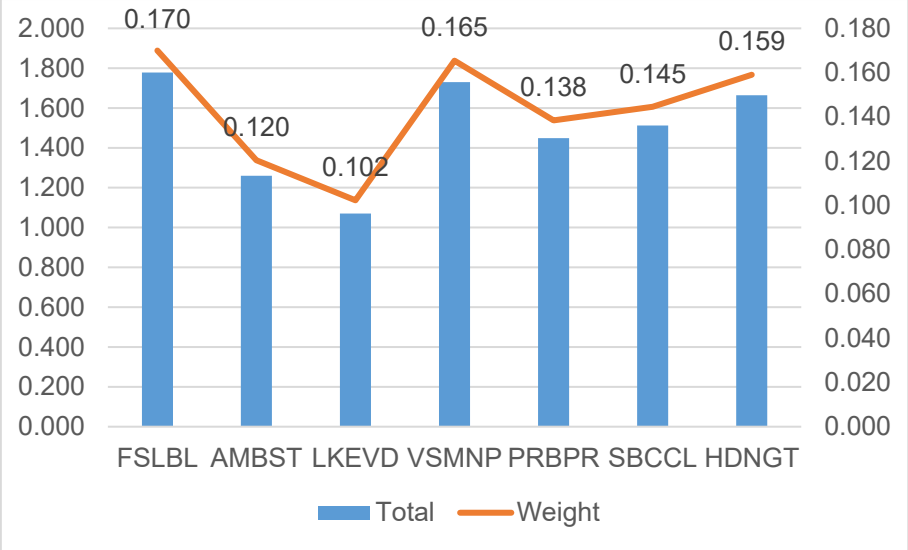
Academician_10	.058	.058	.048	.058	.058	.058	.058
Academician_11	.137	.170	.170	.203	.074	.170	.203
Academician_12	.058	.058	.048	.058	.058	.058	.058
Academician_13	.224	.081	.081	.151	.187	.187	.151
Academician_14	.000	.000	.000	.000	.000	.000	.000

Note. Created by the authors using MS Excel.

Consequently, the expert-weighted normalized values for each criterion are summed by Equation (11), and then, the weights of criteria are estimated using Equation (12). The results are visualized in Figure 1.

Figure 2

Total and Weight Values



Note. Created by the authors using MS Excel.

According to Figure 2, the most important criterion for greenwashing is False Labeling, with 0.17. The second important criterion is Visual Manipulation with 0.165. The third criterion, Downsizing Negative Aspects, has 0.159 importance weight. Then, the fourth one is Hidden Trade-off (0.145). The least important criteria are Price Deception (0.138), Vague Claims (0.120), and Lack of Proof (0.102).

Discussion

The study investigates deceptive mechanisms in the fast fashion industry by ranking greenwashing tactics based on consumer deception risk using the SIWEC method. Quantitative analysis reveals that "False Labeling" (w=0.17) and "Visual/Atmospheric Manipulation" (w=0.165) are the most significant determinants of deception risk. These results offer a refreshed outlook that contrasts with traditional research, which primarily focuses on textual ambiguity. Previous studies have often identified text-based 'Vague Claims' and insufficient information specificity as primary drivers of greenwashing perceptions and consumer skepticism (Musgrove et al., 2018; Orazi & Chan, 2020; Polonsky et al., 2025; Schmuck et al., 2018). Although Yang et al. (2020) also found vague statements to be the most common tactic

in general markets, the current findings indicate that, in the fast fashion sector, the most harmful tactics are those that leverage structural trust through labels and cognitive heuristics via visual cues.

The identification of "False Labeling" as the highest risk is consistent with the information asymmetry framework outlined by Hung and Chang (2024), who contend that consumers lack the technical expertise to verify environmental claims and must therefore depend on external signals. Eco-labels function as essential cognitive shortcuts for consumers navigating complex sustainability information, making their credibility critical (Aasmäe, 2021; Van der Ven, 2019). Recent empirical studies demonstrate that consumers rely extensively on these certification marks to mitigate perceived risks, which increases their susceptibility to deception when such labels are fabricated or unregulated (Kothiyal & Mehta, 2025). Fabrication of these signals results in a complete breach of trust. The finding is further substantiated by Busalim et al. (2025), who identified image barriers and specific doubts regarding sustainability labeling as primary drivers of consumer resistance to sustainable fashion. Therefore, false labeling constitutes not only a deceptive practice but also a structural barrier to the adoption of authentic eco-friendly products.

Kinnunen (2020) further supports the result by demonstrating that baseless claims result in green consumer confusion, which significantly reduces purchase intention. In contrast, Poiriazi et al. (2025) found that robust board governance and transparency mechanisms in the financial sector can mitigate such unethical behaviors. However, the fast fashion industry appears to have a governance gap that enables explicit falsification. The analysis indicates that the regulatory voids identified by Li et al. (2025) in the construction sector are also prevalent in the fashion industry, particularly in the form of unchecked false labeling. On the other hand, recent comprehensive reviews emphasize that although eco-labels are intended to bridge the information gap between producers and consumers, their effectiveness is severely compromised without strict validation mechanisms (Nakaishi & Chapman, 2024). Therefore, the high deception risk of false labeling identified in this study suggests a failure in the current policy tool function of these labels and highlights the need for standardized verification systems.

“Visual or Atmospheric Manipulation” (Green Sheen) is identified as a high-risk greenwashing tactic that exemplifies the 'Eco-Chameleon' strategy within the fast fashion sector. In line with Szabo and Webster (2021), who found that executional greenwashing significantly shapes consumer perception. The current findings elevate this tactic to a critical risk level, approaching that of explicit deception. Moreover, Boncinelli et al. (2023) demonstrated that green-colored packaging and nature-inspired aesthetics can distort market share by creating an unwarranted perception of sustainability. Similarly, Andreoli and Minciotti (2023) observed that explicit textual claims primarily elicit consumer skepticism, whereas visual manipulation often bypasses conscious awareness and avoids scrutiny, making it particularly challenging for consumers to detect deception (Fella & Bausa, 2024). This form of manipulation generates a psychological halo effect, as reported by Li et al. (2025) in the context of corporate reputation. Consumers frequently infer sustainability based solely on green aesthetics (Ende et al., 2023), which enables companies to obscure the synthetic nature of their products. The principal risk emerges when false labels are combined with visual manipulation, as eco-labels function as visual cues, supported by past studies. Lim et al. (2025) further argue that in online retail environments where consumer attention is limited, labels serve both as information sources and as shortcuts for sustainability assessment. Liu et al. (2025) also show that the source and specificity of claims influence purchase intent, reinforcing the view that unverified visual signals can be especially deceptive.

Methodologically, the research bridges the gap between consumer behavior studies and the expanding body of multi-criteria decision-making (MCDM) applications in sustainability. Recent studies have applied MCDM methods to evaluate greenwashing drivers in various sectors. For example, Daga et al. (2025) used TISM to model ESG barriers, while Sklavos et al. (2025) employed DEA-CRITIC-TOPSIS to rank eco-efficiency in banking. Building on these approaches, the present study applies the SIWEC method to consumer deception tactics, thereby complementing prior work and shifting the focus from corporate causes to market consequences. Furthermore, whereas Xu et al. (2025) demonstrated that digital transformation and mergers and acquisitions (M&As) curb greenwashing by enhancing transparency in Chinese firms, the findings of this study suggest that, in the absence of such structural digitization in fashion supply chains, consumers remain vulnerable to "Hidden Trade-off" tactics (Munir & Mohan, 2022), where capsule collections distract from the brand's overall carbon footprint.

Several practical implications for stakeholders can be made. For managers, the elevated risk associated with visual manipulation serves as a clear warning. Employing "nature-inspired" marketing for synthetic products is no longer a permissible "grey area" but constitutes a liability that provokes substantial green skepticism (Andreoli & Minciotti, 2023; Shojaei et al., 2024). Managers are required to ensure that their visual identity accurately reflects material reality to mitigate reputational harm linked to the "Sin of Fibbing" (Yang et al., 2020). For policymakers, these findings indicate that current regulations, which primarily address textual misinformation, are inadequate. As Pagán Martinez et al. (2020) noted, given the complexity of green consumer behavior, regulatory frameworks must expand to include visual semiotics by prohibiting the use of nature imagery on packaging for products that do not meet established sustainability criteria, thereby enhancing the reliability of market signals.

Conclusion and Insights for Future Research

The study examined the complex structure of consumer deception within the fast fashion industry by prioritizing greenwashing tactics based on the risk of consumer deception using the SIWEC method. Expert evaluations enabled the establishment of a quantitative risk hierarchy, which identified "False Labeling" and "Visual/Atmospheric Manipulation" as the most significant threats to market integrity. The findings indicate that greenwashing has evolved from linguistic ambiguity, such as vague claims, to more advanced forms of structural and visual falsification. The evidence confirms that deception has shifted from explicit denial to subtle mimicry through visual manipulation, supporting the perspective that corporate resistance to sustainability is becoming more implicit and psychological. This trend contributes to a significant breakdown in the reliability of marketplace signaling.

In response to recent calls in the literature to evaluate sustainability communications using neuroscientific methods rather than relying solely on self-reported data (Ćirović et al., 2024; Liu et al., 2023), future marketing research should prioritize consumer experiments that examine the cognitive effects of visual greenwashing. Given that visual manipulation represents a significant risk, scholars may employ neuromarketing techniques such as eye-tracking or EEG to investigate how green aesthetics, including color palettes, nature imagery, and rustic store designs, influence subconscious consumer decision-making. It is important to determine whether these cues diminish critical thinking and enable consumers to rationalize the purchase of unsustainable fast fashion despite environmental concerns.

Given the risks associated with False Labeling, future research should examine the potential of technological tools to restore consumer trust. Recent literature underscores the

importance of technological interventions in achieving operational transparency (Guo et al., 2020). Researchers could assess the impact of Digital Product Passports (DPPs) and blockchain-enabled traceability on consumer perceptions of greenwashing (Acciai & Pérez-Bou, 2025; Hina et al., 2024). Specifically, studies should evaluate whether scannable, immutable supply chain data, such as QR codes, reduces perceived deception more effectively than traditional third-party certifications, which are frequently viewed with suspicion due to the possibility of falsification.

A comparative analysis of generational and cultural cohorts represents a promising direction for future research. Recent studies highlight a significant 'consumption paradox' and a pronounced intention-behavior gap among Generation Z, who are both prominent climate advocates and the largest consumer segment for fast fashion (Kang & Badal, 2025). Although this study relied on expert consensus, susceptibility to deception may differ substantially between Generation Z and older cohorts. Future research should investigate whether climate-aware younger consumers demonstrate higher levels of green literacy, enabling them to identify the "Hidden Trade-off" tactics described in this study (Bytof & Ritch, 2023; Williams & Hodges, 2022), or whether their preference for fashionable, low-cost apparel increases their likelihood of overlooking deceptive signals due to cognitive dissonance reduction strategies.

For policymakers and non-governmental organizations (NGOs), the present study highlights the urgent need to broaden consumer protection regulations beyond textual accuracy. Visual Manipulation is a significant deception risk. Regulatory bodies should implement stricter guidelines regarding the semiotics of sustainability. These may include restricting the use of nature-inspired imagery and specific color palettes on packaging for products that do not meet established environmental standards. To address the critical issue of False Labeling, governments should expedite the shift from voluntary corporate disclosures to mandatory, standardized verification systems. For example, a government-backed Digital Product Passport including blockchain technology could be used (Hina et al., 2025). This approach would reduce the ambiguity of self-issued certifications. Accordingly, NGOs play a key role in auditing supply chain transparency. They are also essential in launching visual literacy campaigns to help consumers distinguish between aesthetic cues and true environmental claims.

Although the study offers significant insights, it faces several limitations that indicate avenues for future research. While the SIWEC method quantifies uncertainty effectively, it depends on expert judgment. Consequently, the risk hierarchy reflects theoretical assessments from 14 marketing academicians rather than empirical consumer behavior. Although these experts possessed extensive experience in sustainable marketing, the absence of marketing industry professionals or sector representatives limits the practical industry perspective of the evaluation. Therefore, future research should aim to include a more diverse decision-making panel, incorporating both academic and sectoral experts, to provide a more comprehensive assessment of greenwashing tactics. On the other hand, the sample size limits the generalizability to wider cultural or demographic groups, though sufficient for consistency in multi-criteria decision-making. Finally, the study focuses solely on the fast fashion industry. Thus, the prioritization of tactics such as False Labeling and Visual Manipulation may differ in sectors with stricter regulations, such as food, pharmaceuticals, or automotive.

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The authors declared that the ethical rules for research and publication followed while preparing the article.

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