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Examining Greenwashing Patterns of Brands in the Digital Age: The Impact of Emerging Technologies on Green Marketing and Sustainable Innovation

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Abstract

The aim of this study is to investigate the impact of emerging technologies on green marketing strategies and brand-driven sustainable innovation in the digital age, alongside analyzing the phenomenon of greenwashing. This qualitative research employed a grounded theory approach, utilizing semi-structured interviews and open, axial, and selective coding for data analysis. The statistical population consisted of experts and marketing managers in the fields of branding and green marketing, from whom in-depth interviews were conducted for data collection. The findings revealed that during the data analysis process, initial codes were extracted and ultimately categorized into six main themes: "causal conditions," "contextual conditions," "intervening conditions," "strategies," "consequences," and "enabling factors." These core categories were identified as key components of the study, highlighting the complex interactions between emerging technologies and brand sustainability strategies. Furthermore, the results indicated that greenwashing primarily arises from the mismatch between brands' environmental claims and their actual practices, leading to reputational damage and a decline in consumer trust. This research emphasizes that brands must prioritize transparency, authenticity, and the legitimacy of their actions, leveraging modern technologies for more accurate reporting and more effective engagement with consumers. The findings also underscore the importance of appropriate governance and the alignment of green marketing strategies with consumers' real expectations.

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Introduction

In an era defined by escalating concerns over sustainability across economic, environmental, and social dimensions, the imperative to adopt green technologies has become increasingly clear (Sheikh et al., 2024, p. 4). Empirical evidence indicates a significant and positive relationship among green management, sustainable performance, and green innovation. Moreover, green innovation functions as a partial mediator in the relationship between green management and sustainable performance. These findings suggest that both green management and green innovation are key drivers of enhanced organizational sustainability. As a mediating factor, green innovation plays a pivotal role in bridging managerial initiatives with sustainability outcomes. Overall, the implementation of green strategies and innovations markedly strengthens environmental management practices and improves sustainable performance (Soroushnia et al., 2024, p. 4).

In a separate study, it was reported that 41.7% and 44.4% of marketing activities are influenced by individual and organizational innovation, respectively (Babajani Mohammadi, 2023, p. 4). In the digital era, the integration of technology and marketing has fundamentally transformed how brands communicate their environmental commitments. As consumers become increasingly aware of sustainability issues, firms are adopting green marketing strategies to connect with environmentally conscious audiences. However, this growing trend has also fostered the emergence of "greenwashing"—a practice in which companies overstate or misrepresent their environmental initiatives. Such actions erode consumer trust and compromise brand credibility (Ti Yu, 2024).

The widespread occurrence of greenwashing poses substantial challenges for both marketers and policymakers, as it fosters consumer skepticism and provokes adverse reactions toward brands perceived as insincere in their sustainability claims. The proliferation of digital platforms has further amplified this issue by accelerating the flow of information and enabling consumers to evaluate environmental assertions with unprecedented scrutiny. Such heightened vigilance can trigger significant backlash against companies found to engage in deceptive communication. Empirical research demonstrates that greenwashing undermines corporate credibility, damages brand reputation, and may even prompt consumer boycotts (Xiao et al., 2022, p. 4).

The success of green marketing fundamentally depends on the credibility of corporate sustainability claims. Studies highlight that transparent communication and an authentic commitment to sustainability are essential in mitigating the negative perceptions associated with greenwashing and in strengthening brand image (Ayoub & Awad, 2024). Recent evidence further confirms that brand image exerts a significant and positive effect on brand attachment—reflecting the emotional bond between an individual and a given brand (Ghasemzadeh, 2024, p. 16). At the same time, digital technologies have transformed the landscape of corporate social responsibility (CSR), providing firms with new tools for sustainability reporting and more dynamic consumer engagement. However, this digital evolution may paradoxically intensify greenwashing risks, as organizations sometimes prioritize marketing visibility over substantive environmental action (Li, 2024).

The central challenge, therefore, lies in reconciling the strategic advantages of digital transformation with the imperative of authentic environmental governance. Beyond influencing consumer evaluations, greenwashing can erode investor confidence, weaken stakeholder trust, and invite regulatory scrutiny. Empirical evidence indicates that firms accused of greenwashing often experience declining stock valuations and heightened oversight, underscoring the importance of maintaining integrity within green marketing initiatives. The consequences are far-reaching—encompassing reputational harm, legal exposure, and market-share erosion.

In navigating this increasingly complex environment, companies must understand how emerging digital technologies intersect with green marketing and sustainable innovation. A holistic approach that aligns digital transformation with genuine sustainability practices is crucial to reducing greenwashing risks. By embedding transparency and authenticity into strategic communication, organizations can strengthen brand credibility and make meaningful contributions to broader environmental sustainability and corporate responsibility goals.

Furthermore, contemporary scholarship on green consumer behavior highlights evolving expectations and the growing emphasis on ethical marketing practices. Recent findings reveal increasing awareness—particularly among younger consumers, such as Generation Z—regarding the subtle tactics and implications of greenwashing (Harisha & Darmanantha, 2024). This generation's heightened discernment compels brands to demonstrate verifiable sustainability commitments and communicate them both clearly and credibly in order to cultivate long-term trust and loyalty.

In the digital era, brands pursuing sustainable marketing face a dual reality of opportunities and challenges. On one hand, technology enhances transparency, enables data-driven accountability, and fosters authentic consumer engagement. On the other, it creates new risks associated with deceptive or exaggerated environmental marketing. As green marketing practices continue to evolve, brands must navigate these complexities with an unwavering commitment to authenticity and ethical responsibility. Ensuring that sustainability claims are both credible and consistent with actual operational performance is essential to building consumer trust and securing long-term competitive advantage (Yildirim, 2023).

This study introduces a novel perspective by examining how digital technologies and online platforms influence patterns of greenwashing in contemporary marketing. Whereas most prior research has concentrated on the traditional dimensions of greenwashing and its effects on consumer behavior, the present investigation focuses on the role of emerging technologies—such as artificial intelligence, blockchain, and social media—in shaping consumer perceptions of environmentally responsible brands and in determining the transparency of green marketing practices.

Despite the considerable literature on green marketing and greenwashing, critical conceptual and empirical gaps remain regarding the influence of digital technologies on these dynamics. Previous studies have primarily analyzed the outcomes of greenwashing from consumer and organizational standpoints but have seldom explored how technological innovations might either intensify or alleviate deceptive environmental communication. To address this gap, the current study adopts a qualitative research design grounded in Grounded Theory, enabling an in-depth exploration of marketing managers' and branding professionals' perceptions and lived experiences concerning digital sustainability communication.

Accordingly, this research is guided by the following central question: What impact do emerging digital technologies have on brand greenwashing patterns, and how can these tools be leveraged to reduce deceptive practices while enhancing transparency and credibility in green marketing?

Theoretical and empirical framework

Greenwashing denotes a form of performative behavior—often arising from ignorance, negligence, or intentional manipulation—in which organizations presenting themselves as environmentally responsible, in fact, engage in activities that harm the environment. Such entities typically allocate more resources to promotional and branding efforts designed to project a "green" image than to implementing genuinely sustainable practices. The primary objective of these actions is to construct an environmentally friendly façade that conceals or minimizes the negative ecological consequences of corporate operations. Etymologically, the term greenwashing draws from the notion of concealing facts or misconduct. In this sense, instead of assuming responsibility for their environmental impacts and striving to mitigate them, organizations rely on superficial symbols and marketing rhetoric to appear ecologically conscious (Wess, 2009).

Whitewashing refers to the deliberate suppression or distortion of information to manipulate perceptions and obscure wrongdoing. Greenwashing, a specific variant of whitewashing, entails the deception and manipulation of environmental information. It involves presenting data and narratives that create a misleading impression of ecological responsibility while masking adverse realities (Sun & Zhang, 2019). Within this context, greenwashing can be understood as whitewashing applied to environmental matters. The concept was first introduced in 1986 by American researcher Jay Westerveld, who used it to describe corporate actions that appear to protect the environment but lack authenticity or factual grounding (Akturan, 2018).

Today, greenwashing has become an increasingly prevalent marketing strategy aimed at portraying products as more sustainable and eco-friendly than they truly are. The intent is to persuade stakeholders that the organization makes responsible environmental choices. These claims often highlight features such as “natural,” “non-toxic,” or “healthier” attributes, positioning products as superior to competitors. The overarching goal is to capture consumer attention, enhance public reputation, and secure financial rewards derived from such image-building. However, in practice, these companies frequently fall short of implementing genuine sustainability initiatives, relying instead on symbolic acts and superficial gestures to cultivate stakeholder trust and ultimately maximize profits (Ciano et al., 2017).

The emergence of advanced technologies—such as the Internet of Things (IoT), Artificial Intelligence (AI), and Machine Learning (ML)—has redefined the landscape of green marketing. These technologies improve the monitoring of environmental performance, enable sophisticated data analytics for targeted campaigns, and promote the greening of supply chains. For example, IoT sensors allow real-time tracking of resource consumption, empowering firms to decrease waste and optimize operations. AI-driven analytics facilitate predictive modeling of consumer behavior, enabling brands to deliver personalized, sustainability-oriented marketing content that strengthens engagement with eco-friendly initiatives. In this regard, AI possesses transformative potential in advancing green marketing practices through precise consumer segmentation and product development aligned with sustainability goals. Furthermore, AI-based systems can streamline supply chains by reducing inefficiencies and energy consumption, contributing to lower environmental footprints. Nevertheless, the integration of AI into green marketing introduces ethical challenges—notably issues related to data privacy, transparency, and algorithmic bias—which must be carefully addressed to ensure responsible technological deployment (Karim et al., 2023).

The increasing global emphasis on the Sustainable Development Goals (SDGs) has shifted stakeholder behavior, with consumers increasingly favoring environmentally friendly products and companies. This behavioral transformation, while fostering widespread sustainability adoption, has simultaneously prompted some corporations to engage in greenwashing—exaggerating or falsifying their environmental achievements to attract sustainability-oriented consumers (Ti Yu, 2024). Such practices undermine consumer trust, damage brand equity, and distort the integrity of sustainability commitments. The proliferation of deceptive environmental marketing also risks weakening the perceived “greenness” of brands overall, attenuating the credibility of genuinely sustainable firms in the marketplace (Sabrini et al., 2024).

Empirical research demonstrates that transparent and evidence-based green marketing strategies can substantially mitigate perceptions of greenwashing. Key influencing factors include the attributes of environmentally friendly products, the clarity of brand communication, and the organization’s authentic commitment to sustainability (Ti Yu, 2024). Other studies highlight that green marketers should avoid all forms of exaggeration or deception and substantiate their environmental claims with verifiable data. Equally important is the continuous assessment of consumer perceptions—particularly those of tourists—to identify and correct potential misunderstandings. Thus, the effectiveness of green marketing ultimately depends on three pillars: honesty, transparency, and responsiveness to the target audience’s interpretations (Doosti Irani et al., 2023). Complementary evidence further indicates that the adoption of green strategies and innovation within organizations enhances both sustainable performance and environmental management capabilities (Soroushnia et al., 2024).

The perception of greenwashing exerts the most profound negative influence on consumer-based constructs such as green satisfaction, perceived green quality, green brand image, trust, word-of-mouth, ethical commitment, loyalty, behavioral intentions, and purchase behavior—respectively (Doosti Irani et al., 2013). This detrimental effect can manifest as brand avoidance, wherein consumers intentionally dissociate from companies suspected of insincerity. The phenomenon is further amplified when brand hypocrisy is perceived, leading to deeper erosion of brand equity (Rezvan et al., 2014).

From a conceptual standpoint, greenwashing can be interpreted through two contrasting lenses: a quick escape from environmental accountability or a gradual transition toward genuinely sustainable behavior. This duality underscores the nuanced motivations and tensions underlying corporate environmental communication (Qayyum et al., 2023). As a result, greenwashing discredits brand reputation by violating consumer expectations, intensifying aversion, and shaping negative evaluations of environmental performance. Within this dynamic, green brand trust serves as a critical buffer; brands that build trust through transparent practices demonstrate greater resilience to reputational harm (Borish et al., 2024).

To mitigate the adverse consequences of greenwashing for consumers, the environment, and society at large, it should be recognized as a form of corporate fraud, with attention directed toward reducing the pressures, opportunities, and rationalizations that enable deceptive behavior (Mahmoud Naderi Beni, 2023). The digital era has amplified both the risks and opportunities associated with green communication. Social media and online platforms can disseminate authentic sustainability initiatives with unprecedented reach, yet they can also magnify misleading claims. Consequently, strategic management of digital communication has become critical to maintaining credibility and stakeholder confidence.

Consumer environmental engagement profoundly shapes perceptions of greenwashing. Individuals with greater environmental literacy are more adept at detecting misleading claims, influencing their trust, loyalty, and advocacy behaviors toward brands (Desembriyanta et al., 2024). At the same time, emerging digital technologies have reshaped green marketing practice. Tools such as AI, IoT, and data analytics enhance operational transparency, support real-time sustainability reporting, and foster consumer participation in environmental initiatives—though they simultaneously introduce new spaces for potential manipulation (Tariq et al., 2022).

A growing body of quantitative research employing structural equation modeling (SEM) has examined how greenwashing interacts with trust and consumer behavior, offering sophisticated insights into the underlying relational mechanisms. Cross-cultural analyses, including research from Egypt and Europe, reveal that the perception and impact of greenwashing differ across sociocultural contexts, emphasizing the necessity for localized green marketing strategies (Borish et al., 2024).

The dark side of greenwashing constitutes one of the most persistent challenges for sustainable branding, often resulting in enduring reputational harm, skepticism, and erosion of consumer confidence. To safeguard their legitimacy, brands must exhibit vigilance in ethical communication and align environmental claims with verifiable actions (Yildirim, 2023). Ultimately, the continuing interplay between technology, consumer behavior, and corporate sustainability will define the trajectory of green marketing. Companies that prioritize transparency, accountability, and authenticity in their environmental narratives are expected to achieve enduring trust and competitive differentiation in the evolving green marketplace (Pimonenko et al., 2020).

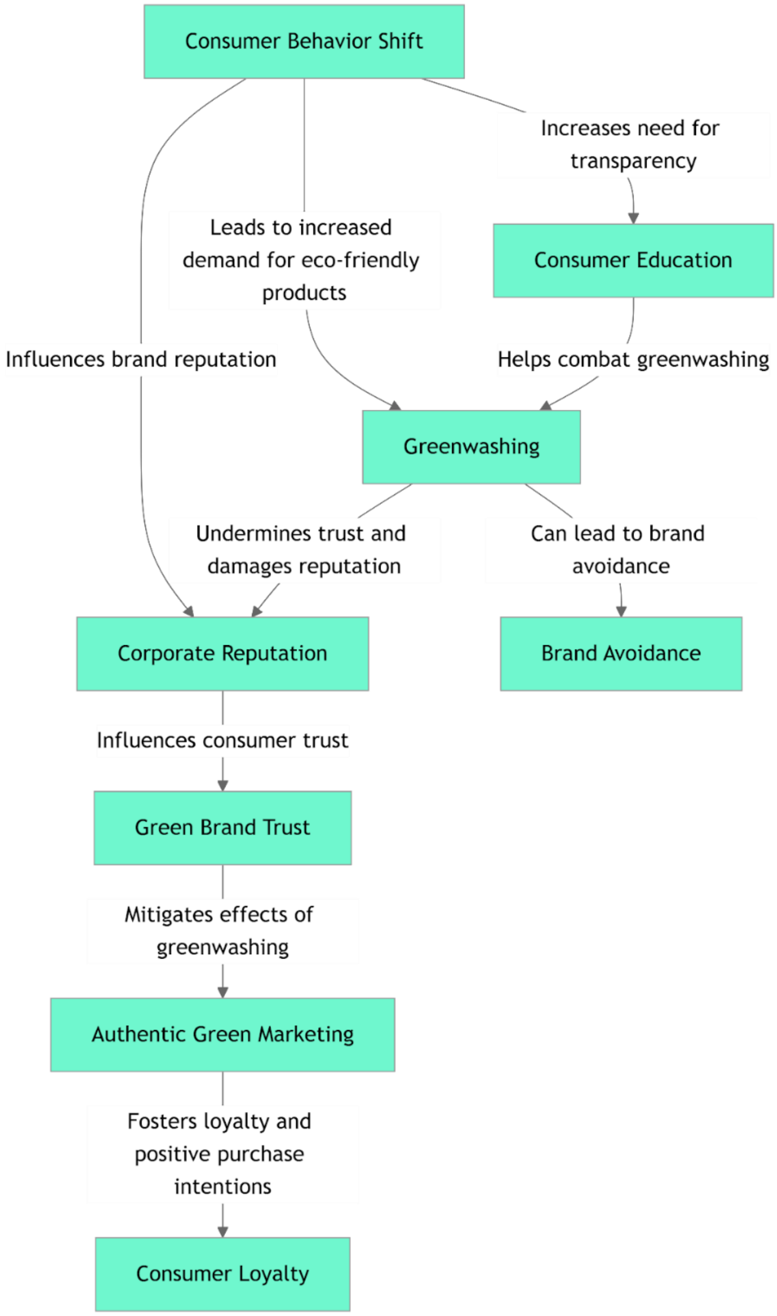

Figure 1. The Interconnection Between Brand Greenwashing and Consumer Behavior

Figure 1. The diagram illustrates the interconnections between brand greenwashing and consumer behavior. It demonstrates how shifts in consumer preferences toward environmentally friendly products can increase pressure on firms to appear sustainable—sometimes prompting superficial or misleading practices that undermine corporate credibility and consumer trust. This erosion of trust may, in turn, trigger brand avoidance and weaken long-term loyalty. Conversely, authentic green marketing and consumer education foster transparency, rebuild trust, and strengthen green brand loyalty, thereby mitigating the adverse effects of greenwashing. The conceptual relationships reflect insights from recent studies underscoring the necessity of honesty and verifiable sustainability commitments in the digital era (Yildirim, 2023; Burich et al., 2024; Xiao et al., 2022).

Materials and Methods

This study is fundamental in its objective and qualitative in nature, adopting a research strategy grounded in the Corbin and Strauss (1990) systematic approach to Grounded Theory. Given the aim—to design a green marketing model in the era of emerging technologies, with a focus on brand transparency and minimizing greenwashing—the systematic grounded theory method was selected for its strong compatibility with conceptual model development in qualitative research. Its process-oriented structure ensures the step-by-step rigor necessary for building a precise and transparent theoretical framework.

Alternative grounded theory traditions, such as the emerging method or the constructivist approach, were deemed less effective for this investigation, as they lack the structural depth needed to generate a comprehensive and replicable process model. By contrast, Corbin and Strauss's systematic method provides an explicit analytical procedure that aligns directly with the design requirements of a digital-technology-enabled green marketing framework.

Grounded theory, by definition, is an inductive approach aimed at explaining new phenomena through patterns emerging from empirical data. The participant population comprised university professors, industry executives, factory managers, and marketing managers from industrial and commercial enterprises—stakeholders with direct expertise in both sustainability communication and the application of emerging technologies in marketing.

A theoretical sampling strategy was employed to ensure the collection of rich, meaningful data linked directly to the research subject. This purposive approach allows for the discovery and refinement of concepts with high theoretical relevance. In total, 26 participants were interviewed, with theoretical saturation reached after 16 semi-structured interviews; however, data collection continued until 20 interviews to confirm and stabilize emerging categories.

The semi-structured interview served as the primary data collection tool. Interview questions were designed to elicit participants' perceptions and experiences regarding the use of emerging technologies in green marketing and their role in enhancing brand transparency. The question set was iteratively refined throughout the data collection process, enabling deeper exploration of key themes until saturation was achieved.

Data analysis followed the three-stage grounded theory process outlined by Corbin and Strauss, encompassing:

1. Open Coding – systematic identification and labeling of concepts directly from the data.
2. Axial Coding – development of relationships between categories and subcategories, integrating conditions, actions/interactions, and consequences.
3. Selective Coding – refinement toward a core category, integrating all concepts into a cohesive theoretical model.

This systematic approach enables researchers to describe the process model of the phenomenon under investigation with precision and transparency.

Table 1. Research Demographics

Characteristic	Industry and Marketing Managers (16 individuals)	University Professors (10 individuals)
Gender	12 men – 4 women	7 men – 3 women
Average Age	45 years	43 years
Educational Level	Bachelor's: 4 individuals (25%)	PhD: 10 individuals (100%)
	Master's: 10 individuals (62.5%)	
	PhD: 2 individuals (12.5%)	
Average Work Experience	18 years	15 years
Area of Expertise	Production Management, Marketing, Strategic Planning	Marketing, Environment, Strategic Management

In this study, the researcher, along with a co-researcher (as the second coder), conducted an analysis of the reliability of the coding. To this end, four interviews were randomly selected, and both researchers independently coded them. The results of the codings were then compared, and the level of agreement and disagreement between the codes was analyzed. To calculate the reliability coefficient between the coders, the following formula was used (Rahmani, Shahhosseini, & Poorzar, 2011).

$$\text{Reliability} = \frac{2 \times \text{Number of Agreements}}{\text{Total Number of Codes}} \times 100 \text{ percent}$$

This coefficient indicates the degree of coordination and consistency between the codings of the two researchers. The closer this coefficient is to one, the higher the reliability. To evaluate the validity of the data collection tool, content validity was applied. For this purpose, two common indicators were used: the Content Validity Ratio (CVR) and the Content Validity Index (CVI). A total of 20 experts from the faculty members of Semnan and Ilam Universities were involved in the validity assessment. The calculations for CVI and CVR were carried out using the standard formulas for these indices.

Table 2. Calculation of Reliability Between Two Coders

Reliability Between Two Coders (Percentage)	Disagreements	Agreements	Number of Codes	Interview Title
46.72%	7	25	69	A
49.63%	8	20	63	B
69.69%	6	23	66	C
28.74%	3	13	35	D
01.79%	23	96	243	Total

$$CVR = (Ne - N/2) / (N/2)$$

$$\text{Ratio} = \frac{\text{Number of evaluations that scored 3 or higher}}{\text{Total number of individuals}}$$

Table 3. Results of the Validity Index

Main Category	Core Category	CVI	CVR
Causal Factors	Consumer Awareness	0.85	0.76
	New Technologies	0.83	0.75
	Investment in Green Brands	0.87	0.78
	Market Competition	0.80	0.73
	Social Changes	0.84	0.77
	Government and Legal Regulations	0.86	0.79
Intervening Factors	Greenwashing by Brands	0.82	0.71
	Consumer Doubt	0.81	0.72
	Rapid Information Dissemination on Digital Platforms	0.79	0.70
	Competition and Pressure from Digital Competitors	0.85	0.77
	Legal and Regulatory Challenges	0.84	0.73
	Cultural and Social Changes	0.88	0.74
Core Phenomenon	Greenwashing and the Crises It Causes	0.83	0.78
	Consumer Trust in Green Brands	0.86	0.79
	Sustainable Innovation	0.84	0.76
	Brand Communication and Public Awareness	0.87	0.75
	Corporate Sustainability and Social Responsibility	0.85	0.77
	Brand Reporting and Transparency	0.89	0.80
Strategies	Preventing Greenwashing	0.83	0.72
	Focusing on Sustainable Innovation	0.86	0.79
	Transparency in Brand Communication	0.85	0.78
	Increasing Consumer Trust	0.87	0.80

	Accurate Environmental Reporting	0.84	0.75
	Social Responsibility-Based Actions	0.88	0.81
Consequences	Decreased Public Trust	0.85	0.76
	Decreased Brand Value	0.87	0.78
	Legal Consequences	0.86	0.77
	Decreased Market Share	0.84	0.75
	Decreased Investor Interest	0.83	0.74
	Damage to Brand Public Relations	0.82	0.73
Enabling Factors	Growth of Digital Platforms	0.88	0.79
	Support for Environmental Laws	0.86	0.80
	Establishing Communication Networks in Brands	0.85	0.78
	Changes in Consumer Behavior	0.84	0.75
	Media Coverage of Brands	0.83	0.74
	International Institutions Supporting Brands	0.89	0.81

Research Findings

The statistical population of this study comprised sixteen experts specializing in marketing, branding, and strategic management. Of these participants, twelve were male and four were female, with an average age of 45 years. In terms of educational background, four participants held a bachelor's degree, ten possessed a master's degree, and two held a Ph.D. On average, the participants had 18 years of professional experience. Their fields of expertise included production management, marketing, strategic planning, and environmental management—areas directly aligned with the core focus of this research. Collectively, these characteristics reflect a high level of professional maturity and subject-matter expertise among the study participants.

Data collection was conducted through semi-structured interviews, designed around six principal questions formulated within the conceptual framework of the study. All interviews were fully transcribed and subsequently analyzed using open coding procedures, from which the initial codes were extracted. A sample of one interview excerpt, illustrating the process of initial coding, is presented in Table 4.

As a result of the coding and categorization process, a total of 36 distinct concepts and 6 overarching categories were identified. Through this iterative analysis, a theoretical model was developed, encompassing causal conditions, contextual conditions, intervening conditions, strategies, and consequences. This model offers a comprehensive framework for interpreting the key challenges encountered by managers and marketing professionals, providing deeper insight into the phenomenon under study.

Table 4. Sample Interview Excerpts and Open Codes

Open Code	Interview Excerpt
Consumer Awareness	"I think nowadays people pay more attention to environmental issues than before. Many avoid brands that don't care about the environment."
New Technologies	"Technologies like apps and digital platforms have enabled brands to connect better with consumers and assure them of their green initiatives."
Investment in Green Branding	"Brands that genuinely focus on sustainability and make green investments gain more credibility than their competitors, which helps attract new customers."
Greenwashing by Brands	"Brands that focus only on green advertising without taking real action cause consumers to lose trust in them."
Consumer Trust	"If brands fail to maintain transparency in their environmental activities, consumers won't trust them and might even abandon them."
Green Marketing Strategy	"Green marketing strategies need to be genuine and verifiable. They should use methods that make consumers truly believe in the brand's positive changes."

Table 5. The Paradigmatic Model of Factors Influencing Greenwashing and Sustainable Brand Communication

Main Category	Core Category	Open Codes
Causal Conditions	Consumer Awareness	Awareness of environmental issues – Accurate information on climate change – Need for sustainable actions – Awareness of brand impacts – Attention to green products – Sensitivity to greenwashing – Education on sustainability
	Emerging Technologies	Use of digital media – Online platforms – Green technologies – Innovation in reporting – Easy access to information – Digital tools in advertising – Digitization of sustainability processes
	Investment in Green Branding	Attracting green investors – Emphasis on corporate social responsibility – Trust in sustainable brands – Acceptance of environmental policies – Need for company assessments – Focus on social responsibility – Interaction with governmental bodies
	Market Competition	Competitive pressure to improve environmental performance – Need for market differentiation – Using greenwashing as a strategy – Increasing competition among green brands – Appeal to Gen Z – Response to market demands – Digital brands
	Social Changes	Changing consumer behavior – Increasing attention to ethical buying – Changes in Gen Z purchasing patterns – Emphasis on sustainability – Attention to corporate responsibility – Public awareness via social media – Focus on brand social responsibility
	Government and Legal Supervision	Environmental protection laws – Legal pressures on companies – Environmental supervision – Obligation for transparency – Government policies supporting green brands – Strengthening anti-greenwashing regulations – Environmental sanctions
Intervening Conditions	Brand Greenwashing	Misleading claims – Exaggeration of environmental efforts – Deceiving consumers – False efforts to attract green consumers – Misguided environmental efforts – Damage to consumer trust – Negative reactions toward brand
	Consumer Skepticism	Decline in consumer trust – Brand dishonesty – Negative reaction to green claims – Doubts about brand sustainability – Lack of transparency in brand communications – Closer scrutiny of claims by consumers – Negative assessment of green brands
	Rapid Information Spread on Digital Platforms	Easy access to online information – Sharing negative experiences – Consumer reviews and opinions – Use of social media – Increased transparency of brand information – Negative impact of online criticism – Immediate consumer feedback
	Competition and Pressure from Digital Rivals	Digital brands and green competition – Digital advertising for sustainability – Use of digital platforms – Striving to outperform rivals – Pressure for green initiatives – Focus on technology to boost brand credibility – Need for competitive differentiation
	Legal and Regulatory Challenges	Consequences of greenwashing on brand reputation – Rising legal costs – Legal threats – New governmental regulations – Expanding anti-greenwashing laws – Pressure to provide legal documentation – Rising compliance costs with environmental laws
	Cultural and Social Changes	Changing buying patterns of new generation – Focus on social responsibility – Emphasis on consumption ethics – Growing sensitivity to greenwashing – Acceptance of sustainable brands – Need for transparency and honesty – Efforts to build Gen Z trust
Central Phenomenon	Greenwashing and Resulting Crises	Deceiving consumers – Reduced brand credibility – Negative responses toward brand – Extra advertising costs – Brand reputation damage – Decreased consumer loyalty – Negative impact on financial performance
	Consumer Trust in Green Brands	Transparency in brand actions – Genuine connection with consumers – Accurate and honest communication – Effectiveness of green advertising – Use of independent reports – Brand's ability to address concerns – Positive impact on customer loyalty
	Sustainable Innovation	Use of green technologies – R&D in sustainability – Changes in packaging – Efficient energy use – Use of recycled materials – Green production

Main Category	Core Category	Open Codes
		initiatives – Changes in brand production processes
	Brand Communication and Public Awareness	Advertising on social media – Creating communication channels with consumers – Using digital strategies for education – Utilizing blogs and videos – Transparent information sharing – Public monitoring of brands – Engaging with customers via online platforms
	Corporate Sustainability and Responsibility	Brand commitment to social responsibility – Promoting sustainability within organization – Stakeholder sustainability evaluations – Changes in production and consumption patterns – Increasing transparency of brand activities – Impact on consumer loyalty – Involvement of environmental experts
	Brand Reporting and Transparency	Providing transparent reports – Use of environmental indicators – Combined financial and environmental reporting – Stakeholder engagement for improvement – Effect of accurate reporting on brand image – Improving transparency in environmental activities – Reducing gap between claims and reality
	Preventing Greenwashing	Using credible reports – Direct engagement with consumers – Creating transparent standards – Strict monitoring of brand activities – Relying on expert opinions – Emphasis on honest marketing – Reporting real environmental outcomes
	Focus on Sustainable Innovation	Use of renewable materials – Utilization of clean energy – Innovative production processes – Sustainability R&D – Global green initiatives – Collaboration with environmental organizations – Advertising based on sustainable innovation
	Transparency in Brand Communication	Use of digital reporting – Using social media for clarity – Ensuring accuracy of brand information – Publishing environmental statistics – Transparency in brand processes – Two-way communication with customers – Emphasis on honesty in advertising
Strategies	Building Consumer Trust	Guaranteeing green product authenticity – Ensuring honesty in advertising – Using reputable opinions to build credibility – Publishing real customer reviews – Open approach to customer feedback – Sharing positive customer experiences – Cooperation with standard verification bodies
	Accurate Environmental Reporting	Publishing clear and accurate reports – Developing an online reporting system – Using digital tools for reporting – Independent reporting – Environmental brand assessment – Impact of reporting on consumer decisions – Use of advanced tools to measure environmental impact
	CSR-based Actions	Prioritizing sustainability in brand strategy – Collaborating with environmental organizations – Focus on sustainable production – Assessing social impacts – Expanding CSR efforts – Emphasis on long-term benefits – Enhancing brand participation in social matters
	Decline in Public Trust	Deceiving consumers – Reduced loyalty – Legal consequences – Decline in sales – Negative media reactions – Lower customer engagement – Negative market impact
	Brand Value Decline	Damaged brand reputation – Reduced consumer willingness to buy – Increased market skepticism – Damage to brand image – Falling stock prices – Decreased customer satisfaction – Weakened brand influence
	Legal Consequences	Environmental fines – Increased regulatory pressure – Impact on global operations – Legal pursuits – Threat of legal action – Changes in government laws – Brand legal accountability
Consequences	Market Share Decline	Losing loyal customers – Negative response to ads – Competition to attract customers – Losing competitive brands – Reduced sales in target markets – Damaged market position – Lost business opportunities
	Decreased Investor Interest	Falling stock value – Doubts about brand effectiveness – Investor mistrust in green brands – Reduced investment interest – Negative impact on attracting investors – Damaged brand credibility in financial markets – Harm to brand investment strategies
	Damage to Brand Public Relations	Negative media reactions – PR crises – Loss of customer trust – Damaged media relations – Public complaints – Customer dissatisfaction – Reduced

Main Category	Core Category	Open Codes
Contextual Conditions		market influence
	Growth of Digital Platforms	Growth of social media – Online information sharing – Use of digital networks – Instant access to information – Digital advertising – Publishing environmental reports online – Consumer data analysis
	Support for Environmental Laws	Development of green laws – Support for sustainable actions – Provision of government incentives – Review of environmental standards – Focus on environmental penalties – Enhancing transparency in environmental laws – Collaboration with international organizations
	Creation of Brand Communication Networks	Creating communication channels with consumers – Active presence on social media – Transparent websites – Development of brand platforms – Effective stakeholder communication – Use of digital channels for more interaction – Facilitating consumer reporting
	Changes in Consumer Behavior	Attention to green products – Conscious selection of sustainable brands – Sensitivity to deceptive advertising – Focus on social responsibilities – Preference for responsible brands – Awareness of purchase impact on environment – Need for brand honesty and transparency
	Media Coverage of Brands	Publishing environmental reports in media – Media influence on consumer awareness – Using media for social change – Increased media coverage of greenwashing – Green advertising and differentiation – Assessment of media impact – Boosting brand impact in digital markets
	International Institutions and Brand Support	Establishing global standards for green brands – Collaboration with international organizations – Supporting environmental change – Global institutions' influence on brand strategies – Global sustainability evaluation – Green brand endorsement by international bodies – Expansion of international environmental laws

Discussion and Conclusion

The present study explores the paradigmatic model of factors influencing brand greenwashing in the digital age, analyzing its relationship with green marketing strategies and sustainable brand innovation. Drawing on expert interviews, the research identifies six primary categories consistent with the Corbin and Strauss paradigmatic framework: causal conditions, contextual conditions, intervening conditions, central phenomenon, strategies, and consequences. This framework provides a systematic lens for examining the interrelated drivers of greenwashing and their implications for sustainable branding in a digital context.

The findings reveal several causal conditions shaping the emergence of brand greenwashing patterns in the digital era. These include consumer awareness, technological advancement, investment in green brand competitiveness, social transformation, and the influence of governmental and legal regulations. These results align with recent research indicating that increasing environmental consciousness among consumers directs their purchasing behavior toward green products and marketing (Correa, 2024). Consequently, firms are compelled to invest in sustainable initiatives and adopt authentic, transparent green marketing strategies to meet the sustainability expectations of contemporary consumers (Chauhan, 2024).

Moreover, the integration of digital technologies significantly enhances corporate communication of environmental actions, enabling brands to engage more effectively with stakeholders and convey their sustainability commitments (Suganya, 2023). Simultaneously, market competition pressures organizations to integrate sustainable practices as a means of preserving brand equity and market share, given consumers' growing preference for brands perceived as environmentally responsible (Lopes, 2024). Finally, social and cultural shifts—combined with stricter demands for corporate transparency and accountability—shape how firms design and communicate their green marketing strategies in response to evolving regulatory frameworks (Aragon, 2024).

The findings of this research indicate that the central phenomenon, namely brand greenwashing and its resulting crises, includes: greenwashing and its resulting crises, consumer trust in green brands, sustainable innovation, brand communication and public awareness, sustainability, and corporate social responsibility. In fact, brand greenwashing has a significant negative impact on consumer trust in green brands, as misleading environmental claims lead to skepticism and reduced brand attachment among consumers (Bhat, 2022). Additionally, the necessity and urgency of achieving sustainable innovations can unintentionally create a context for greenwashing, whereby companies exaggerate the environmental benefits of their products or services, ultimately harming brand perception and consumer trust (Janz, 2024). However, effective and transparent communication from brands plays a crucial role in combating greenwashing; brands that genuinely engage in sustainable practices will be able to significantly enhance their reputation and consumer trust (Prihatiningrum, 2024). Moreover, greenwashing, by undermining the credibility of corporate social responsibility (CSR) initiatives, leads to an overall decrease in trust in the environmental claims made by companies (Teichmann, 2024). Ultimately, companies that honestly and authentically pursue sustainability can ensure long-term customer loyalty, while companies that resort to greenwashing are seriously at risk of damaging their brand image (Ijioma, 2024).

In the contextual conditions section, the identified factors include: the growth of digital platforms, support for environmental laws, the creation of communication networks in brands, changes in consumer behavior, media coverage of brands, international institutions, and brand support. Accordingly, the increasing growth of digital platforms, while transforming how consumers interact and marketing strategies are implemented, has enabled more effective communication of environmental initiatives by brands (Inparaj, 2024). Furthermore, supportive government policies in the form of favorable environmental regulations play a significant role in encouraging companies to adopt green marketing approaches and ultimately influence consumer purchasing decisions (Inparaj, 2024). Additionally, the existence of efficient communication networks among brands strengthens the ground for collaboration and information exchange regarding sustainability practices, consequently affecting consumer attitudes (Chwialkowska, 2024). Alongside these factors, fundamental changes in consumer behavior towards sustainability, driven by increased environmental awareness and social influences, directly impact their purchasing decisions (Raghavendra, 2025). On the other hand, media coverage of brands also significantly affects public perception of the brand and the level of consumer trust, thereby altering the effectiveness of green marketing strategies (Balasenthil, 2024). At the international level, the involvement of international organizations in promoting sustainability standards not only influences brand strategies but also shapes consumer expectations (Ferreira, 2023). Finally, genuine and continuous support of brands for environmental initiatives is a vital element in strengthening consumer loyalty and encouraging sustainable purchasing behaviors (Kurniawan, 2023).

In the intervening conditions section, the identified factors include: brand greenwashing, consumer skepticism, rapid dissemination of information on digital platforms, competition and pressure from digital competitors, legal and regulatory challenges, and cultural and social transformations. Indeed, brand greenwashing, as one of these intervening factors, acts by undermining consumer trust and damaging brand reputation, as companies often exaggerate their environmental actions, leading to skepticism among consumers (To, 2024). Similarly, greenwashing leads to increased consumer doubt towards all green products and negatively affects their perceptions and purchase intentions (Liao, 2024). Moreover, the rapid dissemination of information through social media and digital platforms has intensified scrutiny of brands' environmental claims, thus affecting consumer evaluations (Seiler, 2022). Meanwhile, companies are under pressure to adopt genuine sustainability practices due to increased consumer awareness and growing market competition (Bondarenko, 2024). On the other hand, the spread of greenwashing has necessitated stricter regulations to ensure transparency and accountability in environmental claims, increasing legal and regulatory challenges (Adhikari, 2024). Finally, cultural and social transformations resulting from increased environmental awareness among consumers have led to closer scrutiny of companies' sustainability claims, significantly impacting market dynamics.

In the strategies section, the identified factors include: preventing greenwashing, focusing on sustainable innovation, transparency in brand communication, increasing consumer trust, accurate environmental reporting, and actions based on social responsibility. To address the challenges posed by greenwashing and strengthen genuine green marketing, the adoption of effective strategies appears essential. In this regard, preventing greenwashing through increased transparency, implementing stricter guidelines for environmental claims, and promoting third-party verification is considered a fundamental step (Kirathi, 2024). Furthermore, focusing on sustainable innovation and integrating environmental considerations into innovation processes can not only lead to positive environmental outcomes but also enhance brand image and consumer trust (Bai, 2024). Additionally, creating transparency in brand communication and promoting competence in this area effectively influences consumer attachment to brands and strengthens their loyalty and resilience to negative information (Lin, 2020). In parallel, transparent communication and active engagement with consumers through social media play a significant role in increasing their trust and loyalty to the brand (Pamungkas, 2024). Moreover, accurate and transparent reporting in the field of corporate social responsibility (CSR) is of particular importance for increasing consumer confidence and loyalty (Jyoti, 2025). Finally, implementing genuine and effective social responsibility actions significantly impacts brand loyalty and consumer engagement, emphasizing the importance of incorporating authentic social responsibility into brand strategies (Hoo, 2022).

In the consequences section, the identified factors include: reduced public trust, decreased brand value, legal consequences, reduced market share, decreased investor interest, and damage to brand public relations. Specifically, reduced public trust is a significant consequence; for example, phishing attacks, by threatening organizational security and trust, can lead to long-term consequences on reputation and stakeholder relations, ultimately undermining public trust in brands (Sahijwani, 2024). Furthermore, research shows that corporate social responsibility (CSR) activities, if not managed properly, especially in high-profile companies, may be perceived as unnecessary costs and lead to a decrease in brand value (Farooq, 2015). Additionally, ethical lapses in supply chains can lead to legal consequences and jeopardize brand integrity by damaging reputation (Sandul, 2023). In the competitive arena, a decline in brand reputation can directly negatively impact market share and reduce competitiveness (Chowdhury, 2002). From an investment perspective, a poor perception of a company's brand image can lead to investor disinterest and a decrease in their willingness to invest (Oktarina, 2018). Finally, negative customer perception of a brand's public relations performance can lead to a decrease in their loyalty and damage the overall brand image (Rahi, 2016).

Recommendations

1. Establishing Transparent Standards for Brand Environmental Reporting: Based on the category of transparency in brand communication and accurate environmental reporting, it is recommended that brand managers, using standardized reporting systems such as GRI (Global Reporting Initiative) standards and digital technologies like blockchain, make their environmental claims more transparent. This action will increase consumer trust and reduce the perception of greenwashing.
2. Designing Educational Campaigns to Increase Consumer Awareness about Greenwashing: Based on the category of consumer awareness and reducing brand greenwashing, it is recommended that leading brands in the field of sustainability, non-governmental organizations, and marketing policymakers launch educational campaigns on social media to enable consumers to distinguish between genuine claims and greenwashing. This action, in addition to raising public awareness, will differentiate reputable brands from deceptive companies.
3. Creating a Digital Monitoring System to Track and Evaluate Brands' Green Claims: Based on the category of legal and regulatory challenges, it is recommended that regulatory bodies and marketing legislators establish a digital monitoring platform where brands' environmental claims are reviewed and verified by independent experts. Such a system can identify violating brands and prevent misleading advertising.

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