Hakemli - Süreli - Bilimsel Dergi
İNTERNET UYGULAMALARI ve YÖNETİMİ
Journal of
INTERNET APPLICATIONS and MANAGEMENT
2025 / 16(2)

Perceived greenwashing in social media advertising and consumer trust

Sosyal medya reklamlarında yeşil yıkama algısı ve tüketici güveni

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Received: 22.09.2025; **Accepte**d: 22.12.2025 **DOI**: 10.34231/iuyd.1789154

This study examines the association of examines the relationship between perceived greenwashing indicators and consumer trust. The primary objective is to reveal how sustainability-themed messages are presented in social media environments and how they shape consumer trust and levels of engagement. Using the BrandMentions digital monitoring platform, a dataset of 10,012 sustainability-related posts was collected from various digital platforms in Türkiye between September 2024 and September 2025. The content was evaluated through sentiment analysis, risk categories (uncertainty, lack of evidence, false claims), and types of supporting evidence. The findings indicate that sustainability discourses are predominantly presented in an informative and emotionally neutral tone. Although relatively rare, negative content (e.g., criticism, skepticism) generated significantly more comments and shares, thereby fostering stronger audience engagement. Moreover, messages lacking concrete evidence or containing ambiguous statements were more likely to reduce consumer trust and reinforce perceptions of greenwashing. Clear differences were observed across platforms; overall, the results underscore that consumer trust plays a decisive role in sustainability communication and that transparent, verifiable messages strengthen this trust. The study provides both conceptual and practical contributions to understanding consumer behavior in the context of perceived greenwashing in digital advertising.

Keywords: *Greenwashing, digital advertising, consumer trust, social media, sustainability*

Bu çalışma, dijital reklamcılıkta algılanan yeşil yıkamanın tüketici güveni üzerindeki ilişkisini incelemektedir. Araştırmanın amacı, sosyal medya ortamlarında sürdürülebilirlik temalı mesajların hangi biçimlerde sunulduğunu, tüketici güveni ve etkileşim düzeyini nasıl şekillendirdiğini ortaya koymaktır. Çalışmada, BrandMentions dijital izleme platformu aracılığıyla Eylül 2024–Eylül 2025 döneminde Türkiye'deki farklı dijital mecralardan 10.012 sürdürülebilirlik içerikli paylaşım toplanmıştır. İçerikler duygu analizi, risk kategorileri (belirsizlik, kanıt eksikliği, yanlış iddialar) ve kanıt türlerine göre değerlendirilmiştir. Bulgular, sürdürülebilirlik söylemlerinin büyük ölçüde bilgilendirici ve duygusal vurgu içermeyen (nötr) bir tonda sunulduğunu göstermektedir. Nadir de olsa olumsuz içeriklerin (ör. eleştiri, şüphecilik) daha fazla yorum ve paylaşım alarak daha güçlü etkileşim yarattığı saptanmıştır. Ayrıca, somut kanıt sunmayan ya da belirsiz ifadeler içeren mesajların tüketici güvenini azaltma ve yeşil yıkama algısını güçlendirme olasılığının daha yüksek olduğu görülmüştür. Platformlar arası belirgin farklar bulunmuş; sonuçlar, tüketici güveninin sürdürülebilirlik iletişiminde belirleyici rol oynadığını ve şeffaf, doğrulanabilir mesajların güveni güçlendirdiğini ortaya koymaktadır. Çalışma, dijital reklamcılıkta algılanan yeşil yıkamanın tüketici davranışlarını anlamada önemli bir kavramsal ve uygulamaya katkı sunmaktadır.

Anahtar Kelimeler: *Yeşil yıkama, dijital reklamcılık, tüketici güveni, sosyal medya, sürdürülebilirlik*

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1. INTRODUCTION

In recent years, environmental sustainability has become a key issue shaping both how consumers behave and how companies communicate globally. Yet, a growing gap between what companies claim about their environmental efforts and what they actually do has brought the issue of greenwashing to the forefront of academic and public discussion. Rather than being a simple case of false advertising, greenwashing is a complex communication issue that varies in form and intensity. According to Bladt et al. (2023), greenwashing can be analyzed through two main lenses: the type of environmental claim (whether it is false, vague, or omits key information) and the level at which it appears (product-level or company-wide). Their research highlighted that misleading firm-level claims and outright false statements are especially damaging to consumer trust and how brands are perceived.

Similarly, Zioło et al. (2024) found that using selective information, nature-themed visuals, or messaging that contradicts real practices erodes trust, lowers satisfaction, and fuels skepticism among consumers. This issue becomes even more complex in digital advertising. On social media, many brands use nature-inspired imagery, symbolic language, and polished visuals to present themselves as environmentally responsible. Yet, as Parguel et al. (cited in Zioło et al., 2024) describe, these tactics—known as executional greenwashing—can create misleading impressions of sustainability. The same digital environment that enables such strategies also empowers consumers to investigate and challenge questionable claims. This tension makes transparency and evidence-based communication more critical than ever for preserving consumer trust.

Online consumer behavior now plays a pivotal role in shaping brand perception. According to Gülmez et al. (2025), digital actions such as product returns or online reviews can directly influence brand credibility and loyalty. In Türkiye, interest in sustainability communication is growing, but academic studies on the subject remain scarce. Given the country's high levels of social media engagement, understanding how digital sustainability claims affect consumer trust, participation, and purchase decisions is particularly important. Akturan (2018) emphasizes that while environmentally themed advertising often appeals to younger audiences, any sign of inauthenticity can quickly erode trust. Consequently, Turkish companies that prioritize visibility over genuine commitment risk being perceived as greenwashing.This research is grounded in the United Nations' 2030 Sustainable Development Goals, specifically Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action, which emphasize the need for truthful, verifiable communication (United Nations, 2015). Within this framework, examining how sustainability narratives are crafted in Türkiye's digital advertising landscape is both academically significant and practically necessary for designing more transparent communication strategies and informed policy initiatives.

The study aims to explore how sustainability-related messages are used across Türkiye's digital media platforms. It seeks to identify potential greenwashing practices, assess their relationship on consumer trust, and evaluate their impact on digital engagement. Additionally, it considers cultural factors and platform-specific dynamics to better understand how audiences perceive and interpret sustainability messages online.

In this context, the research questions are as follows:

1. How are sustainability-themed contents presented in digital platforms in Türkiye in terms of tone and discourse style?
2. How are greenwashing risk categories (ambiguity, lack of evidence, false claims) related to consumer trust and engagement levels?
3. What kinds of differences can be observed in the emotional tone and engagement dynamics of sustainability discourses across different digital platforms (e.g., Twitter, Instagram, news websites)?
4. How does the perceived credibility of sustainability messages in Türkiye shape consumer engagement and purchase intention?

Despite the growing body of international research on perceived greenwashing and consumer trust, empirical evidence based on large-scale, real-time digital discourse in emerging markets such as Türkiye remains highly limited. Existing studies primarily rely on survey-based experimental designs, while organic, platform-based sustainability communication has been largely overlooked. This study directly addresses this gap by analyzing more than 10,000 sustainability-related digital contents to examine how greenwashing risk indicators shape sentiment, trust, and engagement in natural online environments. Accordingly, the following section systematically addresses the relevant literature.

2. LITERATURE REVIEW

2.1. Perceived Greenwashing: Conceptual Foundations and Consumer Responses

Perceived greenwashing arises when consumers notice discrepancies between a company's actual environmental practices and its public sustainability messaging (Delmas & Burbano, 2011). When corporate claims fail to align with genuine performance, audiences tend to classify these efforts as greenwashing (Nyilasy et al., 2014; de Jong et al., 2018). Such perceptions can erode trust and shape consumer attitudes, emotions, and purchasing intentions (Lyon & Montgomery, 2015; Wang & Wang, 2023).

In the literature, greenwashing commonly refers to environmental messages that are vague, overstated, or unverified (Schmuck et al., 2018; Bernini et al., 2023). Ambiguity, in particular, heightens consumer skepticism and may trigger negative emotional responses (Schmuck et al., 2018; Krstić et al., 2021), often leading to diminished trust and a reduced likelihood of purchasing eco-labeled products (Ali et al., 2021). Perceptions of greenwashing are influenced by several factors, including consumers' environmental awareness, the framing of messages, and the credibility of supporting evidence. Verifiability plays a pivotal role in building trust. When sustainability claims rely primarily on aesthetic or symbolic cues—such as nature imagery or "green" color palettes—without substantive evidence, they are often perceived as superficial and lose credibility (Martinez et al., 2023; Chen et al., 2024; Koay, 2023; Kwon et al., 2024; Wongkitrungrueng & Srisuphaolarn, 2024).

Beyond individual attitudes, greenwashing highlights systemic issues of transparency and accountability within markets. Weak regulatory mechanisms and limited oversight allow misleading practices to persist. Some scholars have even characterized greenwashing as the

"evil twin" of corporate social responsibility (Minneti, 2009; de Jong et al., 2018; Ribeiro & Ribeiro, 2024). Internal pressures, short-term financial objectives, and information asymmetries further perpetuate the problem (Delmas & Burbano, 2011).

Recent research indicates that consumers who are more environmentally engaged and familiar with the United Nations Sustainable Development Goals (SDGs) are better equipped to detect inconsistencies in green marketing. These individuals tend to scrutinize environmental claims more critically and lose trust more rapidly when misalignments are identified (Zhang & Yuan, 2024; Chatzitheodorou et al., 2023). Over time, perceived greenwashing not only harms relationships with individual brands but also fuels widespread skepticism toward sustainability communication as a whole.

Given this context, it becomes increasingly important to understand how sustainability messages are constructed and interpreted within digital advertising environments. The following section explores the dynamics of sustainability communication in these online spaces.

2.2. Sustainability Messages in Digital Advertising

Digital advertising provides a dynamic environment for communicating sustainability messages, allowing for both direct engagement and interactive participation. Unlike traditional media, digital platforms enable real-time feedback, offering opportunities for meaningful dialogue while also exposing brand messages to greater public scrutiny. When sustainability claims are vague or insufficiently detailed, they tend to heighten perceived risk and reduce consumer trust (Pavlou, 2003). Consequently, clarity, transparency, and verifiable information have become essential components of credible environmental communication. Urban micromobility systems have increasingly been analyzed through multi-dimensional frameworks that consider environmental, technological, and socio-cultural factors (Yaprak et al., 2025).

The structure of sustainability messages—whether visual or textual—plays a critical role in shaping audience perceptions. Nature-inspired visuals, green color schemes, and symbolic imagery often appeal to younger audiences. However, without substantive content, such aesthetic elements quickly lose credibility (Muralidharan et al., 2021; Martinez et al., 2023; Lu & Wang, 2024). Ensuring alignment between visual design, message tone, and audience expectations is therefore crucial for maintaining trust. While overtly promotional or overly polished content can appear biased or inauthentic, balanced and nuanced messages are generally perceived as more credible (Wang & Wang, 2023).

Social media has become one of the most influential channels for disseminating environmental messages. Its visual orientation and extensive reach offer brands significant visibility, but also demand greater strategic precision to avoid skepticism. On visually driven platforms such as Instagram, the absence of detailed or verifiable information often contributes to perceptions of greenwashing (Kwon et al., 2024). To counter this, visual narratives must be complemented by transparent, evidence-based content. Research further indicates that individuals actively engaged in environmental initiatives are particularly critical of superficial or manipulative messaging (Zhang & Yuan, 2024; Chatzitheodorou et al., 2023).

Effective green advertising therefore depends not only on symbolic representation but also on the inclusion of concrete and verifiable claims. Detailed environmental information has been found to positively influence consumer attitudes and purchase intentions, whereas vague or superficial claims tend to produce the opposite effect (Krstić et al., 2021; Agarwal & Sarkar, 2020; Shen et al., 2024). Moreover, interactive features such as likes, comments, and shares shape perceptions of message credibility and engagement; posts that generate higher interaction levels are more likely to encourage green product adoption (Cao et al., 2021).

Framing strategies also play a key role in determining message effectiveness. For instance, altercast framing—which positions consumers as responsible and empowered actors—has been shown to enhance the perceived persuasiveness of sustainability messages (Milfeld & Pittman, 2024). Despite these developments, much of the literature continues to suggest that digital sustainability communication remains largely symbolic and superficial, emphasizing the growing need for transparency, authenticity, and credibility in this domain (Braga et al., 2024).

2.3. Consumer Trust, Engagement, and Purchase Intention

In digital sustainability communication, trust lies at the core of consumer responses. While the accuracy of environmental claims reinforces trust, questionable, exaggerated, or ambiguous claims undermine it—leading consumers to distance themselves from the brand and weakening their purchase intentions (Peattie & Crane, 2005; Nyilasy et al., 2014; Martinez et al., 2023; Lu & Wang, 2024). Within this process, the perception of greenwashing emerges as a key triggering factor; notably, the loss of trust is more pronounced among consumers with higher environmental sensitivity (Chan et al., 2020; Wang & Wang, 2023). Digital interactions—such as likes, shares, and comments—serve as tangible reflections of trust. Elements of social proof reduce perceived risk and strengthen trust, while increases in engagement rates directly enhance purchase intention (Schmuck et al., 2018). Indeed, Pavlou (2003) emphasizes that trust in digital environments reduces perceived risk and increases transactional intent.

Consumer responses are also shaped by the framing and quality of message content. Generation Z, in particular, tends to place greater trust in explanatory and well-documented content rather than in superficial visuals (Muralidharan et al., 2021). A lack of information or advertisements relying solely on symbolic cues weakens trust (Wongkitrungrueng & Srisuphaolarn, 2024; Kwon et al., 2024), whereas evidence-based and transparent communication strengthens trust and supports positive behavioral intentions (Chen et al., 2024; Koay, 2023).

How sustainability messages are framed plays a critical role in maintaining consumer trust. One effective approach is the altercast framing technique, which invites individuals to see themselves as responsible actors in environmental efforts. This strategy has been shown to strengthen both trust and the intention to purchase (Milfeld & Pittman, 2024). Similarly, messages that acknowledge both positive and negative aspects—known as two-sided messages—help minimize perceptions of manipulation and enhance message credibility (Wang & Wang, 2023). When consumers already have favorable impressions of green brands, this positive perception reinforces trust and loyalty, encouraging continued support and purchase behavior (Rahman et al., 2015). On the other hand, when there is a disconnect

between a brand's sustainability claims and its actual practices, the damage extends beyond consumer skepticism—investor confidence can also be shaken, weakening long-term brand commitment (Chatzitheodorou et al., 2023). Additionally, consumers who are more active on social media tend to evaluate symbolic environmental content more critically, which can speed up the erosion of trust (Zhang & Yuan, 2024).

To summarize, the relationship between trust, engagement, and purchase intention forms the foundation for effective sustainability communication. Yet, inconsistencies in how these concepts are defined and measured suggest the need for clearer and more unified theoretical models (Bernini et al., 2023). Ultimately, the impact of sustainability messaging depends not just on presenting a "green" image, but on delivering honest, evidence-based, and substantively rich communication (Braga et al., 2024). In this context, the credibility of digital sustainability advertisements becomes a central factor influencing whether consumers trust and act on the message. Therefore, understanding how trust, engagement, and consumer behavior interact is essential for advancing both research and practice in this field.

2.4. Greenwashing and Digital Sustainability Communication in the Turkish Context

In Türkiye, rising public awareness of environmental issues has prompted consumers to approach sustainability claims with greater skepticism and critical awareness. This shift suggests that green-themed advertisements designed primarily to enhance brand visibility—rather than convey meaningful information—can undermine trust and reinforce perceptions of greenwashing (Martinez et al., 2023; Akturan, 2018). In developing markets, the consistency between a company's sustainability messaging and its core organizational values plays a particularly significant role in shaping credibility (Lu & Wang, 2024). Within the Turkish context, where social media usage is extensive, brands frequently rely on visually appealing content to attract attention. However, when such content lacks substantive depth, it risks eroding consumer confidence. These trends underscore the importance of communication strategies that are transparent, verifiable, and rooted in genuine environmental commitment (Kwon et al., 2024; Braga et al., 2024).

Although previous studies indicate that younger consumers are generally receptive to environmental messaging, they also tend to be more discerning and critical of authenticity. Consequently, messages that are clear, evidence-based, and multidimensional are more likely to foster trust and engagement. In contrast, superficial or overtly promotional narratives can diminish credibility and negatively affect purchase intentions (Wang & Wang, 2023; Akturan, 2018; Agarwal & Sarkar, 2020). The effectiveness of green marketing therefore depends not only on aesthetic appeal or symbolic representation but also on the delivery of credible, context-sensitive messages that reflect local social realities. Achieving this balance is essential for cultivating trust and positively shaping consumer behavior.

At this point, the interplay between trust, engagement, and purchase intention emerges as a central determinant of sustainability communication effectiveness. Since these dynamics are strongly influenced by social and cultural contexts, it is crucial to examine consumer responses specifically within Türkiye. Emerging research suggests that the digital consumption habits of younger generations play a decisive role in how sustainability messages are interpreted and

acted upon. Moreover, socially driven consumption patterns indicate meaningful generational differences in the internalization and expression of sustainability values (Ökten, 2025).

3. METHODOLOGY

This study adopts a quantitative, data-driven content analysis approach to examine the tone, risk categories, and evidential structures of sustainability-related posts shared across digital platforms in Türkiye. A total of 10,012 public mentions were retrieved using the digital monitoring platform BrandMentions, which is widely utilized in digital media analytics and sustainability communication research (Ahmad et al., 2022; Küngül & Aydın, 2023). This study follows a non-experimental, observational research design and does not involve any manipulation, treatment, or controlled comparison.

3.1 Research Design

The research follows a non-experimental, cross-sectional design based on naturalistic data collection. No stimuli were introduced; rather, public digital discourse was passively observed and analyzed. This approach allows for the exploration of organic communication behaviors, which is crucial for understanding real-world sustainability narratives (Franco-Riquelme et al., 2023).

The study employed a multi-step analytical pipeline including: (1) Keyword filtering based on green marketing terminology (TerraChoice, 2009), (2) Automated sentiment classification, (3) Risk category tagging, (4) Platform-based comparative analysis, and (5) Time-series trend evaluation. A visual representation of the full workflow is provided in Figure 1. Figure 1 presents the overall research workflow, including stages of data collection, preprocessing, sentiment classification, and analysis.

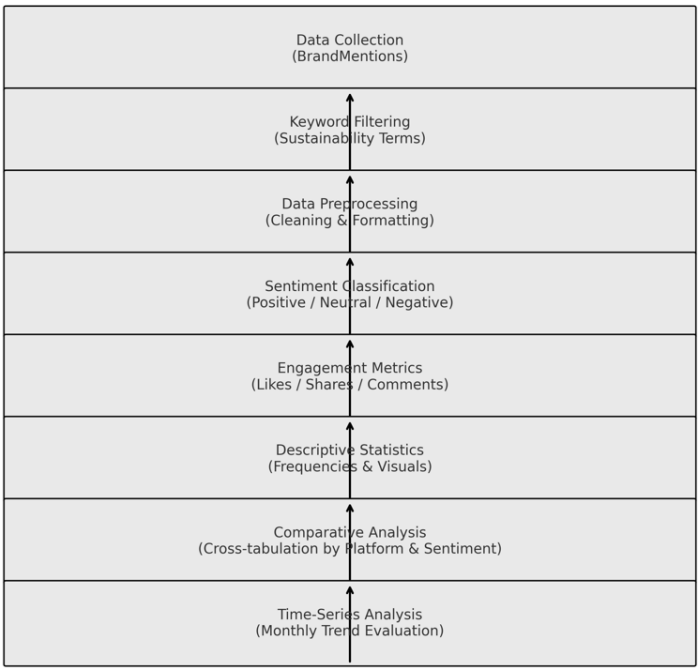

Figure 1. Research workflow illustrating sequential stages of data collection, filtering, preprocessing, sentiment classification, and analysis

3.2 Sampling and brand selection

The sample consists of publicly available social media and digital content associated with nine brands operating in Türkiye, selected from three key sectors: fashion/textile, food & retail, and cosmetics/personal care. Specifically, three brands per sector were included, chosen based on the following criteria:

(i) High public visibility and engagement on social media,
(ii) Active communication regarding sustainability themes, and
(iii) Broad consumer recognition within the Turkish market.

Brand names have been deliberately anonymized in accordance with ethical research principles. All analyses are therefore presented based on sectoral representation, ensuring both academic rigor and reputational neutrality.

3.3 Data collection

The dataset was obtained through the BrandMentions platform. This platform aggregates social media content and online mentions from sources such as Twitter, Instagram, Facebook... Sustainability-related keywords such as *"sürdürülebilirlik" (sustainability), "çevre dostu" (eco-friendly), "geri dönüşüm" (recycling), and "yeşil dönüşüm" (green transformation)* were used in combination with brand identifiers to filter relevant content. The data collection was limited to posts in the Turkish language and covered the period from September 2024 to September 2025. A total of 10,012 posts and online mentions were included in the final dataset after cleaning and verification.

3.4. Variables and data processing

Each post in the dataset was annotated with three analytical indicators: (1) whether it contained a green claim, (2) the presence and type of supporting evidence, and (3) its assigned perceived risk category. Together, these markers provided a structured framework for identifying potential indicators of greenwashing, consistent with established analytical approaches in previous studies (Nyilasy et al., 2014; Schmuck et al., 2018).

The dataset used in this research includes several core variables essential for examining the tone, reach, and thematic composition of sustainability communication across digital platforms. Each entry records the publication timestamp, the digital platform on which the content appeared (e.g., Twitter, Instagram, or online news outlets), and the full text of the post or article. Including the platform variable enables comparative analysis across channels, allowing for the assessment of variations in content style, emotional tone, and audience engagement.

A key analytical variable in this study is the sentiment score, automatically generated by the BrandMentions platform through a proprietary machine learning algorithm. Sentiment classifications—positive, neutral, or negative—are based on the linguistic structure and emotional tone of each post. Typically, neutral content employs factual or descriptive language, while positive sentiment reflects endorsement or approval of sustainability-related initiatives. Negative sentiment, by contrast, often signals criticism, skepticism, or doubt, frequently associated with perceptions of greenwashing.

Another critical variable is the tracked keyword, which identifies the specific sustainability theme addressed in each piece of content—such as eco-friendly behavior, recycling, environmental protection, or carbon neutrality. These keywords played a dual role: first, in filtering relevant content during the data collection phase, and second, in grouping posts into thematic categories for subsequent analysis. Where available, engagement metrics such as likes, shares, and comments were also recorded, serving as proxies for audience interaction and responsiveness to different tones of sustainability messaging.

Prior to analysis, all variables underwent a structured data-cleaning and preprocessing procedure. This included standardizing date formats into datetime objects, converting categorical variables to lowercase for consistency, and addressing missing or irregular entries. Numerical fields representing engagement metrics were converted from strings to integers, with non-numeric values excluded or replaced with zeros where appropriate. Outlier interaction data were retained unless clear evidence indicated data corruption or input error. Text fields were preserved in their original form to maintain contextual and semantic nuances relevant to sentiment interpretation.

In addition to descriptive statistics, inferential analyses were conducted to test the relationships among key variables. First, chi-square tests were used to examine the association between (a) platform type and sentiment categories, and (b) tracked sustainability keywords and sentiment. Second, a one-way ANOVA was performed to compare engagement levels (total number of likes, shares, and comments) across sentiment categories. Because engagement scores were highly skewed, a log-transformed engagement variable (log(1 + engagement)) was used in the ANOVA. Inferential analyses were conducted using chi-square tests and one-way ANOVA in order to statistically validate the relationships observed in descriptive findings.Overall, the data processing and preparation procedures were designed to ensure analytical reliability while preserving the authenticity of public discourse. This approach allowed the study to capture both quantitative patterns and qualitative dimensions embedded within digital narratives of sustainability communication and potential greenwashing.

3.5. Analytical procedure

The analytical process employed in this study was designed to examine the digital representation of sustainability-related discourse from multiple perspectives—quantitative distribution, emotional tone, platform-specific variation, and temporal dynamics. The overarching objective was to understand how sustainability claims are communicated and received across online platforms, and to identify potential patterns that may signal either authenticity or perceived greenwashing.

The first stage of the analysis involved descriptive statistical exploration to provide an overall profile of the dataset. Frequency distributions were calculated for variables such as platform type, sentiment category, and sustainability-related keywords. These distributions were visualized through bar charts, pie charts, and line graphs to illustrate dominant trends in the occurrence, tone, and thematic composition of sustainability messages. This stage established a foundational understanding of how frequently sustainability content appeared, where it was disseminated, and in what tone it was expressed.

The second stage focused on comparative and cross-tabulation analyses to uncover relationships among key variables. Sentiment distribution was examined across platforms to determine whether certain media environments were more prone to hosting negative or skeptical content. Similarly, associations between sentiment and thematic keywords were analyzed to reveal which sustainability topics elicited more positive or negative emotional responses. Engagement metrics—such as likes, shares, and comments—were also compared across sentiment categories to assess the relationship between emotional tone and user interaction, providing insights into how audiences respond to varying message styles and intensities.

The third analytical dimension employed a time-series approach to track the evolution of sustainability discourse over the twelve-month study period. By aggregating posts on a monthly basis, temporal fluctuations in content volume were observed, revealing spikes in activity that often coincided with corporate campaigns, environmental awareness events, or public controversies. This temporal perspective added contextual depth, allowing for the interpretation of sentiment shifts and engagement patterns in light of broader environmental communication dynamics.

All analyses were conducted using Python, leveraging libraries such as Pandas, Matplotlib, and Seaborn for data processing and visualization. Analytical rigor was ensured through standardized variable treatment, systematic verification of distributions, and transparent documentation of data-cleaning procedures. The combined use of descriptive, comparative, and temporal methods enabled a comprehensive and multidimensional understanding of how sustainability messaging operates within Türkiye's digital media landscape.

3.6. Ethical considerations

This study uses only publicly available data without any personal identifiers, ensuring compliance with digital research ethics (Townsend & Wallace, 2016). Since the analysis does not involve direct interaction with individuals, nor private accounts or protected content, institutional ethical approval was not required. Brand names were anonymized at the sectoral level (e.g., "X sector brand") to minimize reputational bias and maximize analytical objectivity.

4. FINDINGS

4.1 Distribution of mentions by platform

The dataset comprises a total of 10,012 sustainability-related mentions collected from various digital platforms, including social media channels and news sites. As illustrated in Figure 2, Twitter emerges as the most prominent platform, accounting for approximately 39% of all mentions. This is followed by news websites (26.2%), Instagram (12.3%), Facebook (7.3%), and LinkedIn (6.5%). Other platforms such as TikTok, YouTube, and Reddit contributed marginally to the total volume of sustainability discourse.

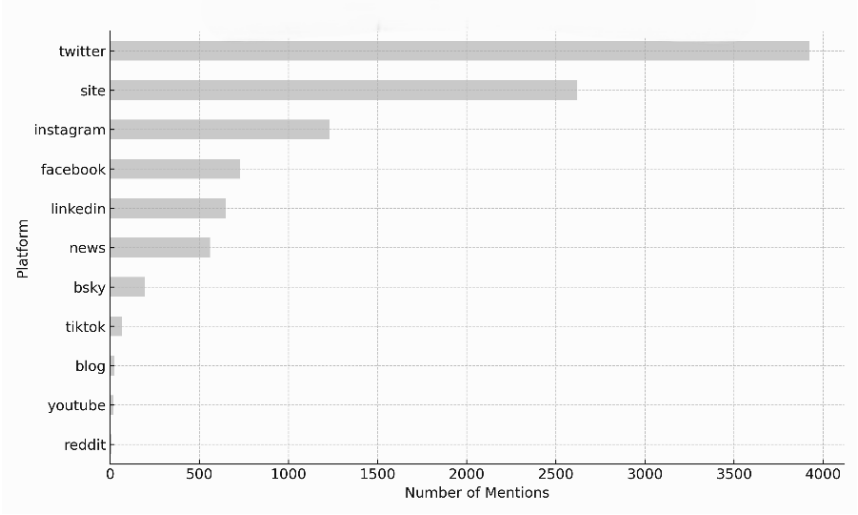

Figure 2. Distribution of sustainability-related mentions by digital platform

This distribution suggests that text-dominant platforms such as Twitter and online news outlets serve as primary venues for sustainability communication in the Turkish digital environment. Their dominance may be attributed to the informational nature of sustainability content, which tends to be more compatible with platforms that support extended text formats and hyperlink integration. Visual platforms like Instagram and TikTok, while not leading in frequency, may still hold strategic value for brand-driven campaigns targeting aesthetic or lifestyle narratives. The data also reflect the multichannel nature of green marketing, where both user-generated content and brand-owned media coexist. However, the concentration of discourse on a few dominant platforms raises questions about platform bias and the representativeness of public sentiment, which will be further explored in subsequent sections.

4.2 Sentiment distribution across all posts

An essential aspect of understanding digital sustainability discourse is examining the emotional tone that accompanies it. In this study, each post was automatically classified as either positive, neutral, or negative, based on algorithmic sentiment analysis performed by the data platform. As shown in Figure 3, the vast majority of posts — approximately 95.8% — were classified as neutral, while positive and negative sentiments accounted for 2.6% and 1.6%, respectively.

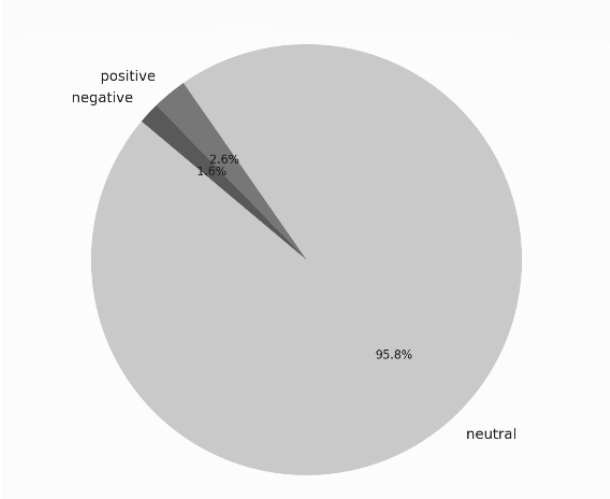

Figure 3. Sentiment distribution of sustainability-related posts

Figure 3. Distribution of sentiment (positive, neutral, and negative) in sustainability-related digital content collected between September 2024 and September 2025. The classification is based on automated sentiment analysis performed by the data platform. The overwhelming neutrality of the content suggests that much of the sustainability-related discourse in Turkish digital spaces is informational rather than emotional. Posts commonly include announcements, corporate statements, or campaign descriptions without overt evaluative language. This finding aligns with the notion that sustainability communication often aims to convey legitimacy and compliance rather than provoke engagement or persuasion.

Interestingly, although negative sentiment was relatively rare, it may carry disproportionate influence in shaping public perception — especially when associated with high-risk claims or suspected greenwashing. This phenomenon will be revisited in the analysis of sentiment by platform and interaction metrics in the following sections.

4.3 Monthly trends in sustainability discourse

Understanding how sustainability discourse evolves over time is essential for identifying patterns related to public awareness, campaign impact, and potential reputational risks. In this study, digital mentions were aggregated on a monthly basis over a twelve-month period, from September 2024 to September 2025. As illustrated in Figure 4, the volume of mentions remained relatively stable until mid-2025, after which a significant increase occurred.

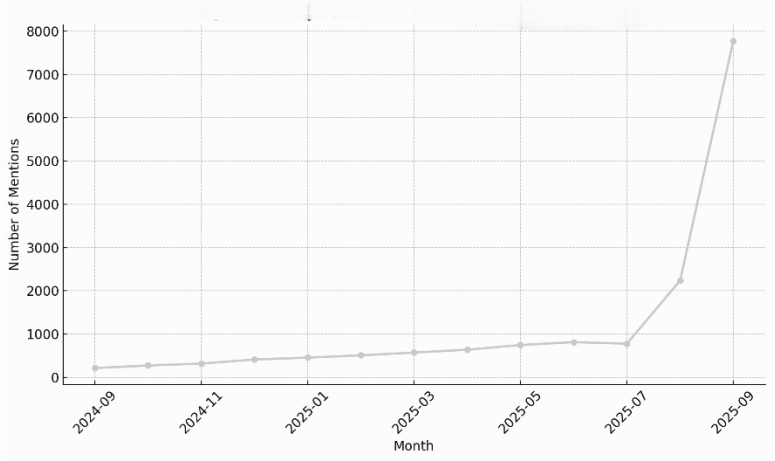

Figure 4. Monthly trend in sustainability-related digital mentions (Sept. 2024 – Sept. 2025)

Figure 4. Monthly trend of sustainability-related digital mentions between September 2024 and September 2025. A sharp spike is observed in September 2025, indicating a possible event-driven surge in communication activity. The data reveal a sharp surge in September 2025, during which more than 7,700 mentions were recorded—over three times the volume observed in the previous month. A smaller yet notable rise was also visible in August 2025, suggesting a buildup in sustainability-related communication activity. This spike may correspond to specific external events such as global environmental awareness days, corporate sustainability announcements, or consumer backlash against perceived greenwashing. However, determining causality would require additional qualitative inquiry.

These temporal fluctuations suggest that sustainability communication in digital media is not evenly distributed over time but may be triggered by event-driven dynamics. For brands and policymakers, this highlights the importance of monitoring public sentiment not only in aggregate but also in response to specific time-bound developments.

4.4 Sentiment analysis by platform

While the overall sentiment distribution reveals a dominant neutrality across all posts, breaking down sentiment by platform provides deeper insights into how sustainability discourse varies depending on the communication environment. As illustrated in Figure 5, Twitter exhibits the highest number of both positive and negative posts, despite being only one of several platforms analyzed. Specifically, Twitter accounts for 146 negative and 201 positive mentions, indicating that this platform fosters more polarized discussions around sustainability.

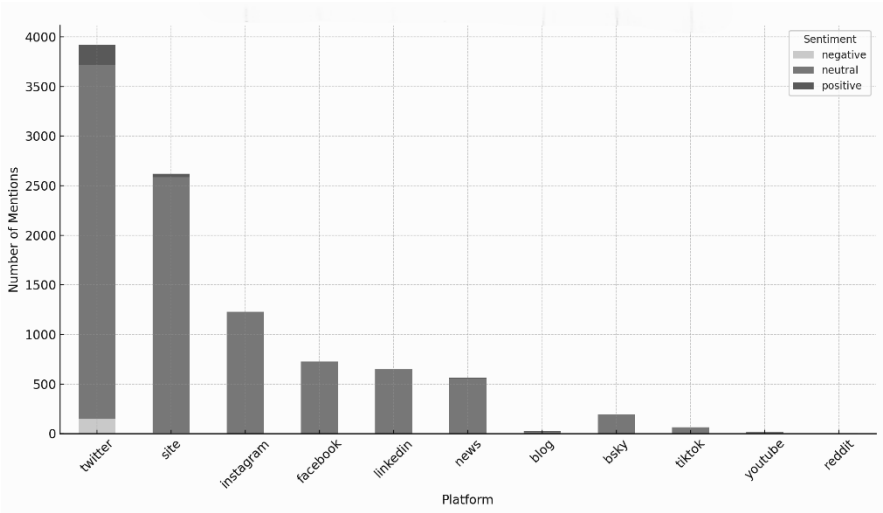

Figure 5. Sentiment distribution by platform for sustainability-related posts

Figure 5. Distribution of sentiment (positive, neutral, negative) across platforms for sustainability-related digital content. Twitter shows the highest level of both positive and negative sentiment, while most other platforms maintain a predominantly neutral tone. In contrast, platforms such as Instagram, LinkedIn, and Facebook display a far more neutral tone, with the overwhelming majority of posts categorized as neither supportive nor critical. For example, over 99% of Instagram posts were labeled as neutral, reflecting the platform's focus on visual storytelling and brand-curated aesthetics rather than opinionated dialogue. Similarly, news sites and blogs maintained a largely neutral tone, possibly due to their emphasis on factual reporting and announcements.

These findings suggest that platform affordances and user culture play significant roles in shaping the tone of sustainability communication. Twitter's real-time, text-based, and conversational nature appears to invite both praise and criticism, making it a key site for monitoring greenwashing perceptions and public sentiment. Meanwhile, the low presence of negative sentiment on platforms like Instagram may reflect strategic brand messaging and a preference for non-confrontational content formats.

4.5 Keyword frequency in sustainability narratives

In order to identify the dominant sustainability themes circulating within Turkish digital discourse, all collected posts were categorized according to tracked keywords. These keywords—either explicitly stated in the content or tagged via hashtags—represent recurring concepts such as "sustainability," "eco-friendly," "recycling," and "green transformation." As visualized in Figure 6, the most frequently mentioned keywords were "sürdürülebilirlik" (sustainability) and "geri dönüşüm" (recycling), followed closely by "doğa dostu" (nature-friendly) and "çevre dostu" (eco-friendly).

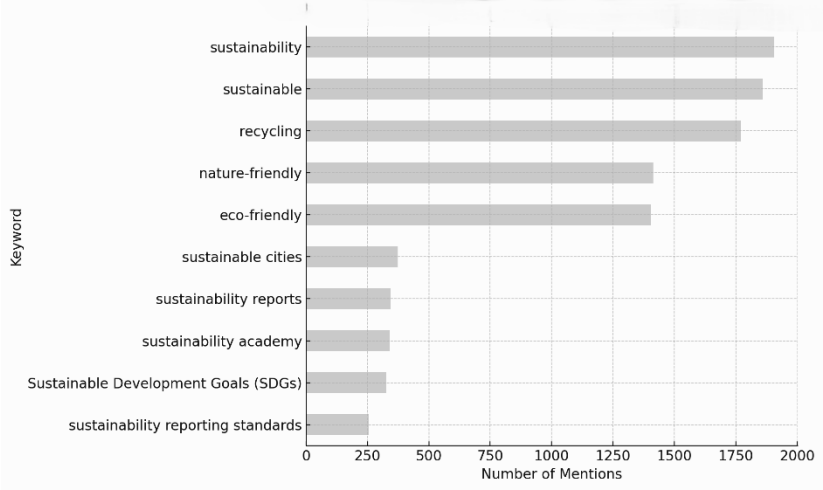

Figure 6. Most frequently used keywords in sustainability-related posts

Figure 6. Frequency of the top 10 keywords in sustainability-related digital content. While keywords are shown in English for clarity, the original dataset was collected using Turkish-language search terms to reflect the local context. The high frequency of these terms suggests that sustainability narratives in Türkiye are heavily concentrated on practical environmental practices (e.g., recycling, packaging, waste reduction) rather than abstract policy-level discourse. Furthermore, the emphasis on general descriptors such as "eco-friendly" rather than specific metrics (e.g., carbon footprint reduction) may reflect a communication strategy focused more on perception than on technical performance. It is also notable that certain keyword variations—such as "sürdürülebilir kalkınma amaçları" (sustainable development goals)—appear with lower frequency. This suggests a limited penetration of formal sustainability frameworks in popular discourse, possibly due to a gap between institutional language and public engagement.

4.6 Interaction metrics by sentiment type

Beyond sentiment classification alone, it is essential to assess whether different emotional tones elicit distinct levels of public engagement. In this study, three key interaction metrics were analyzed: likes, shares, and comments. Posts were grouped according to their sentiment label—positive, neutral, or negative—and their average engagement scores were compared.

As illustrated in Figure 7, posts labeled as negative generated the highest average number of comments and shares, despite being the least frequent overall. This indicates that critical or accusatory content, while rare, tends to provoke more public response and discussion. Positive posts, in turn, received the highest number of likes, suggesting a more favorable but less discursive reception. Neutral posts—by far the most common—were associated with lower levels of interaction across all metrics, confirming their primarily informational and low-engagement nature.

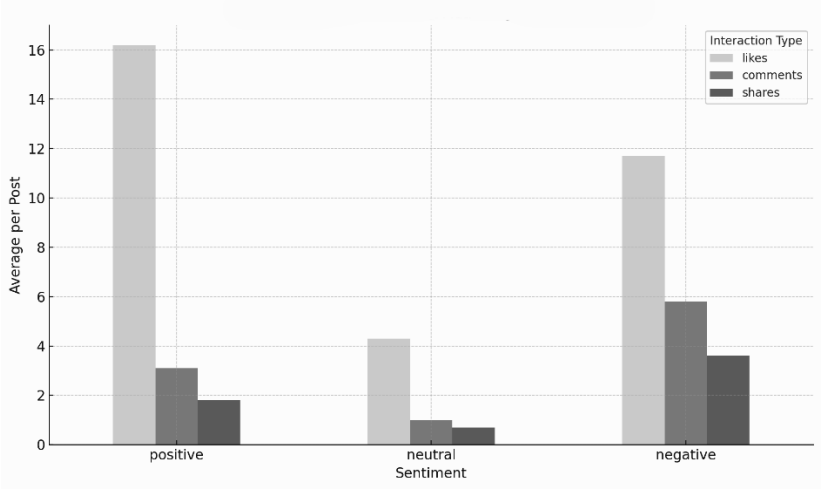

Figure 7. Average interaction metrics (likes, comments, shares) by sentiment type

Figure 7. Comparison of average interaction metrics—likes, comments, and shares—across sentiment types. Negative posts receive higher engagement overall, particularly in comments and shares, indicating a stronger audience reaction. These results align with prior literature suggesting that negatively-valenced content often triggers higher cognitive and emotional involvement, particularly in issue-based communication such as environmental responsibility. For brand communication strategists, this highlights the dual-edged nature of negative sentiment: while it draws attention, it may simultaneously amplify reputational risk.

4.7 Inferential analyses

Chi-square test

A chi-square test revealed a statistically significant association between platform type and sentiment distribution, $\chi^2(20, N = 10{,}012) = 370.21$, $p < .001$. Negative posts were disproportionately concentrated on Twitter, whereas posts on Instagram, Facebook, and news websites were predominantly neutral. This finding confirms that platform-specific communication environments shape not only the volume but also the emotional tone of sustainability-related discourse. A second chi-square test also showed a significant association between tracked sustainability keywords and sentiment, $\chi^2(20, N = 10{,}012) = 101.37$, $p < .001$. This result indicates that certain sustainability themes (e.g., recycling, eco-friendly practices) are more likely to be associated with either positive or negative sentiment compared to others, highlighting thematic differences in audience perception.

ANOVA results

A one-way ANOVA indicated that log-transformed engagement levels differed significantly across sentiment categories, $F(2, 10{,}009) = 12.07$, $p < .001$. On average, neutral posts generated higher levels of engagement than both positive and negative posts. This pattern suggests that informational and announcement-style sustainability content attracts broader interaction in Türkiye's digital media environment than explicitly emotional messages.

5. DISCUSSION

One of the key findings is the dominance of neutral sentiment across all platforms, suggesting that sustainability communication is still largely informational rather than affective. This

supports the view that many organizations focus on awareness-raising rather than persuasive or emotionally resonant sustainability messaging (Schmuck et al., 2018). However, the relatively high engagement with negative posts, especially in terms of comments and shares, indicates that content perceived as critical or skeptical provokes stronger audience reactions. This aligns with prior research suggesting that consumers are particularly responsive to perceived inauthenticity or greenwashing (Nyilasy et al., 2014).

Moreover, the presence of green claims without supporting evidence was noticeably associated with higher perceived risk. This resonates with the literature on vague environmental claims, where lack of substantiation undermines credibility and trust (Schmuck et al., 2018). Conversely, content supported by concrete evidence—whether narrative, visual, or document-based—was more likely to be classified as low-risk, supporting the claim that perceived transparency reduces suspicion (Ahmad et al., 2022).

From a sectoral standpoint, spikes in high-risk posts were observed more frequently in industries already under scrutiny, such as fashion/textile and food/retail. These spikes were often temporally clustered, suggesting a reaction to specific campaigns, environmental awareness events, or public backlash. This finding reinforces the importance of timing and public sentiment in the digital life cycle of sustainability claims.

In terms of platform dynamics, Instagram and news websites had the highest number of mentions, but Twitter showed the most negatively skewed sentiment, highlighting how platform culture influences message reception. Prior research has also shown that Twitter often amplifies dissent and criticism due to its real-time and public debate features (Franco-Riquelme et al., 2023).

Importantly, the automated classification of greenwashing-related dimensions using variables like has_green_claim, evidence_type, and risk_category proved analytically fruitful. These variables enabled a multidimensional exploration of not only what is said but how it is said, how it is framed, and how the public responds. As emphasized by Yaprak et al. (2025), bridging the gap between environmental promise and operational reality is critical for achieving truly sustainable micromobility ecosystems. This observation highlights the broader need for aligning sustainability communication with measurable corporate actions to ensure credibility and lasting consumer trust.

6. CONCLUSION

6.1. Theoretical implications

Rather than proposing a new theoretical model, this study provides contextual empirical validation of established greenwashing and trust frameworks within the Turkish digital media environment. By utilizing large-scale organic digital data, the study strengthens the external validity of existing greenwashing theories in emerging market settings. By incorporating inferential statistical analyses, this study moves beyond descriptive patterns and provides statistically supported evidence on how platform environments, sustainability themes, and emotional tone interact in shaping digital engagement. The results confirm that sustainability communication in Türkiye is not only platform-dependent but also thematically and emotionally differentiated. The results reinforce and extend prior theoretical models indicating that vague or unsubstantiated environmental statements diminish trust, whereas

evidential support strengthens message credibility (Nyilasy et al., 2014; Schmuck et al., 2018). Moreover, the study illustrates how sentiment analysis and risk categorization can be effectively employed in large-scale digital monitoring, offering a methodological basis for future research that combines computational approaches with critical theory in the study of sustainability discourse.

6.2. Practical implications

For communication professionals, brand strategists, and sustainability officers, the findings highlight the importance of evidentiary integrity in green messaging. Posts containing verified and transparent environmental claims were more likely to receive neutral or positive sentiment, while vague or unsubstantiated content tended to generate negative reactions and higher perceived risk. To avoid reputational damage and enhance audience trust, companies operating in Türkiye should: (1) Accompany sustainability statements with visual, narrative, or third-party evidence; (2) Align messaging with consumer expectations and sensitivities, and; (3) Monitor real-time feedback across platforms to fine-tune communication strategies.

6.3. Policy implications

From a policy perspective, this research underscores the urgent need for clearer regulatory frameworks surrounding environmental claims in digital advertising and brand communication. In Türkiye, as in many other jurisdictions, green claims are often self-regulated, which leaves room for greenwashing practices to go unchecked. The categorization system proposed in this study could inform the development of national guidelines on environmental advertising standards. Regulatory bodies may consider mandating the disclosure of evidence behind sustainability claims, especially in sectors with high consumer visibility such as fashion, food, and personal care.

6.4. Limitations and future research

While the study offers robust insights, several limitations should be acknowledged. First, the sentiment classification was based on an automated algorithm, which may not fully capture sarcasm, irony, or cultural nuance in Turkish-language content. Second, the study focused exclusively on quantitative content patterns, without engaging in qualitative discourse analysis or consumer interviews. Third, brand names were anonymized for ethical reasons, which limits brand-specific conclusions.

Future research could address these limitations by:

- Incorporating manual content coding or deep learning NLP models for sentiment analysis,
- Examining audience-level data (e.g., demographics, brand loyalty),
- Comparing cross-national patterns in digital sustainability discourse, and
- Investigating the long-term reputational effects of greenwashing claims.

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