Bibliometric Analysis of Sustainable Packaging and Brand Communication

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Article Info	ABSTRACT
	This study presents a comprehensive bibliometric analysis of the scholarly landscape on sustainable packaging and brand communication, aiming to uncover key research themes, intellectual structures, and emerging trends in the field. Using data from the Scopus database and visualized through VOSviewer, a total of 350 publications were analyzed to identify patterns in keyword co-occurrence, author collaboration, and international research networks. The results reveal a significant evolution from early research focused on environmental impact and packaging materials toward more consumer-oriented themes, such as purchase intention, social media engagement, and eco-friendly brand messaging. Central concepts such as "sustainable development" and "sustainable packaging" dominate the literature, while emerging topics like "sustainable consumption" and "circular economy" reflect the growing integration of environmental and behavioral approaches. The United States, China, and the Netherlands emerge as major contributors in global collaboration networks. This study provides theoretical insight into the interdisciplinary nature of the topic and offers practical implications for marketers, policymakers, and sustainability strategists. Despite limitations related to database scope and content depth, this bibliometric mapping contributes valuable direction for future research and cross-sector innovation.

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1. INTRODUCTION

Over the past two decades, global concerns about environmental sustainability have intensified, prompting industries to rethink their production, packaging, and communication strategies. The packaging industry, in particular, has come under scrutiny due to its significant contribution to environmental degradation through excessive material use, plastic pollution, and non-recyclable waste. As consumers become more environmentally conscious, brands are now expected not only to offer sustainable products but also to adopt eco-friendly packaging solutions that align with the broader sustainability agenda [1]. This shift is not merely cosmetic but represents a profound transformation in how companies design, source, and present their packaging.

Sustainable packaging has evolved from being a niche trend to a core component of corporate environmental responsibility. It encompasses the use of renewable, recyclable, biodegradable, and minimal-impact materials, as well as innovations in design and supply chain efficiency. According to [2], sustainable packaging seeks to minimize the environmental footprint across the packaging lifecycle—from raw material sourcing to post-consumer disposal. However, the success of these efforts is closely tied to how well they are communicated to consumers. Without effective brand communication, even the most sustainable initiatives may fail to achieve their intended impact.

This is where brand communication plays a pivotal role. The increasing integration of sustainability themes in branding efforts, whether through packaging design, product labeling, or advertising, reflects a growing realization that communicating sustainability is as crucial as practicing it [3]. Clear, credible, and emotionally resonant communication helps consumers understand the environmental value of sustainable packaging, fostering trust and influencing purchase behavior. Research by [4] found that consumers respond positively to green packaging cues, especially when such cues are congruent with brand values and supported by transparent information.

Nevertheless, the relationship between sustainable packaging and brand communication is not without complexity. The risk of greenwashing (misleading consumers about the environmental benefits of packaging) is a critical concern [5]. To maintain authenticity and avoid backlash, brands must strike a careful balance between sustainability claims and demonstrable action. Moreover, cultural, regional, and demographic differences influence how sustainability messages are perceived and acted upon, making it essential for brands to adapt their communication strategies accordingly.

In light of these dynamics, scholarly attention to sustainable packaging and brand communication has grown significantly. Researchers across marketing, environmental science, consumer behavior, and supply chain disciplines have contributed to the discourse, generating a diverse and rapidly expanding body of literature. This proliferation of research makes it increasingly challenging to synthesize key trends, identify influential works, and assess emerging themes. Bibliometric analysis, therefore, offers a valuable methodological approach to mapping the intellectual structure of this interdisciplinary field, tracking publication growth, co-authorship networks, and citation patterns over time [6].

Despite the apparent growth of literature on sustainable packaging and brand communication, there remains a lack of consolidated understanding regarding how the field has developed over time. Questions persist about which journals and authors are leading the conversation, what theoretical frameworks dominate the discourse, and where knowledge gaps exist. Moreover, there is limited insight into how the field has responded to evolving environmental regulations, technological innovations, and shifts in consumer expectations. Without a structured overview, researchers and practitioners risk duplicating efforts or missing valuable interdisciplinary linkages that could enhance both theory and practice. Given these challenges, the present study aims to conduct a bibliometric analysis of the academic literature on sustainable packaging and brand communication.

2. METHODS

This study employed a bibliometric analysis approach to systematically map the development, structure, and key trends within the scholarly literature on sustainable packaging and brand communication. Bibliometric methods allow for the quantitative assessment of publication patterns, citation structures, and intellectual linkages across a specific field of research (Donthu et al., 2021). The methodology followed the standard process for bibliometric

reviews, including data retrieval, filtering, and analysis of bibliographic metadata.

The data source for this study was the Scopus database, which is widely recognized for its broad coverage of peer-reviewed literature across disciplines. A search query was constructed using the following key terms and Boolean operators to capture relevant articles: ("sustainable packaging" OR "eco-friendly packaging") AND ("brand communication" OR "marketing communication" OR "green marketing"). The search was conducted in July 2025, with no restriction on publication year to allow for the identification of historical trends. Only journal articles and conference papers written in English were included. After manual

screening to exclude irrelevant documents (e.g., those focused solely on industrial engineering or lacking communication-related content), a final dataset of 350 documents was retained for analysis.

Using the cleaned dataset, several types of bibliometric maps were generated. First, co-authorship analysis was conducted to identify collaboration patterns between authors and institutions. Second, co-occurrence analysis of author keywords revealed dominant research themes and their interconnections, helping to identify major conceptual clusters within the field. Third, a citation analysis was performed to highlight the most influential publications and their roles in shaping the academic conversation.

3. RESULTS AND DISCUSSION

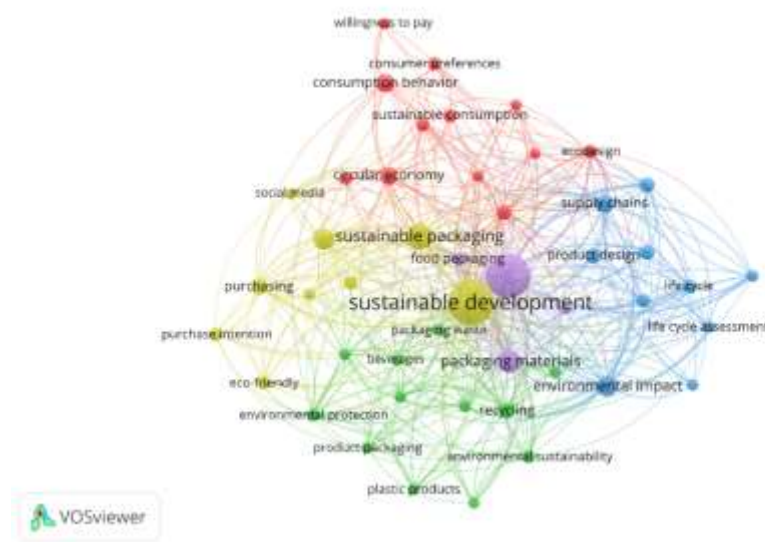### 3.1 Keyword Co-Occurrence Network

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

At the core of the visualization lies "sustainable development" (purple) and "sustainable packaging" (yellow-green), indicating their dominant and foundational role within the literature. These terms serve as the primary nexus from which other concepts radiate. Their proximity and high degree of connection to surrounding nodes such as "packaging waste," "packaging materials," and "environmental sustainability" reflect how sustainable packaging is consistently

framed within broader sustainability discourses. This central position affirms that studies in this field are deeply embedded in the larger goal of balancing environmental, social, and economic objectives. The red cluster in the upper part of the map includes terms like "sustainable consumption," "consumer preferences," "consumption behavior," and "willingness to pay." This cluster emphasizes the behavioral and psychological dimension of sustainable

packaging. It suggests that many studies investigate how consumers perceive, interpret, and respond to sustainability cues in packaging—often linking it to their purchasing intentions or brand loyalty. The inclusion of "social media" and "circular economy" indicates that consumer influence is not just passive, but interactive and informed by broader societal discourses on circularity and online engagement.

Positioned in the lower left, the green cluster features keywords such as "environmental protection," "eco-friendly," "product packaging," "plastic products," and "recycling." This grouping highlights the technical and environmental aspects of sustainable packaging. The presence of keywords like "recycling" and "plastic products" shows an ongoing concern with waste management and material innovation. This area of research often deals with the development of biodegradable or recyclable materials, as well as lifecycle thinking and design-for-environment strategies. It's also closely tied to regulatory implications and the reduction of plastic pollution. On the right side, the blue cluster includes terms such as "eco-design," "product design," "life cycle," "supply chains," and "life cycle assessment." This cluster reflects the systems-level thinking

applied to sustainable packaging, where environmental impact is analyzed across the entire lifecycle—from raw material extraction to post-consumption disposal. The linkage to supply chains further emphasizes that sustainable packaging decisions cannot be made in isolation but require alignment across logistics, procurement, and product development. The use of lifecycle assessment (LCA) tools also indicates a methodological rigor in evaluating the sustainability of packaging solutions.

To the left-center of the map, the yellow cluster connects keywords like "purchase intention," "purchasing," "eco-friendly," and "social media." This area bridges marketing and communication concerns with consumer behavior. Research in this cluster often examines how sustainability claims—whether visual, textual, or symbolic—on packaging influence decision-making processes. "Social media" plays a role in amplifying brand messaging and enabling consumers to engage with brands more transparently. These studies often aim to assess the credibility of sustainability claims, the risk of greenwashing, and the effectiveness of green labeling or certification in shaping trust.
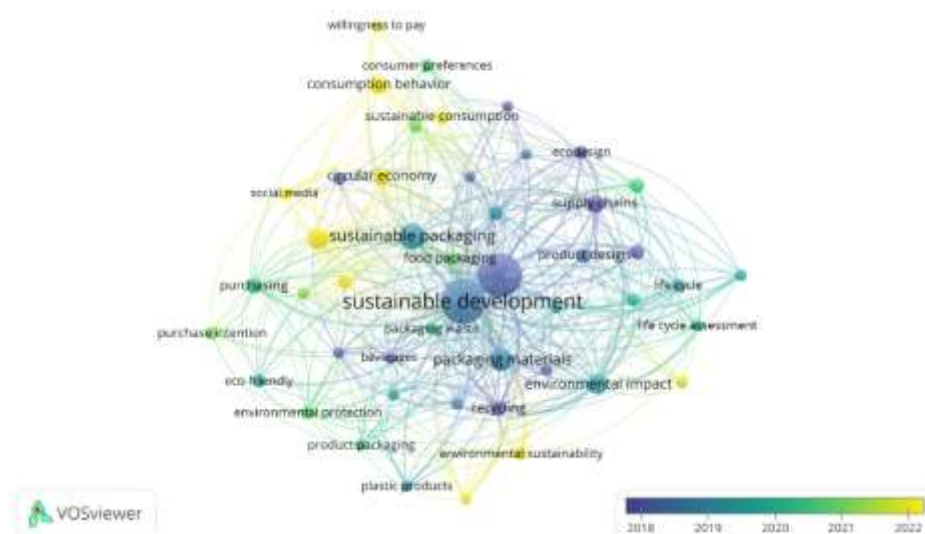

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2025

From the map, keywords such as "social media," "purchase intention," "consumer preferences," and "sustainable packaging" are shaded in yellow to light green, indicating that these themes have become more prominent in recent years (2021–2022). This suggests a growing scholarly interest in how consumers perceive and respond to sustainable packaging, especially in the context of brand messaging and digital platforms. The prominence of terms like "willingness to pay" and "eco-friendly" further supports this shift, signaling a move from purely technical packaging concerns to consumer-driven narratives and behavior research. In contrast, nodes such as "life cycle assessment," "supply chains," "product design," and "environmental impact" appear in blue and purple, reflecting their earlier emergence (2018–2019) in the research landscape. These keywords are associated with foundational studies that emphasize environmental systems thinking,

technical optimization, and measurement of sustainability across the product life cycle. The centrality of "sustainable development" and "packaging materials" shows that these concepts remain structurally important but may have plateaued in novelty, making way for newer angles involving communication and consumer behavior. Keywords such as "circular economy" and "sustainable consumption" are shown in green-yellow hues, indicating a mid-to-late period rise (2020–2021). Their position linking both technical and behavioral clusters highlights their role as bridging concepts. Scholars appear increasingly focused on how circular strategies—such as reuse, reduction, and recycling—can be integrated into brand identity and consumer engagement. This represents a conceptual convergence, where sustainability in packaging is no longer just a material or compliance issue, but a strategic brand communication tool.
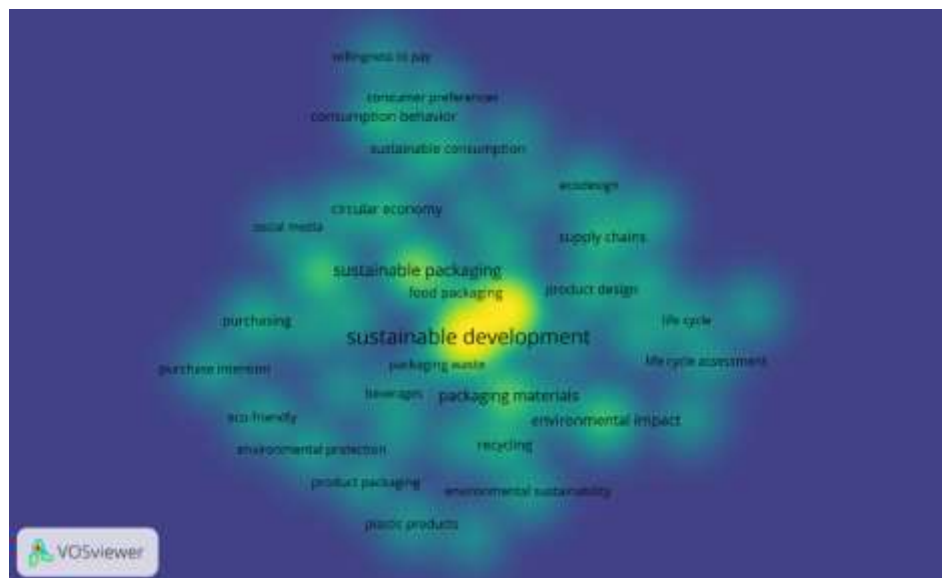

Figure 3. Density Visualization
Source: Data Analysis, 2025

The most prominent hotspots are centered around the keywords "sustainable development," "sustainable packaging," "packaging materials," and "packaging waste." These terms represent the core thematic foundation of the field, suggesting

they are not only highly frequent but also deeply interconnected with other concepts. The strong density in this central area reflects a consistent scholarly focus on the intersection of environmental objectives (i.e., sustainable development) and the material and waste-

related aspects of packaging. This confirms that technical and environmental concerns remain pivotal in sustainability-oriented branding literature. Moving outward from the center, moderate-density regions in green and light blue shades include keywords such as "consumer behavior," "purchase intention," "eco-friendly," "social media," "recycling," "supply chains," and "life cycle assessment." These areas indicate emerging or supporting themes, suggesting that while they are well-studied, they do not dominate the literature to the same extent. Their peripheral yet connected placement implies a broadening scope, where researchers are increasingly exploring behavioral, strategic, and systemic dimensions of sustainable packaging. The relative low-density zones in dark blue, such as "plastic products" and "willingness to pay," highlight underexplored yet potentially rich areas for future investigation.
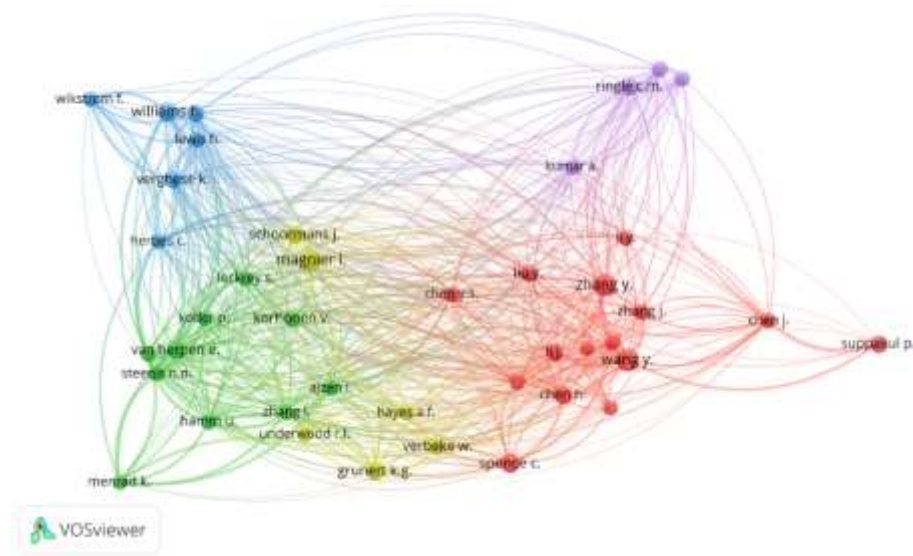
3.2 Co-Authorship Network

Figure 4. Author Collaboration Visualization
Source: Data Analysis, 2025

The co-authorship network visualization highlights the intellectual structure and collaboration patterns within the field of sustainable packaging and brand communication. Several distinct clusters emerge, reflecting geographical or thematic research communities. The red cluster on the right features prolific authors like *Liu Y.*, *Zhang Y.*, *Chen J.*, and *Suppakul P.*, indicating strong intra-collaboration among Asian-based researchers, particularly focusing on technical aspects like packaging materials and food safety. The green cluster in the center-left includes scholars like *Kotler P.*, *Grunert K.G.*, and *Verbeke W.*, representing foundational work in marketing, consumer behavior, and sustainability communication. The blue cluster, with authors like *Williams H.* and *Wikström F.*, seems concentrated on environmental lifecycle and packaging system assessments. Meanwhile, *Ringle C.M.* and *Kumar A.* form a purple methodological cluster, likely contributing statistical or modeling techniques (e.g., SEM). The dense interlinkages across clusters reflect a high degree of interdisciplinary collaboration, with scholars bridging topics such as communication strategy, environmental science, and behavioral marketing within the sustainability context.
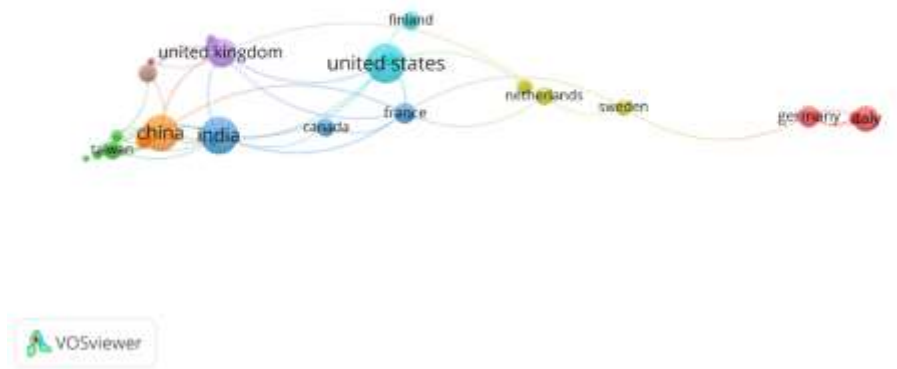
Figure 5. Country Collaboration Visualization
Source: Data Analysis, 2025

Figure 3 reveals the geographical landscape of international research collaboration on sustainable packaging and brand communication. The United States stands out as the most central and collaborative node, forming strong co-authorship ties with countries across Europe and Asia, such as China, India, the United Kingdom, France, and the Netherlands. The China–India cluster also appears highly interconnected and active, suggesting a significant contribution from Asia in the sustainability discourse, particularly in material innovation and packaging systems. Meanwhile, Germany and Italy form a more isolated bilateral cluster, indicating regional collaboration with less outreach beyond their borders. Countries like Sweden, Finland, and the Netherlands serve as important bridges linking North America to Northern and Western Europe.

3.3 Citation Analysis

Table 1. Top Cited Research

Citations	Authors and year	Title
273	[7]	Active and intelligent packaging: The indication of quality and safety
243	[8]	Consumer reactions to sustainable packaging: The interplay of visual appearance, verbal claim and environmental concern
214	[9]	Consumer attitudes towards biobased packaging – A cross-cultural comparative study
130	[10]	Ecoflex® and ecovio®: Biodegradable, performance-enabling plastics
104	[11]	Understanding consumers' purchase intentions toward natural-claimed products: A qualitative research in personal care products
81	[12]vv	A sustainable life cycle for cosmetics: From design and development to post-use phase
78	[5]	Which are the sustainable attributes affecting the real consumption behaviour? Consumer understanding and choices
75	[13]	Green marketing and the SDGs: emerging market perspective
64	[14]	Understanding plastic packaging: The co-evolution of materials and society
62	[15]	Design and Communication of Ecological Content on Sustainable Packaging in Young Consumers' Opinions

Source: Scopus, 2025

Practical Implication

The findings of this study offer several practical insights for professionals in marketing, product development, sustainability strategy, and environmental policy-making. Firstly, the prominence of keywords such as "purchase intention," "eco-friendly," and "social media" in recent literature highlights the growing importance of communicating sustainability effectively to consumers. This suggests that brands should not only implement sustainable packaging practices but also clearly and credibly communicate those efforts through packaging design, digital content, and advertising campaigns. Messaging must go beyond buzzwords, offering transparency and emotional resonance to build consumer trust. Secondly, the keyword clusters reveal the importance of cross-functional collaboration between product designers, marketers, and supply chain managers, especially in areas like eco-design and life cycle assessment. Sustainable packaging is no longer just a technical concern, it has become a strategic asset that can reinforce a brand's identity and competitive advantage. Moreover, the country collaboration network indicates that nations like the United States, China, and the Netherlands are central hubs in this research space. This presents an opportunity for researchers and institutions from emerging economies to engage in more international partnerships, tapping into global knowledge networks and innovation ecosystems.

Theoretical Contribution

This study contributes to the theoretical landscape by offering a comprehensive bibliometric mapping of how the fields of sustainable packaging and brand communication have evolved over time. One key contribution is the visualization of a conceptual shift, from an early focus on environmental impact and packaging materials to a more nuanced exploration of consumer behavior, social influence, and brand messaging. This trend suggests the need to expand sustainability marketing theories by integrating constructs from consumer psychology, digital behavior, and social media influence, enriching the traditional green marketing models. Furthermore, the co-authorship and country collaboration analyses provide a meta-perspective on the epistemic structure of the field, showing how scholarly knowledge is shaped by geographic, disciplinary, and institutional networks. The study invites researchers to consider the role of interdisciplinarity and cross-cultural contexts in shaping theoretical frameworks related to sustainable consumption and packaging communication. As such, the findings not only validate existing theory but also propose new theoretical linkages, such as the alignment between brand sustainability narratives and consumer identity construction in digital environments.

Limitation

While this study offers a structured and data-driven overview of the literature, several limitations must be acknowledged. First, the analysis is based solely on the **Scopus database**, which, although extensive, may not capture relevant studies indexed in other repositories such as Web of Science or Google Scholar. This may introduce a selection bias, potentially overlooking important regional publications or gray literature that contribute to the field. Second, as a **quantitative bibliometric study**, this research does not engage in deep content analysis of individual articles. It does not assess the **qualitative depth, methodological rigor, or theoretical frameworks** of each publication, focusing instead on citation patterns and keyword co-occurrence. Therefore, the study provides a macro-level view of the research landscape but does not substitute for **systematic literature reviews** or meta-analyses. Lastly, the use of **VOSviewer settings** (e.g., minimum keyword occurrence

thresholds, counting methods) may influence the visibility of certain concepts, and while these parameters were selected with care, alternative configurations could yield different clustering outcomes.

4. CONCLUSION

This bibliometric study provides a structured overview of the evolving research landscape in sustainable packaging and brand communication. By analyzing 350 publications using VOSviewer, the study uncovers key thematic clusters, influential authors, collaborative networks, and emerging trends. It highlights a conceptual shift from traditional environmental and material-focused packaging research toward more consumer-centered themes such as purchase intention, eco-friendly perception, and sustainability messaging via digital platforms. The findings reveal the importance of interdisciplinary collaboration and underscore the growing role of communication in driving sustainable consumption. While the study is limited by its reliance on Scopus data and bibliometric scope, it offers valuable insights for academics, practitioners, and policymakers seeking to navigate and contribute to this dynamic and increasingly impactful field.

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