

Bibliometric Analysis: Trends in Green Marketing Research Development and Consumer Behavior towards Sustainable Products

Eko Triawan^{1*}, Nopa Dwi Saputra², Apep Indra Saputra³, Rohmadi⁴

^{1,2}Department of Entrepreneurship, Institut Teknologi Muhammadiyah Sumatera, Indonesia

^{3,4}Department of Digital Business, Institut Teknologi Muhammadiyah Sumatera, Indonesia

Abstract

This study aims to analyze research development trends on green marketing and consumer behavior towards sustainable products in the 2020-2024 period. Using bibliometric methods, this study evaluates the number of publications, citation trends, author collaboration patterns, and thematic relevance through keyword co-occurrence analysis of indexed scientific literature. The results show an increase in the number of publications each year, although the citation impact tends to be greater in early publications during the study period. Citation analysis identifies influential articles that highlight key factors in consumers' green purchasing behavior. Mapping author collaborations reveals a solid network among researchers, while keyword co-occurrence analysis identifies three main clusters focusing on the basic concepts of green marketing and sustainable consumption, green product marketing strategies, and methodological studies. The conclusions of this study underscore the importance of a deep understanding of consumer behavior in designing effective green marketing strategies and the need for further research to broaden insights in this field.

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Corresponding Author:
Eko Triawan
(ekotriawan2@gmail.com)

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1. Introduction

In recent years, awareness of environmental issues has increased among consumers worldwide. This phenomenon has encouraged companies to adopt more sustainable marketing strategies, known as green marketing. Green marketing focuses not only on promoting environmentally friendly products but also encompasses the entire production, distribution, and consumption process, all while taking environmental impacts into account (Bhardwaj et al., 2023). Research on green marketing and consumer behavior toward sustainable products has become highly relevant, given changes in consumer behavior that increasingly show a preference for products that are not only high-quality but also sustainable.

According to a report from Nielsen (2015), approximately 66% of consumers worldwide are willing to pay more for sustainable products. The impetus for this behavior often stems from a combination of concern for environmental impact, a desire for a healthier lifestyle, and the perception that sustainable products are of better quality. This indicates a clear trend of consumers increasingly supporting companies committed to sustainability. Therefore, a deeper understanding of consumer behavior in the context of green marketing is crucial for marketing researchers and practitioners.

In this context, research on green marketing must consider various factors that influence consumer purchasing decisions. Some of these include environmental awareness, personal values, and social influence. Recent research shows that consumers with high environmental awareness are more likely to choose sustainable products (Hojnik et al., 2019). Furthermore, the influence of friends and family also plays a significant role in shaping consumer behavior, where

recommendations from close friends can increase the likelihood of purchasing environmentally friendly products (Salazar et al., 2013).

Furthermore, it is important to explore how companies can communicate their sustainability values to consumers. An effective communication strategy can increase consumer trust and create brand loyalty. For example, companies like Unilever have successfully implemented a green marketing strategy by launching sustainable products and transparently promoting them to consumers (Juanita et al., 2024). This case demonstrates that companies that effectively communicate their commitment to sustainability can attract more environmentally conscious consumers.

Against this backdrop, this journal aims to delve deeper into the development trends in green marketing research and consumer behavior toward sustainable products. Through a comprehensive analysis, it is hoped that new insights will be uncovered that can help companies formulate more effective and sustainable marketing strategies. This research is important for academics, businesses, and policymakers. It helps academics understand consumer behavior for green products, businesses can develop marketing strategies and sustainable product innovation, and policymakers have a foundation for environmentally friendly business regulations. Furthermore, this research enriches the green marketing literature and opens up opportunities for further research in the future.

Green Marketing

Green marketing, the marketing of environmentally friendly products and services, is now crucial in shaping consumer perceptions and corporate strategies (Chen et al., 2024). This concept emerged in response to growing awareness of environmental and sustainability issues. Data from Nielsen (2015) shows that 66% of global consumers are willing to pay more for sustainable products. This demonstrates that green marketing is not just a trend but an increasingly pressing market need.

In this context, research on green marketing shows a positive trend. Data from Web of Science shows that the number of publications related to green marketing has increased by more than 30% in the past five years. This indicates that academics and practitioners are increasingly recognizing the importance of sustainable marketing strategies. For example, a study by Chen et al. (2024) explains that green marketing extends beyond environmentally friendly products to sustainable production, distribution, and packaging processes. Overall, green marketing shows significant potential to influence consumer behavior and encourage the adoption of sustainable products.

Given the increasing environmental awareness and changing consumer behavior, in-depth research is needed to understand these dynamics and find the most effective sustainable product promotion strategies, where companies need to build close relationships with consumers through education and engagement, such as sustainable practice campaigns (e.g., recycling or waste reduction programs) that can strengthen brand loyalty, in line with the findings of Romdhoni et al. (2020) that consumer involvement in sustainable practices increases positive brand image.

Consumer Behavior

Consumer behavior is the study of how individuals or groups select, purchase, use, and dispose of goods or services. Consumer behavior involves seven key stages: how they search for information, obtain funds to purchase, interact with the store, interact with the product, make the purchase, use and dispose of the product, and share their experiences (Ieiri et al., 2025). In the context of sustainable products, consumer behavior is key to understanding how and why consumers choose environmentally friendly products.

Green marketing practices directly encourage consumers' sustainable behavior, reinforced by green consumption values and pro-environmental identities, with perceived obligation being a key driver of environmentally conscious actions (Y. Zhang et al., 2025). Consumer behavior toward sustainable products is influenced by various factors, including personal values, knowledge of environmental issues, and social influence. Research by Ng & Basu (2019) states that individuals with a stronger global identity and higher environmental concern are more

likely to support and purchase environmentally friendly products. This suggests that environmental awareness plays a significant role in shaping consumer behavior.

Perceived quality and green value are key drivers of loyalty to eco-friendly products (Pahlevi & Suhartanto, 2020). Consumer perceptions of the quality, performance, and price of sustainable products influence purchasing decisions. Doubts arise if quality is perceived as low or price is high. Marketers need to communicate the added environmental, functional, and economic value. Information transparency, certification, and competitive pricing build trust and encourage adoption.

2. Methods

This study uses a quantitative-descriptive approach with bibliometric methods to analyze the dynamics of scientific publications related to sustainability and technological innovation issues during the 2020–2024 period. The bibliometric method was chosen because it is able to measure, map, and evaluate the characteristics of scientific publications, such as trends in the number of articles, citation distribution, author collaboration patterns, and the interrelationships of key themes in the academic literature. The main objective of this approach is to obtain a comprehensive overview of the development of scientific knowledge in the field of sustainability, as well as the contribution of research to the Sustainable Development Goals (SDGs).

Primary data was collected from internationally indexed scientific publication databases such as Scopus or Web of Science, focusing on articles discussing technology, sustainability, green innovation, and public policy relevant to the SDGs. Data selection was based on inclusion criteria: articles published between 2020 and 2024, relevant to the specified topic, and published in reputable journals. The search process used keywords such as green marketing, consumer behavior, and sustainable products.

After data collection, article metadata was classified and coded based on publication year, number of citations, author affiliation, and keywords used. Data processing and analysis were carried out in several stages, using a combination of tools such as VOSviewer for visualizing co-author networks and analyzing keyword co-occurrence, as well as Microsoft Excel and descriptive statistics software for analyzing the distribution of articles and citations over time.

The analysis was conducted in four main stages. First, trend analysis was conducted to observe the growth in the number of publications and the development of annual citations. Second, citation analysis aims to identify the most influential articles and analyze their content qualitatively to determine the thematic contributions and methodological approaches used. Third, collaboration network analysis was conducted to map the connections between authors and institutions. Fourth, keyword co-occurrence analysis was used to identify dominant topic clusters and thematic relationships within scientific publications.

In the final stage, a thematic interpretation of the articles with the highest number of citations was conducted. This analysis aims to evaluate the substantive contribution of the leading research to scientific development in the field of sustainability and technological innovation. The results of this process are then compiled into conclusions that can be used as a basis for recommendations for further research directions and contribute to the formulation of scientific and sustainable development policies.

3. Results and Discussion

Number of publications and citations to articles

The publication of scientific articles in 2020-2024 shows a growth trend that tends to increase each year. The growth indicated by the table shows the number of articles published in 2024 showed the highest number at 84 articles (35.29%), followed by publications in 2020-2023 with 30, 30, 35, and 59 articles. However, the number of articles was stable in 2020 and 2021 at 30 articles. The number of citations obtained tends to show a greater number than the

number of articles published in the same year. This can be seen in the number of articles and citations in 2020, which showed 30 articles with a total of 1,352 citations, while in 2024, which showed a total of 84 articles with 248 citations.

Table 1. Number of Publications and Citations

Year	Number of articles	Percentage (%)	Citation	Percentage (%)
2020	30	12,61%	1.352	35,78%
2021	30	12,61%	873	23,10%
2022	35	14,71%	746	19,74%
2023	59	24,79%	560	14,82%
2024	84	35,29%	248	6,56%
Total	238	100,00%	3.779	100,00%

Source: Processed primary data, 2025

The data in Table 1. The number of publications and citations in 2024 shows the number of articles as many as 84 articles with 248 citations. The highest number of citations in an article was in 2020, at 1,352 (35.78%). Looking at the data shown in the table, we can see that citations have decreased from year to year. Although the number of articles in 2024 was 84 articles, their contribution to citations was not large, indicating that the articles published in that year did not have a significant impact in terms of references and influence. This can be seen from the number of citations from 2020-2024, which were 1,352, 873, 746, 560, and 248, respectively. The citation results have the potential to increase in the observation years, namely 2020 to 2024. High citations indicate that the research becomes a reference source for other research. High citations indicate that the research becomes a reference source for other research.

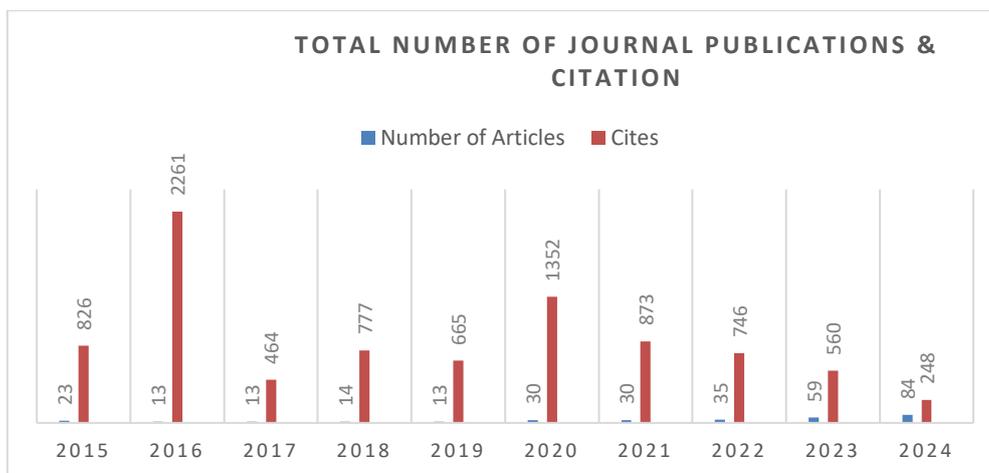


Figure 2. Article and Citation Data
Source: Processed primary data (2025)

The results of article data processing and citation rates are presented in Table 2. Based on the data referenced in Table 2, the most cited article was obtained by Sharma (2021) with the title "Consumers' purchase behavior and green marketing: A synthesis, review and agenda" with a total of 178 citations from the International Journal of Consumer Studies. The study reveals an overview of green marketing and the gap between consumers' attitudes and actual purchasing behavior towards green products. Consumer green purchasing behavior is influenced by personal factors, the purchasing process, and the green marketing mix, where environmental concerns, labeling, experience, and usefulness drive purchases, but the attitude-behavior gap arises due to lack of knowledge, price, risk, corporate image, trust, and willingness to pay.

The next article has 175 citations with the title "Why not green marketing? Determinates of consumers' intention to green purchase decision in a new developing nation" written by Nekomahmud & Fekete-Farkas (2020) published by Sustainability. This study, analyzing green product purchasing decisions in Bangladesh using an extended Theory of Planned Behavior

(TPB) model, found that environmental concern, perceived green benefits, green price consciousness, green purchase willingness, and green marketing future expectations positively influence consumers' green purchase decisions, although perceived green quality has a negative influence, and suggests companies, marketers, and policymakers to use green marketing tools such as advertising, branding, and eco-labels to increase the promotion of green products.

An article with 156 citations is entitled "Why do consumers make green purchase decisions? Insights from a systematic review" published by the International Journal of Environmental. The article written by Zhang & Dong (2020) who analyzed 97 empirical papers on green purchasing behavior from 2015 to 2020, concluded that consumer purchasing decisions are influenced by individual factors, product and marketing attributes, and social factors, and recommended further research to address biases, expand the cultural context, and incorporate diverse consumer theories.

Table 2. Development of articles and citation sources

Rating	Total Citation	Title	Author and year	Source	Publisher
1	178	Consumers' purchase behaviour and green marketing: A synthesis, review and agenda	(Sharma, 2021)	International Journal of Consumer Studies Sustainability	Wiley
2	175	Why not green marketing? Determinates of consumers' intention to green purchase decision in a new developing nation	(Nekmahmud & Fekete-Farkas, 2020)		MDPI
3	156	Why do consumers make green purchase decisions? Insights from a systematic review	(X. Zhang & Dong, 2020)	International Journal of Environmental Research and Public Health	MDPI
4	146	Transforming consumers' intention to purchase green products: Role of social media	(Nekmahmud et al., 2022)	Technological Forecasting and Social Change	Elsevier
5	133	Green brand of companies and greenwashing under sustainable development goals	(Pimonenko et al., 2020)	Sustainability	MDPI
6	129	Determinants that influence green product purchase intention and behavior: A literature review and guiding framework	(Wijekoon & Sabri, 2021)	Sustainability	MDPI
7	101	Which are the determinants of green purchase behaviour? A study of Italian consumers	(Dangelico et al., 2021)	Business Strategy and the Environment	Wiley
8	88	Green market segmentation and consumer profiling: a cluster approach to an emerging consumer market	(Jaiswal et al., 2021)	Green market segmentation	Emerald
9	85	How do environmental values impact green product purchase intention? The moderating role of green trust	(Li et al., 2021)	Environmental Science and Pollution Research	Springer Nature
10	71	Determinant attributes and the compensatory judgement rules applied by young consumers to purchase environmentally sustainable food products	(Lago et al., 2020)	Sustainable Production and Consumption	Elsevier
11	62	Investigating the antecedents of consumer behavioral intention	(Dangelico et al., 2022)	Technological Forecasting and	Elsevier

		for sustainable fashion products: Evidence from a large survey of Italian consumers		Social Change	
12	62	Green marketing and the SDGs: emerging market perspective	(Amoako et al., 2022)	Marketing intelligence & planning	Emerald
13	60	Consumer behaviour and environmental sustainability	(Nguyen & Johnson, 2020)	Journal of Consumer Behaviour	Wiley
14	56	Green Marketing to Gen Z Consumers in China: Examining the Mediating Factors of an Eco-Label-Informed Purchase	(Song et al., 2020)	SAGE Open	Sage
15	52	Purchasing Eco-Sustainable Products: Interrelationship between Environmental Knowledge, Environmental Concern, Green Attitude, and Perceived Behavior	(Rusyani et al., 2021)	Sustainability	MDPI

Source: Scopus Data Processing (2025)

Studies have investigated the effectiveness of green marketing strategies in influencing consumer behavior, brand image, purchasing decisions, and overall company performance, emphasizing the positive effects of incorporating green elements into the traditional marketing mix and the importance of considering environmental factors in product development, communication, and overall marketing strategy (Biercewicz, 2024). The research objects observed in several of the above studies were conducted on young people, the studies were conducted by Lago et.al (2020); and Song et.al (2020).

Attitude, subjective norms, behavioral control, green thinking, and social media marketing significantly influence consumers' green purchasing intentions on social media in a study by Nekmahmud et al. (2022). Different results in a study by Pimonenko et al. (2020) showed that greenwashing practices against green brands of companies in Ukraine significantly damaged investor and consumer trust, as indicated by a decline in green brands. This gap can be another research gap to be developed. The results of a study by Wijekoon & Sabri (2021) showed that consumer decisions to purchase environmentally friendly products, green purchasing (GPI), and green purchasing behavior (GPB) are influenced by five main groups of determinants: individual factors, non-individual factors, situational factors, product attributes, and demographics.

In a study by Dangelico et al. (2021), they found that green purchasing behavior is a multifaceted phenomenon influenced by various antecedents, including personal norms, monetary value, and green purchase satisfaction, which play a significant role in predicting Italian consumers' purchase frequency. A study in India by Jaiswal et al. (2021) identified three consumer groups based on environmental cognitive variables: keen greens, moderate greens, and reluctant greens, reflecting differences in awareness, knowledge, perceived effectiveness, perceptions of eco-friendly labels and brands, intentions, and green purchasing behavior.

Li et al.'s (2021) research shows that altruistic and biospheric values positively encourage green product purchase intentions, while selfish values inhibit them, with environmental concern acting as a mediator and green beliefs strengthening the relationship between environmental concern and purchase intentions, thus providing insights for companies in developing green marketing strategies and building consumer trust in environmentally friendly products. Environmental concern and perceived product value positively influence purchase intentions and consumers' willingness to pay premium prices for sustainable clothing, with consumer experience, both direct and indirect, also playing a significant role although the effect varies depending on the type of environmentally friendly materials used, and consumers' green purchasing behavior is also influenced by their socio-demographic characteristics (Dangelico et al., 2022).

Research in Ghana shows that green marketing strategies aligned with the Sustainable Development Goals (SDGs) positively influence consumer purchasing decisions and brand

loyalty, with price acting as a mediator in this relationship (Amoako et al., 2022). In a special issue of the Journal of Consumer Behavior, Nguyen & Johnson (2020) emphasized that environmentally friendly consumer behavior is influenced by a variety of internal, social, situational, and demographic factors that vary depending on the national context and consumer, thus requiring integrative models and green marketing tailored to the characteristics of target groups to encourage pro-environmental behavior.

A study of Indian consumers conducted by Rusyani et al. (2021) showed that environmental knowledge, environmental concern, and green attitudes positively influence green purchasing behavior, with environmental knowledge and concern also being key factors in perceived behavioral control, providing insights for green marketers to develop more effective strategies.

Relationship between researchers (co-authors)

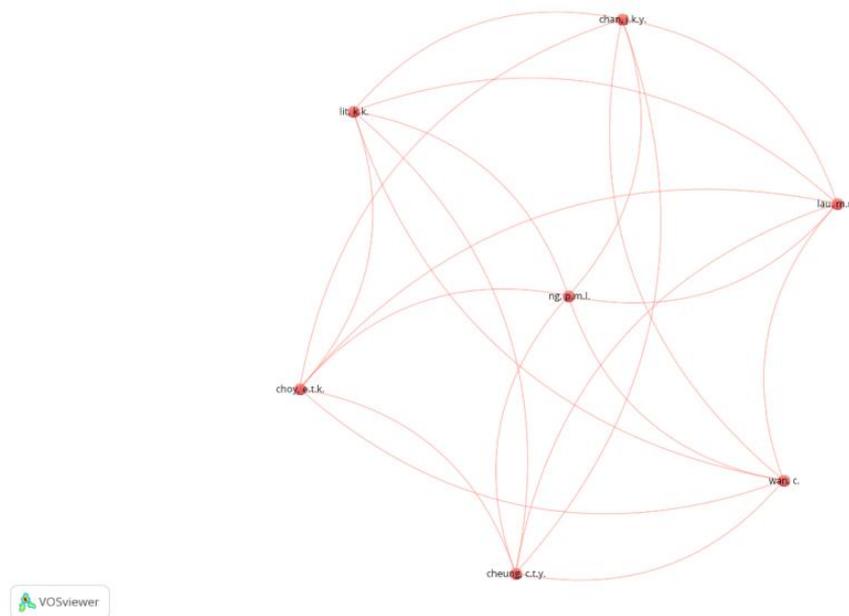


Figure 3. Relevance between researchers (co-authors)
Source: Processed Primary Data (2025)

From Figure 3, we can see that only a single cluster has formed regarding the relevance between researchers (co-authors). In the bibliometric analysis that maps collaboration between authors, the emergence of only one large cluster indicates that the researchers involved have very strong collaborative relationships and focus on similar topics. This situation indicates deep research interaction and collaboration within a closely connected research community. However, the lack of cluster diversity may also indicate a lack of diversity in collaboration, both in terms of disciplines and geographic location. This result suggests that research on this topic may not yet be leveraging diverse perspectives or expertise from outside the core research network. Therefore, there is an opportunity for researchers to broaden the scope of their research.

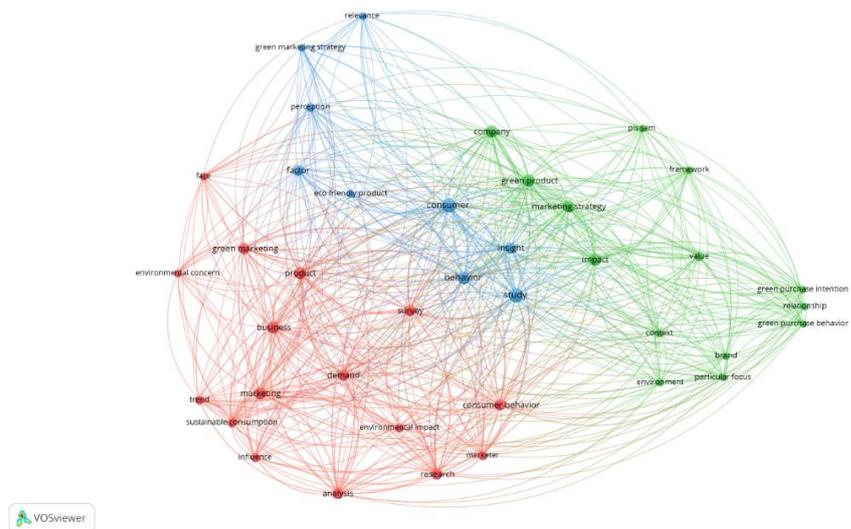


Figure 4. Network Visualization of Co-occurrence
Source: Processed Primary Data (2025)

The data shown in Figure 4 shows the relationship between words. The largest node indicates the most dominant word. Co-occurrence data from the title and abstract overview were followed by fullcounting with a minimum number of occurrences of 1. This method in the data extraction results are also shown in Table 3 and Figure 4. The data shown in Table 3 obtained 3 clusters. Cluster 1 is dominated by the occurrence of Green Marketing which has relevance to Consumer Behavior and Sustainable Consumption. Cluster 2 is dominated by Green Product, Green Purchase Behavior, and Marketing Strategy. Cluster 3 is dominated by Study.

The occurrence value in cluster 1 indicates that extensive research on green marketing has been conducted. Cluster 1 is shown in the red node. Research on green marketing is related to influencing factors. Green marketing began to develop in the early 1970s when environmental issues received widespread attention, and is a strategy in which companies implement environmentally friendly measures in production, promotion, and distribution to meet consumer demands for environmental protection (Luo et al., 2025). Green marketing practices are promotional strategies that emphasize environmentally friendly and sustainable products or services, which are now increasingly sought after by businesses to attract and retain environmentally conscious consumers (Sohaib et al., 2025). The green marketing trend continues to grow along with increasing consumer awareness towards environmental issues. Companies are increasingly recognizing the importance of integrating sustainability principles into their marketing strategies.

Table 3. Co-occurrence data by cluster

Klaster	Items	Total Link	Co-Occurrences
1	Analysis	51	5
	Business	60	5
	Consumer behavior	54	4
	Demand	50	4
	Environmental concern	20	2
	Environmental impact	34	3
	Face	25	2
	Green marketing	44	4
	Influence	36	3
	Marketer	39	3
	Marketing	59	5
	Product	64	5
	Research	52	4
	Survey	55	4
	Sustainable consumption	35	3
Trend	38	3	

2	Brand	28	2
	Company	67	5
	Context	30	2
	Environment	31	2
	Framework	29	2
	Green product	65	5
	Green purchase behavior	29	2
	Green purchase intention	29	2
	Impact	63	5
	Marketing strategy	70	5
	Particular focus	28	2
	Pls sem	33	2
	Relationship	29	2
	Value	39	3
3	Behavior	81	6
	Consumer	92	7
	Eco friendly product	23	2
	Factor	54	4
	Green marketing strategy	25	2
	Insight	61	4
	Perception	42	3
	Relevance	26	2
Study	96	7	

Source: VOSviewer Data Processing (2025)

Consumer awareness can influence consumer decisions to purchase environmentally friendly products, as well as the reciprocal relationship between environmental knowledge, environmental concern, green attitudes, and perceived behavioral control (Rusyani et al., 2021). This study examined factors that encourage consumers to choose sustainable products, such as eco-labels, health benefits, and corporate social responsibility.

Sustainable consumption refers to consumption patterns that meet the needs of the present without compromising the ability of future generations to meet their own needs. The goal is to reduce the environmental impacts of consumption, such as overuse of natural resources and waste production. Green marketing makes brands appear environmentally conscious, influences consumer behavior and brand equity, and supports social, business, and economic sustainability (Jave-Chire et al., 2025). Environmentally conscious consumer behavior will drive consumer decision-making in purchasing environmentally friendly products and supporting environmentally friendly businesses (Y. Zhang et al., 2025). This includes the choice to purchase durable products, reduce waste, and support environmentally conscious companies. There is a link between cluster 1 and cluster 2.

Cluster 2

Green products refer to products that are produced, used, and recycled in an environmentally friendly manner (Liang et al., 2024). This includes products that use environmentally friendly raw materials, energy-efficient production processes, and recyclable packaging. Characteristics of green products include the use of sustainable raw materials, reduced waste and emissions, and a longer product life cycle. Therefore, as consumers' environmental awareness increases, their propensity to purchase green products also gradually increases (Wu et al., 2024). Consumers' increased understanding of environmentally friendly green products will influence their green purchasing behavior.

Green purchasing behavior refers to consumers' decisions to purchase environmentally friendly products. Factors influencing this behavior include environmental awareness, personal values, social norms, and perceptions of green products. Research focuses on how consumers evaluate information about green products, compare alternatives, and make responsible purchasing decisions. Furthermore, consumers' intention to purchase environmentally friendly products is influenced by their environmental knowledge and awareness, attitudes toward environmental issues, the influence of norms and social norms, and personal values such as altruism and commitment to the environment (Duque Oliva et al., 2024; Lin & Niu, 2018). Furthermore, several studies have shown that socio-demographic factors such as gender, age,

education, income, and family composition have a significant impact on green purchasing behavior (Alharthey, 2019; Witek & Kuźniar, 2020).

A green marketing strategy encompasses all corporate efforts to promote environmentally friendly products and business practices, the implementation of which has been proven to enhance corporate image, strengthen customer loyalty, and create competitive advantage (Mukonza & Swarts, 2020). Green marketing efforts encompass not only the holistic greening of products and companies, but also require a thorough understanding of public policy processes, in addition to the traditional marketing mix (product, price, place, and promotion) (Prakash, 2002). To achieve a positive image, customer loyalty, and competitive advantage through a green marketing strategy, a thorough understanding of the value of sustainable products is crucial.

Cluster 3

Recent research on green marketing and consumer behavior toward sustainable products highlights several key trends. Research shows that consumers are more likely to engage in pro-environmental behavior when influenced by social factors, habit formation, individual identity, emotions, and tangible elements (White et al., 2019). Rising environmental awareness among consumers drives preferences for sustainable products and services, with green purchasing behavior influenced by environmental attitudes, lifestyle, willingness to pay, and subjective norms (Štofejová et al., 2023). Therefore, a deeper understanding of these psychological and social factors is essential for encouraging the adoption of sustainable products among increasingly environmentally conscious consumers.

Factors such as ecological literacy and self-efficacy positively influence attitudes toward green products, while attitudes and perceived behavioral control influence intentions and consumption (Al Mamun et al., 2018). The growing importance of green marketing is evident in the increasing use of terms such as sustainable, ethical, green, ecological, and eco-friendly in recent literature (Bhardwaj et al., 2023). These findings emphasize the need for businesses and policymakers to promote green products and implement programs that encourage sustainable consumption to address environmental issues and climate change.

4. Conclusion

A bibliometric analysis of scientific publications from 2020 to 2024 reveals a significant upward trend in research on green marketing and consumer behavior toward sustainable products, although citation impact tends to be greater in earlier publications. Influential articles highlight the complexity of factors influencing green purchasing decisions, ranging from environmental concerns to price and trust. A mapping of research collaborations reveals a robust network with potential for expansion, while a keyword co-occurrence analysis identifies three primary research focuses: basic green marketing concepts and their impact on sustainable consumption, aspects of green marketing products and strategies, and methodological studies. The implications of these findings emphasize the importance of a deep understanding of consumer behavior for the formulation of effective green marketing strategies, transparent communication of sustainability values, and the need for further research to address gaps and broaden the context of studies. Overall, this field continues to evolve and is relevant for academics, business practitioners, and policymakers in promoting the adoption of sustainable products.

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