Review

Exploring International Outlooks on Collaboration in Green Marketing: Bibliometric Analysis

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Abstract: As sustainability emerges as a global priority, the relationship between collaboration and green marketing warrants increasing scholarly attention. This study investigates research trends at this intersection through a bibliometric analysis of 575 projects published in 291 journals and conferences over the past two decades. Using VOSviewer for bibliometric mapping complemented by content analysis, the findings reveal a marked rise in academic engagement, particularly within Engineering, Environmental Sciences, and Business Economics, with citation growth underscoring the expanding relevance of the field. The analysis highlights a diverse and interconnected research landscape, with the Journal of Cleaner Production identified as a leading outlet and China, the United States, and India emerging as key contributors, led by China's extensive collaborative activity. Central thematic areas include green supply chain management and the integration of sustainability into economic strategies. The study offers both theoretical and practical contributions: it delineates research pathways for advancing literature while providing actionable insights for managers implementing green marketing initiatives. Specifically, it underscores the importance of partnerships, supply chain collaboration, regulatory alignment, knowledge exchange, and the incorporation of Corporate Social Responsibility (CSR) practices as critical strategies for enhancing organizational performance and advancing sustainable development.

Keywords: green marketing cooperation; sustainable cooperation; sustainability; bibliometric analysis; VOSviewer

1. Introduction

In general, collaboration enables firms to harness collective knowledge, resources, and advocacy, promoting sustainable practices, encouraging innovation, and influencing consumer behaviour toward a more environmentally friendly future. However, integrating marketing and collaboration can be challenging and requires further discussion as an innovative solution (Geldes et al., 2015; Mazandarani, 2024).

Of course, green marketing differs from other marketing aspects (Polonsky, 2008). Businesses can align their marketing strategies with environmental concerns and profitability by collaborating with consumers and prioritizing sustainability (Shi et al., 2022; Singh et al., 2023; Zhang et al., 2023). Sustainable cooperation reduces the costs associated with implementing sustainability and ensures that consumer needs are met. It is also worth noting that green marketing prioritizes values beyond profitability (Barman et al., 2023). The Green Marketing Mix has shown that various eco-friendly products are available on the market, and consumers are willing to pay a premium price for products with functional attributes that benefit the environment (Dangelico & Vocalelli, 2017). Accordingly, collaboration in green marketing may yield more significant benefits than just competition.

However, some firms still prefer individual benefits over the collective good (D'Attoma & Ieva, 2020). These decisions prioritizing profit over the collective good can impede environmental preservation, efficient resource use, social progress, and long-term prosperity. Accordingly, sustainable cooperation has become a significant concern for researchers, governments, industrial experts, and the public (Stål & Jansson, 2017).

Today's macro policies require businesses to cooperate with other parties for sustainability (Guan et al., 2023). Considering the role of green marketing, cooperation in this field is crucial. Dangelico and Vocalelli (2017) studied the definition of green marketing and found that researchers have identified many ways to segment consumers in green marketing strategies. They also revealed that green brand positioning is more significant than green product positioning and can differentiate a brand. Furthermore, the closed-loop supply chain and reverse planning are crucial, with careful advertising content and ecolabels as essential tools. Accordingly, more research should promote green marketing techniques to encourage sustainable consumerism and enhance cooperation.

To this aim, one of the main challenges in conducting such investigations is transforming gathered data into useful information that can aid decision-makers at various levels of management and academia in making intelligent and actionable decisions (Agarwal & Kumar, 2021). As a complementary solution, de-duplication for keyword visualization interpretation can assist in extracting meaningful insights from data and effectively presenting them (Reza Mazandarani & Royo Vela, 2022). This study aims to validate the findings using keyword classification. In simpler terms, this research utilizes relevant keywords of green marketing cooperation and explains them with existing literature to gain a more comprehensive understanding.

Consequently, this study organizes and analyzes the current literature on green marketing and collaboration and aims to (a) describe relevant research's characteristics and relationships, (b) create a structured organization of their contents and outcomes, (c) identify any limitations and areas where knowledge is lacking to determine potential streams for future research.

After the introduction, section 2 discusses the literature on green marketing and cooperation. Then, the research methodology and technique used to collect and analyze data are discussed in Section 3. Next, section 4 provides a systematic overview of the research trends, publishing journals, authors, institutions, and countries, articles, and keyword clusters. Additionally, this work will explain important keywords through a literature review. Lastly, the article concludes, sections 5 and 6, by highlighting the study's results, managerial implications, limitations, and future research.

2. Defining the relationship between green marketing and cooperation

When it comes to environmental responsibilities, consumers are increasingly aware of their impact. To meet this demand, manufacturers design and produce more eco-friendly products that retailers promote through green marketing (Hong & Guo, 2019). This calls for a greater focus on cooperation (Kar & Harichandan, 2022). However, researchers may have varying viewpoints on the correlation between cooperation and green marketing. While some researchers view cooperation as a hindrance to green marketing adoption (Banerjee, 2003; Dangelico & Pujari, 2010), numerous publications highlight a strong correlation between these topics (Li et al., 2022; Nielsen et al., 2020; Peng et al., 2022; Yang et al., 2022).

Due to its practical importance, academics have attempted to explain the impact of cooperation on green marketing over the past two decades. For instance, promoting sustainability can be more effective by understanding how cooperation influences green marketing strategies (Calik et al., 2020). In addition, firms can achieve significant positive environmental impacts through green marketing efforts by collaborating on initiatives like industry-wide sustainability programs, supply chain partnerships, and collective action (Rane et al., 2021; Youn et al., 2012). These collaborations allow Companies to share knowledge and pool resources (Salim et al., 2020). Collaboration among businesses, NGOs, and regulators can foster industry standards in green marketing (Rauter et al., 2019). This will enhance business credibility and promote positive consumer attitudes, building trust (Casidy & Yan, 2022). As one of the most productive authors on green marketing (Silva &

Razzolini Filho, 2023), Polonsky (2011) mentioned that collaboration facilitates the exchange of ideas, best practices, and innovations between businesses. Furthermore, sharing knowledge in green marketing can contribute to developing sustainable technologies, eco-friendly production processes, and green product design. The idea of green collaboration was highlighted in response to the implementation problems of green marketing, mainly due to the high costs of acquiring knowledge (Benabdellah et al., 2021; Ilg, 2019; Melander, 2017; Salim et al., 2020), innovation in production (Ullah & Arslan, 2022; Yu et al., 2021), and cultural development (De Medeiros et al., 2018; Wang et al., 2020). In layperson's terms, green cooperation works towards its goals by promoting teamwork, sharing resources, and adopting sustainable methods to solve environmental issues and establish a sustainable tomorrow. As a result, it is crucial to develop a comprehensive framework that addresses cost management, knowledge exchange, innovation, and culture building to implement green marketing cooperation successfully.

By integrating cooperation with green marketing strategies, businesses can promote eco-friendly products and practices, involve customers in environmental campaigns, and establish a positive brand image through sustainability efforts (Fadavi et al., 2022). Nonetheless, upon reviewing multiple abstracts, it has become clear that the relationship between cooperation and green marketing can be subjective and vary depending on the context and goals of an organization. For instance, green marketing promotes environmentally friendly products, practices, and values. To this end, marketing strategies must highlight the environmental benefits of products, target eco-conscious consumers, and incorporate sustainability messaging into brand communication (Hyytia, 2022; Liao et al., 2013). Therefore, this bibliometric research aims to shed light on every aspect of green marketing cooperation by addressing the following questions:

1. Are there any emerging trends or patterns in the literature concerning cooperation and green marketing?
2. Which keywords or terms related to cooperation and green marketing are emerging as significant in recent literature?
3. Which publications and scholars are most cited in cooperation and green marketing, and what new perspectives do they offer?

3. Methodology

This study uses bibliographical coupling to group authors, documents, and journals based on their similarities in explaining the relationship between cooperation and green marketing. A bibliometric analysis visualizes a subject's research landscape, identifies current and emerging research topics, and highlights influential academics and publications (Kar & Harichandan, 2022; Trang et al., 2023). Additionally, the bibliometric analytical approach allows for an impartial, systematic, and unbiased assessment. This method also facilitates the evaluation of publication success and the explanation of the structural dynamics of the research topic (Kar & Harichandan, 2022; Reza Mazandarani & Royo Vela, 2022).

Furthermore, the authors utilize keyword classification using the de-duplication technique to highlight important keywords. In other words, all similar keywords related to a specific topic will be grouped. In the fourth step of the process, after gathering and analyzing the data, the authors elucidate highlighted keywords by referencing existing literature.

This research utilized a five-step literature review process commonly employed by previous researchers, such as Agarwal & Kumar (2021), to address the research questions and accurately represent the current literature on green marketing and cooperation.

- Step1. Choosing a period for research- The papers are reviewed over three decades (1990–2023). The review focused on investigations from 1990, when initial research explained the role of cooperation in green marketing (Roy & Whelan, 1992). The data was retrieved on July 7, 2023, marking the end of the year.
- Step 2. Choosing a suitable database- Based on numerous studies, the Web of Science is widely regarded as a reputable and frequently utilized source for bibliometric analysis

(Agarwal & Kumar, 2021). Researchers can access academic journals, conference proceedings, and scholarly publications across multiple disciplines. Web of Science rigorously selects content for indexing based on journal quality, citation patterns, and other factors. A significant impact of published works has been achieved due to researchers' reliance on the Web of Science as the only source of bibliometric research information (Agarwal & Kumar, 2021; Araújo et al., 2018; Fetscherin & Usunier, 2012; Radler, 2018).

- Step 3. Selecting the keywords- Identifying keywords related to green marketing is challenging, as it is defined by multiple interchangeable terms and overlapping concepts, making research less consistent and multidisciplinary. We selected the keywords for analysis through previous research on green marketing. A bibliometric analysis of green marketing (Bhardwaj et al., 2023, p. 3) stated that "eco marketing," "sustainable marketing," "Enviro Marketing," and "Ethical marketing" could also be termed "green marketing." We also add five more keywords from the green marketing mix definition, such as "green price," "green place," "green product," "green promotion," and "green purchasing." The authors utilized synonyms from the Word Reference Dictionary to choose keywords for collaboration (WordReference, 2023). Accordingly, the final search string includes keywords in titles, keywords, and abstracts: [("green marketing" or "environment marketing," "sustainable marketing," "green price," "green product," or "green promotion," or "green place," or "green purchasing" (Topic) AND "cooperation" or "working together" or "joint action" or "combined effort" or "teamwork" or "mutual support" or "partnership" or "coordination" (Topic)]
- Step 4. Data and bibliometric analysis- This paper conducted a detailed citation analysis report on 575 articles and reviews through the Web of Science's online portal. We analyzed publication data using a Microsoft Excel spreadsheet, including the number of publications per year, the publication type, the top journals, countries, authors, universities, industries covered, and the research tools used. Then, the data were exported to VOSviewer Software (Version 1.6.19) for further analysis. Bibliometric analysis uses VOSviewer to construct a distance-based map. The distance between two nodes in a distance-based bibliometric network approximates the degree of relationship between the nodes (Van Eck & Waltman, 2010).
- Step 5. Topic discussion and gap identification — Research gaps were identified after a thorough review and analysis of the literature. Some research areas still need to be explored in green marketing cooperation, which could provide opportunities for future research.

4. Results: A Systematic Bibliometric Analysis

This study gathered 575 prominent cooperation and green marketing publications from the Web of Science. This information was utilized as a component of its bibliometric analysis. To conduct a more in-depth analysis, the data collected from WOS were exported to VOSviewer Software (Version 1.6.19). Various keyword maps, co-citation maps, and coupling maps were created to obtain insights. By using the software, we improved the visualization of the data. Much attention has been paid to visualizing bibliometric networks, also known as science mapping, since the early days of bibliometric study (Van Eck & Waltman, 2014).

4.1 Publication Trends by Year

Regarding RQ1, green marketing has received increased attention recently despite limited coverage before 2005. Based on the 575 publications we collected, our research statistics support this issue. The publication trend is shown in Figure 1. These findings show that 89% of the publications (509 research) fall within the past decade, between 2013 and 2023. The maximum number of publications is found in 2022 (108 publications, around 19%). The number of articles published in 2023 is expected to increase significantly by the end of the year. The oldest article in the selection talked about the achievement of recycling through collaboration in the value chain (Roy & Whelan, 1992). After analyzing the data presented in Figure 2, we observed that only forty-four documents

were published between 1990 and 2010, less than 8% of the total 575. Articles on "green marketing" and "cooperation" increased significantly after 2012.

However, there is also a noticeable trend of increasing citation rates for these documents. This trend steadily rose from 2017 onwards and peaked in 2022, which means new investigations are essential to future research (Figure 1). This upward trend will continue, as research was conducted in the middle of 2023.

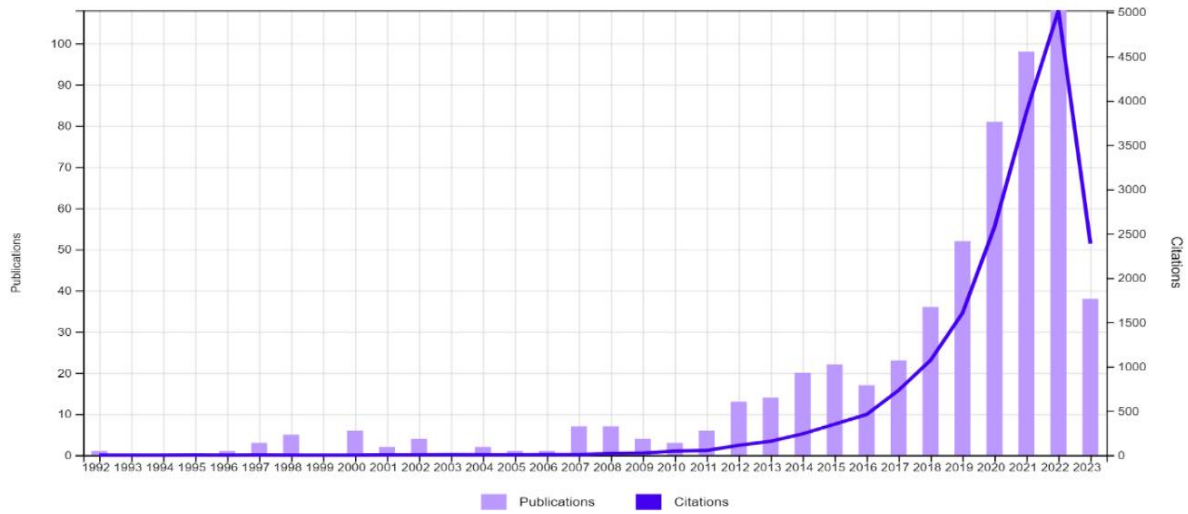

Figure 1. Number of articles and citations received on green marketing and cooperation- source Web of Science

Furthermore, the researchers employed artificial intelligence to scrutinize the contents of Figure 1, aiming to discern emerging trends or patterns within the literature concerning cooperation and green marketing. This examination yielded substantial outcomes. The image illustrates that post-2008, there was a notable increase in the volume of scholarly articles and their citations, reaching a zenith in 2015, with this upward trajectory persisting to the present day. Such findings underscore a growing academic and practical interest in the nexus between collaboration and green marketing. The pronounced escalation in research activity in recent years highlights these studies' expanding scope, influence, and integration into future works. This evolution indicates a continuous effort by researchers to build upon previous investigations, suggesting an ongoing identification of novel challenges linked to earlier discoveries.

4.2 Research categories

The examination of publications by subject area, as observed in our article on cooperation in green marketing, uncovers the trends and frequency of their occurrence in literature. The analysis of the articles based on the subject area (in the case of our article on cooperation in green marketing) reveals the trend and pattern of appearances (Table 1). For example, the dominant fields of publications are related to engineering, which accounts for 37.39 per cent of the literature. It strongly focuses on the technical aspects of implementing green marketing strategies in cooperation with stakeholders. Then, environmental science and ecology represent a significant part of literature, with 32.52%. The ecological focus of the articles shows a strong interest in the environmental impact of these collaborative marketing efforts. Then, business and economics hold a significant share of 28.35%, reflecting the economic analysis and dynamics of the green marketing market in cooperative frameworks. Also, the coverage of green marketing and collaboration in the broader topics of science and technology (24.35%) and operations research and management science (13.91%) show that this field is not only limited to environmental and engineering perspectives but also includes operations and Aspects of strategic management. The role of computer science (13.57%) also shows that digital and computing tools are used in the analysis, tracking, and perhaps in implementing green marketing strategies. According to 6.26% mathematics, there is a trend

towards using quantitative methods to model and understand the dynamics of cooperation in green marketing. In addition, telecommunications (5.04%) indicates that technology and communication networks may play a role in facilitating collaborative strategies and expanding green marketing initiatives.

However, although less attention has been paid to social impacts, social sciences (2.78%) and energy and fuel (2.26%) have been represented, indicating a growing awareness of the social implications and energy considerations of green marketing practices in cooperative investments. As mentioned in the previous section, the growing body of research on previous findings can be a reason for these two issues to receive more attention in the future.

Table 1. Subject area-wise publications on cooperation in green marketing

	Research Areas	Record Count	% of 575
1	Engineering	215	37.39%
2	Environmental Sciences Ecology	187	32.52%
3	Business Economics	163	28.35%
4	Science Technology Other Topics	140	24.35%
5	Operations Research Management Science	80	13.91%
6	Computer Science	78	13.57%
7	Mathematics	36	6.26%
8	Telecommunications	29	5.04%
9	Social Sciences Other Topics	16	2.78%
10	Energy Fuels	13	2.26%

4.3 Prominent Journals

Figure 2 and Table 2 provide detailed information on the top 10 journals that strongly emphasize green marketing collaboration. The analysis indicates that the Journal of Cleaner Production has published the highest number of articles on cooperation in green marketing compared to other journals. This finding indicates that this journal has paid particular attention to research on the impact of marketing on sustainability and environmental issues.

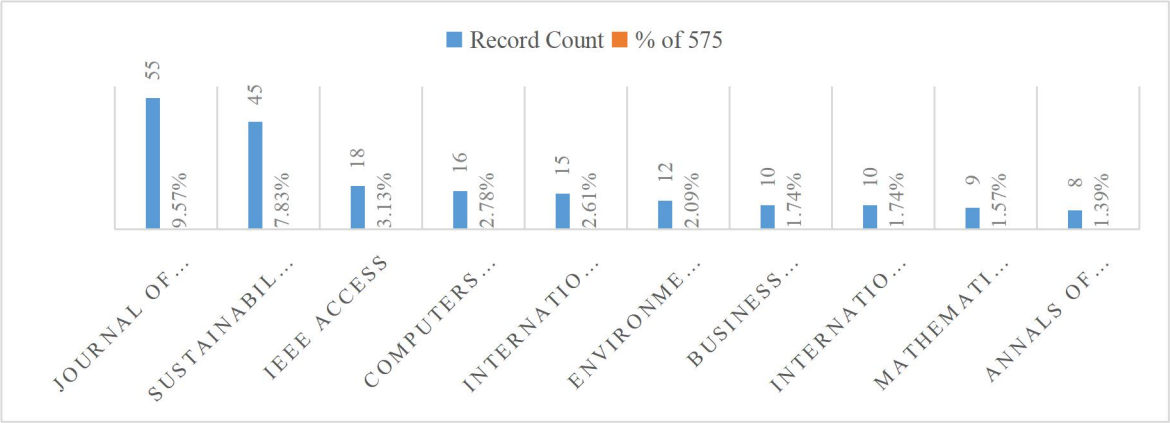

Figure 2. Top 10 Journals based on the number of publications in this field

Indeed, the evidence must convincingly demonstrate that the "Journal of Cleaner Production" contains the foremost articles in this field. Although most publications and citations in Greek marketing cooperation are related to this journal, other journals have fewer publications and a higher average number of citations. For instance, "Supply Chain Management an International

Journal," with two publications, has the highest average of citations (783). This journal was followed by "The International Journal of Operations Production Management" with three papers and 858 citations.

However, the diverse range of journal titles and their varied focus on aspects such as sustainability, technology, and business underscore the breadth and depth of the issue of cooperation in green marketing. This wide coverage of commercial and industrial activities and the interdisciplinary approach in this scientific research field, as evidenced by the journals in this list, further enriches our understanding of the environmental impact of green marketing, making our audience feel the full scope of this field. Furthermore, the number of publications in journals such as "IEEE Access" and "Computers & Industrial Engineering" and their citations point to a significant trend in which technological innovations and industrial applications are integrated with green marketing strategies.

Table 2. Top 10 Journals based on the number of citations in this field

	Publication Titles	Number of research	Citations	Average Citation per item	% of Total citations
1	JOURNAL OF CLEANER PRODUCTION	55	3363	61.15	18%
2	INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	15	1528	101.87	8%
3	INTERNATIONAL JOURNAL OF OPERATIONS PRODUCTION MANAGEMENT	3	858	286.00	5%
4	BUSINESS STRATEGY AND THE ENVIRONMENT	10	800	80.00	4%
5	SUPPLY CHAIN MANAGEMENT AN INTERNATIONAL JOURNAL	2	783	391.50	4%
6	COMPUTERS INDUSTRIAL ENGINEERING	16	754	47.13	4%
7	INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	10	668	66.80	4%
8	EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	5	552	110.40	3%
9	SUSTAINABILITY	45	445	9.89	2%
10	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	3	436	145.33	2%

4.4 Top Authors

The data and analysis presented in this section provide a comprehensive response to the initial research query. Figure 3 highlights the top ten authors discussing green marketing and collaboration, ranked by the number of their studies. Lead authors were responsible for about 1% of the publications, which reveals that no single author dominates the research landscape, as the field features contributions from various authors.

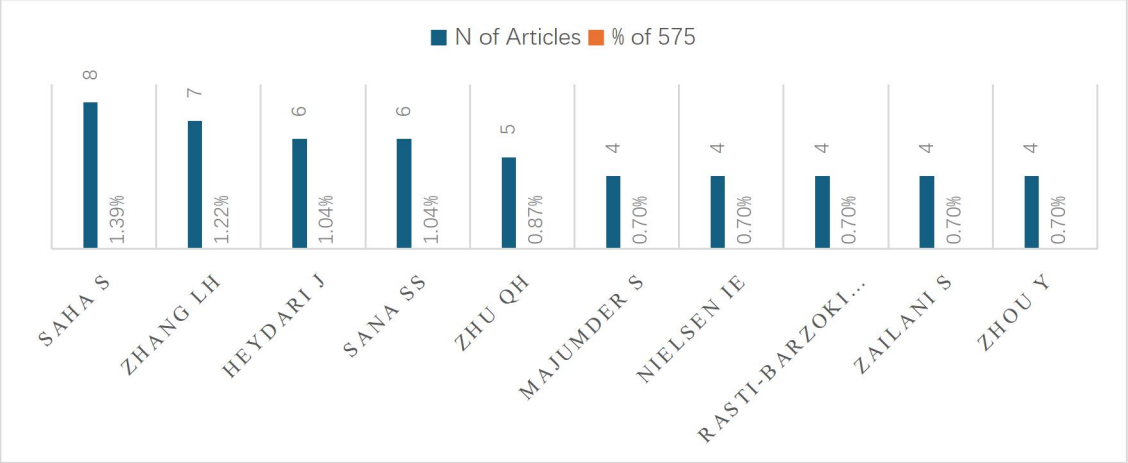

Figure 3. List of the top ten authors, ranked by the number of publications for green marketing cooperation

Figure 3 shows the author's networks in two colors. Each color likely represents the author's correlation and topic of interest. Authors within the same cluster are more frequently co-cited, suggesting they may work on similar issues. The size of each rectangle indicates the number of co-citations each author has had. However, comparing Figures 3 and 4 revealed that some researchers with fewer publications gained high attention from other authors, for instance, "Zhu, gh."These authors are often vital influencers or have produced seminal works.

Figure 4 shows the thickness of the lines between the authors, representing co-citation links. A thicker or more numerous line between authors suggests a more robust relationship or greater relevance of their combined work to the field. For instance, Green et al (2012) publication has received over 724 citations (see Table 5), which makes a strong connection between them.

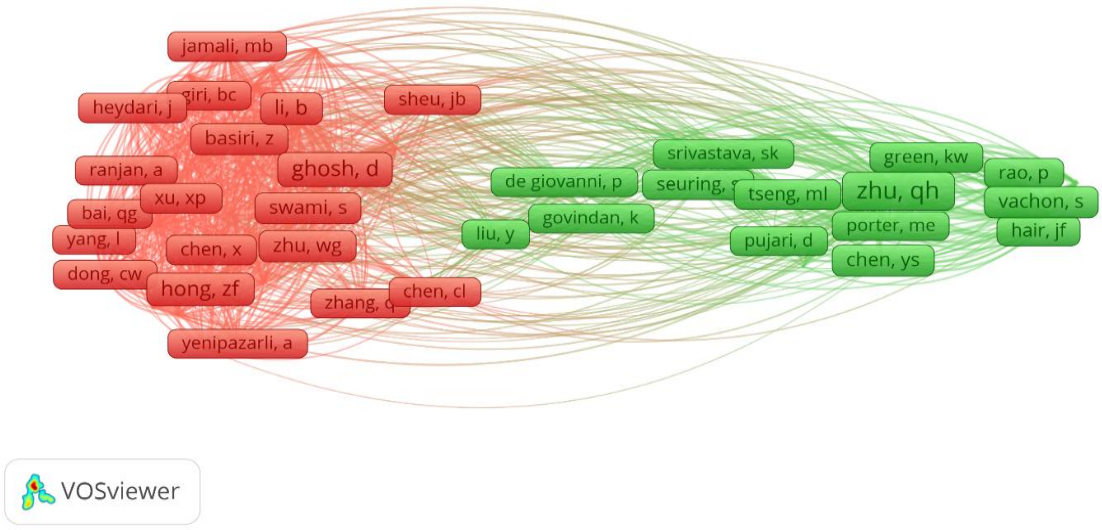

Figure 4. Map of co-citation analysis based on authors.

4.5 Prominent countries

Table 3 and Figure 5 listed the top ten countries based on the number of publications and citations. These findings reflect where the research community's emphasis lies geographically. These results signal that green marketing and cooperation in Asia and North America are particularly pertinent or well-funded. The numbers in Table 3 show a significant concentration of research activity in China, as indicated by the highest record count and a substantial number of citations. Chinese researchers are followed by research contributions from the USA, India, and other countries, suggesting active research engagement across diverse global regions.

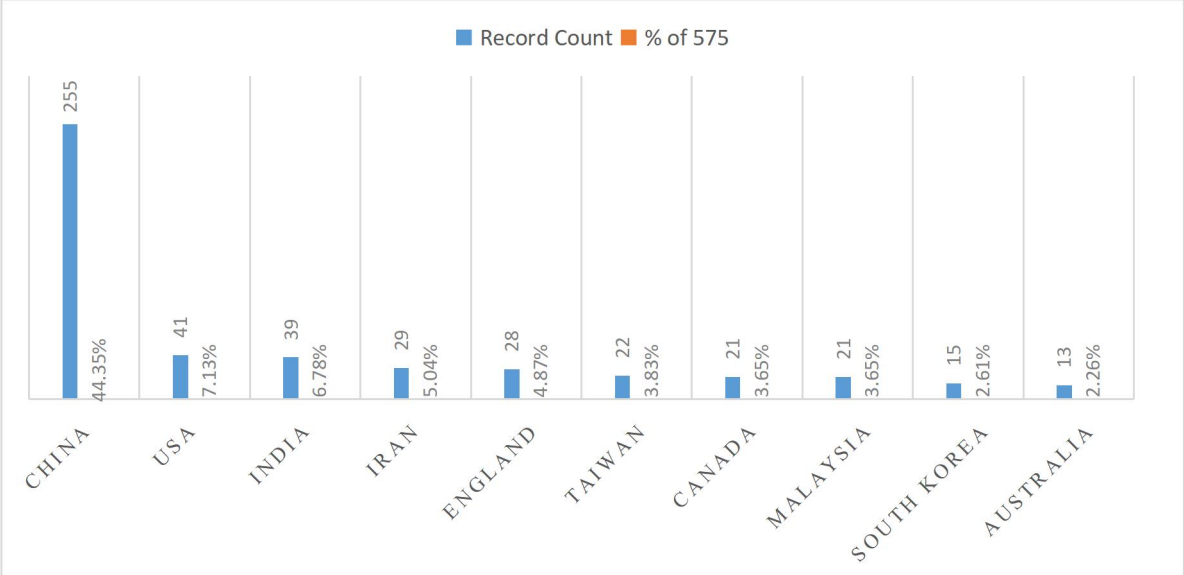

Figure 5. List of the top ten countries, ranked by the number of publications for green marketing cooperation

However, despite China having the highest record count, the average citation per item is higher for the USA, England, and other countries like Spain, which could imply that while Chinese research output is voluminous, the impact, as measured by citations per publication, is more significant in different regions (see Table 3).

Table 3. Citations for green marketing collaboration in the top countries

	Countries/Regions	Record Count	Number of Citations	Average citation per item
1	CHINA	255	6336	24.8
2	USA	41	2410	58.8
3	ENGLAND	28	1683	60.1
4	INDIA	39	1662	42.6
5	IRAN	29	1569	54.1
6	TAIWAN	22	1383	62.9
7	CANADA	21	1068	50.9
8	SPAIN	9	717	79.7
9	AUSTRALIA	13	679	52.2
10	SOUTH KOREA	15	654	43.6

In addition, Figure 6 illustrates the network between countries that simultaneously targeted cooperation and green marketing, as depicted in the VOSviewer software output. This cluster map displays the global landscape of scholarly partnerships, distinguishing four principal clusters. Figure 6 divides the four clusters into four different colors. Each rectangle contains a country name. The size of each rectangle indicates the magnitude of scholarly contributions or citations received, and the connecting lines represent the intensity and frequency of cross-citation among nations. For example, the depiction highlights China's prominent research collaborations with Iran, the United States, and India. The assortment of colors and groupings on the map further enables the identification of closely allied nations and those exerting significant scholarly influence.

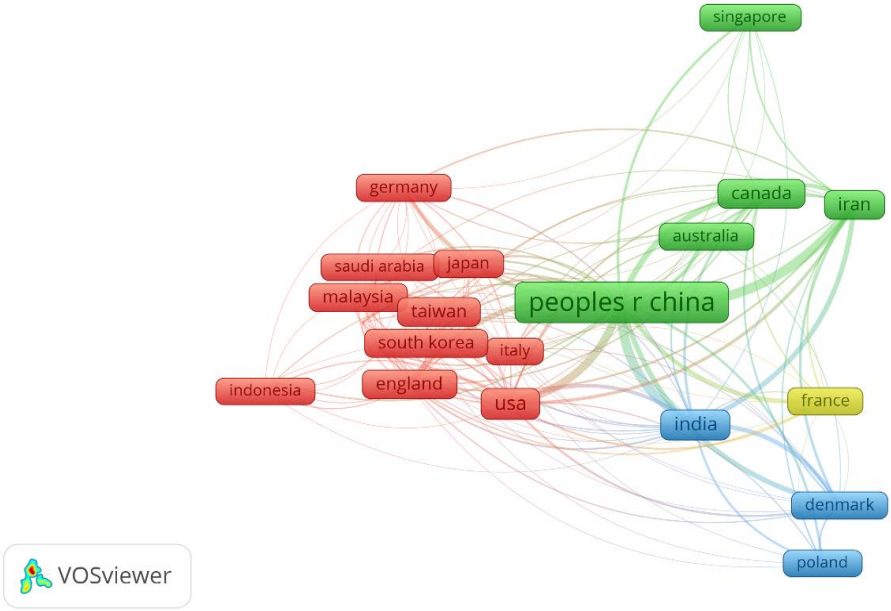

Figure 6. Map of bibliometric citation analysis based on countries.

4.6 Most cited publications

This research shows that 575 collected articles have been cited 18,765 times until January 21, 2023. Table 4 lists the top 10 cited papers. Accordingly, this list shows the field's most foundational or particularly influential research. In response to the third research question, the article focuses on sustainable supply chain management practices, the role of management and human resources in green practices, and consumer behavior related to environmentally friendly products.

A review of the topics of the 10 top research reveals that these leading publications offer new insights into the efficiency and effectiveness of green supply chain practices (Green et al., 2012; Hong & Guo, 2019; B. Li et al., 2016), the strategic importance of management commitment to environmental issues (Daily & Huang, 2001), and innovative approaches to evaluating green practices (El-Kassar & Singh, 2019; Ghosh & Shah, 2015; Triguero et al., 2013), such as the use of fuzzy DEMATEL (Decision Making Trial and Evaluation Laboratory) (Lin, 2013) and the examination of green consumer profiles (Akehurst et al., 2012).

Figure 7 illustrates the distribution of clusters and the interconnectedness of articles. Due to the large volume of articles on this topic, a threshold of fifty citations was set for a document to be included (Maier et al., 2020). Out of 575 papers reviewed, only eighty-eight were cited over 50 times. Consequently, the density visualization map in Figure 7 highlights the areas of intensive research into cooperation and green marketing. It marks the significant contributors and critical timeframes with specific names and years, indicating key authors and significant periods of contribution. Each cluster signifies either thematic concentrations or methodological perspectives within the scholarly literature.

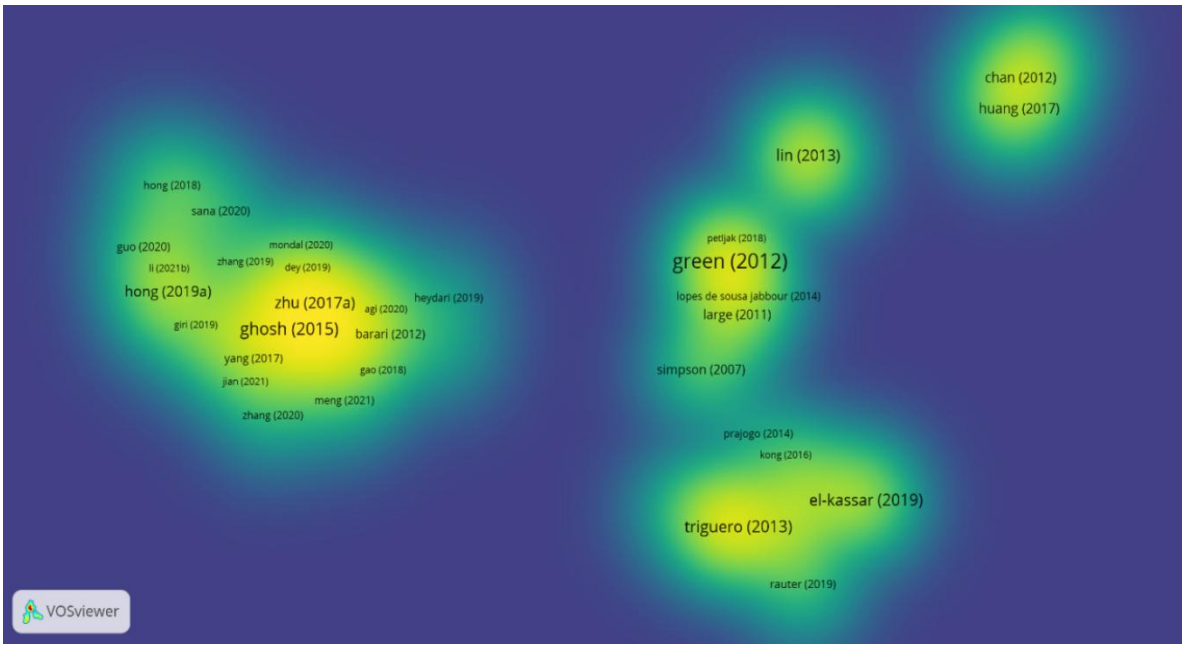

Figure 7. Density visualization map of articles on cooperation and green marketing

Table 4. Top 10 articles cited for green marketing collaboration.

Title	Authors/ Year	No Citations	Average per year
Green supply chain management practices: impact on performance.	Green et al., 2012	724	60.33
Achieving sustainability through attention to human resource factors in environmental management.	Daily & Huang, 2001	532	23.13
Supply chain analysis under green sensitive consumer demand and cost-sharing contract	Ghosh & Shah, 2015	488	54.22
Drivers of different types of eco-innovation in European SMEs	Triguero et al., 2013	429	39
Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices.	El-Kassar & Singh, 2019	404	80.8
Using fuzzy DEMATEL to evaluate the green supply chain management practices.	Lin, 2013	395	35.91
Green product design in supply chains under competition	Zhu & He, 2017	363	51.86
Green product supply chain contracts considering environmental responsibilities	Hong & Guo, 2019	351	70.2
Pricing policies of a competitive dual-channel green supply chain	Li et al., 2016	342	42.75
Re-examining green purchase behavior and the green consumer profile: new evidence.	Akehurst et al., 2012	291	24.25

4.7 Keyword analysis

This paper followed Agarwal and Kumar's (2021) methodology in identifying critical keywords in this research area. This study employed the counting method for keyword analysis within VOSviewer, setting a threshold of at least eight occurrences to be considered significant. Consequently, the software identified thirty-six words as the most pertinent. In response to the second inquiry of this research, this section unveiled six common word clusters. The following words were the most prevalent within each respective cluster:

- Cluster 1 (10 keywords)- environmental performance, game theory, green innovation, green product development, green purchasing, green supply chain management, innovation, supply chain management, sustainability, sustainable development
- Cluster 2 (9 keywords)- channel coordination, consumer environmental awareness, dual-channel, fairness concern, government subsidy, green marketing, green product design, supply chain coordination, sustainable supply chain
- Cluster 3 (6 keywords)- coordination, dual-channel supply chain, fairness concerns, green degree, green supply chain, Stackelberg game
- Cluster 4 (6 keywords)- competition, corporate social responsibility, pricing, supply chain
- Cluster 5 (4 keywords)- carbon dioxide, green products, optimization, supply chains
- Cluster 6 (3 keywords)- government intervention, green product, green technology innovation

To complete the above discussion, Figure 8 presents a visualization of keyword co-occurrence from bibliometric data generated by VOSviewer. This figure shows the interaction between keywords in six clusters in different colors. Each rectangle presents one keyword, and its size represents the prevalence of the keyword in the literature. Lines connecting rectangles indicate how often other researchers cited similar keywords, with thicker lines indicating stronger associations between terms.

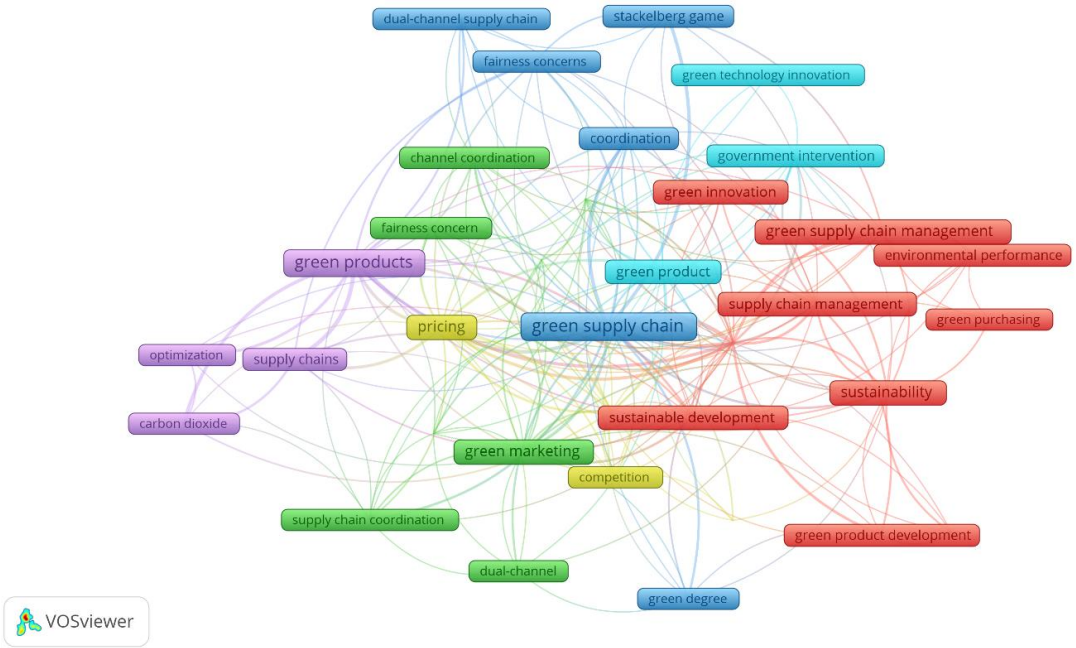

Figure 8. An analysis of co-occurrences based on keywords.

In this map, clusters of keywords have been formed around central topics in cooperation and green marketing. Figure 8 reveals that terms such as "green supply chain management," "sustainability," and "green product" indicate critical focus areas in green marketing cooperation literature. Furthermore, the diversity and relevance of these terms suggest a multidisciplinary approach that intersects environmental considerations with business practices, technological

innovations, and consumer behavior. This cluster map is a valuable tool for quickly understanding the scope and focus of research in this field in a given period.

After comparing the six keyword clusters with the results of Figure 8, the authors refined the main keywords using de-duplication detection techniques. This method groups similar keywords together. Consequently, the research categorized the keywords into seven primary groups, as summarized in Table 5.

Table 5. De-duplicated keywords

Primary Group	Keywords
1. Green Innovation and Development	• green innovation • green product development • green technology innovation • green product • green products • optimization • green product design • innovation
2. Green Supply Chain Management	• green supply chain management • supply chain management • supply chain coordination • green supply chain • supply chains • supply chain • sustainable supply chain
3.Sustainability and Environmental Performances	• sustainability • sustainable development • environmental performance • green degree • carbon dioxide
4. Government and Corporate Roles	• government subsidy • government intervention • corporate social responsibility • fairness concern • fairness concerns • competition
5. Game Theory and Strategic Interactions	• Stackelberg game • pricing • game theory
6. Marketing and Consumer Awareness	• green marketing • green purchasing, • consumer environmental awareness
7. Coordination and Channel Strategies	• channel coordination • dual-channel • coordination • dual-channel supply chain

The conclusion obtained from the detailed examination of keywords can answer this research's first and second questions. To this end, the study primarily focused on subjects within the most repeated keywords, notably Green Innovation and Development, Green Supply Chain Management, and Sustainability and Environmental Performance. Other keyword groups, such as Government and Corporate Roles, Fairness and Competition, Game Theory and Strategic Interactions, Marketing and Consumer Awareness, and Coordination and Channel Strategies, emerged as promising areas for future investigation.

In alignment with the discussions in the literature review, the first step aimed to deepen our understanding of the relationship between cooperation and green marketing. This research has meticulously reviewed the literature to explain each keyword group independently. Table 6 and related references show a more detailed view of the available literature about each topic.

Table 6. Literature validation of identified keywords

Topic	Related Literature
Green Supply Chain Management	Successfully implementing sustainable practices in the supply chain necessitates a collaborative approach (Liu et al., 2023). Companies must collaborate closely with their suppliers and distributors to ensure eco-friendly sourcing, manufacturing, and distribution of products (Yang et al., 2023). By fostering cooperation within the supply chain, businesses can reduce their environmental impact and contribute to a more sustainable future (Sun & Zhong, 2023). However, out of 575 papers, around 15% (85 papers) discussed supply chain collective activities, while only twenty-eight specifically mentioned supply chain cooperation and collaboration.
Marketing and Consumer Awareness	Educating consumers about the benefits of green products and services can be accomplished through collaboration between manufacturers, retailers, and consumers (Tao et al., 2023). Raising awareness among consumers about environmental issues through joint campaigns, workshops, and informative materials can encourage them to embrace eco-friendly products, even if they come with a slightly higher price tag (Chang, 2023). 15% of publications (88 Papers) mentioned education or awareness. Out of 88 papers, 79 mentioned awareness, and four specifically mentioned customer awareness. The remaining nine were about education.
Government, Corporate Roles	Government and regulatory agencies often play a significant role in shaping green marketing practices (Fakheri et al., 2022). Businesses must cooperate with regulatory authorities to ensure compliance with environmental regulations and work towards more stringent standards promoting sustainability (Miao et al., 2022). Out of all the collected papers, 75 publications mentioned rules and standards, but only three specifically discussed regulatory compliance. In addition, developing essential criteria (He & Chen, 2022) and certifications (Hyytia, 2022) for green products can be achieved through cooperation between businesses and relevant industry associations. These standards and certifications help consumers identify environmentally friendly options, and the messaging across the industry is consistent. As a result of the increasing number of companies obtaining eco-labels or third-party certifications for their environmentally friendly products, the introduction of green products is growing (Dangelico et al., 2013).
Green Innovation and Development	Collaboration among research, development, marketing, and sustainability teams can foster the creation of eco-friendly products (Batwara et al., 2022). Companies must

	share their knowledge and resources to develop environmentally friendly solutions (Salim et al., 2020). It was found that 29 of the collected papers discussed product development, while 19 mentioned green product development.
Game Theory and Strategic Interactions	Constantatos and Herrmann (2011) mentioned that if a company decides to introduce an environmentally friendly product, it may initially experience a decrease in profit due to higher costs. Accordingly, cooperation between multiple stakeholders can distribute costs and benefits equitably to achieve green initiatives (Kuiti et al., 2020), such as recycling programs (Mandal & Pal, 2023) and renewable energy projects (Liu et al., 2022).
Sustainability and Environmental Performances	Regarding Ma et al. (2018), In a centralized scenario, participants of the green supply chain collectively make decisions to maximize overall profit. For this reason, social capital can perform several beneficial functions, such as sharing information, coordinating activities, and making collective decisions (Kim, 2018). Collective recycling, for example, enhances producer responsibility while remaining affordable for coalition members by adopting the proposed two-part allocation scheme (Chen & Chen, 2019). Further, the convergence of various entities can significantly affect consumer behavior and industry practices, leading to positive outcomes (de Caluwe, 2004).
Coordination and Channel Strategies	Collaboration among businesses, organizations, and governments is often necessary in green marketing efforts to tackle environmental issues. To amplify the effects of their sustainability efforts, companies can collaborate with environmental non-profits, government agencies, or other businesses to combine resources and expertise (Calik et al., 2020). Out of 575 documents collected for this research, approximately 10% (56 papers) discussed Partnerships and Alliances. Collaboration helps with the transfer of information and the dissemination of innovative methods (Ming-Chieh, 2016). Sharing intelligence with suppliers and users is crucial for businesses to fulfill unmet needs and succeed in the market (McCarthy et al., 2015). As a result, for entrepreneurs' success in green entrepreneurship, planners and managers should consider shared value and knowledge flows in addition to all fundamental factors (Fallah & Soori, 2023). CSR strategies promote collaboration with environmental research and development, which can result in more substantial investments but does not necessarily translate to higher social welfare (Li et al., 2023). A company can develop sustainable product attributes by leveraging corporate social responsibility research and development knowledge and human capital (Ullah & Arslan, 2022). The Corporate Social Responsibility (CSR) philosophy can enhance competitiveness, trade, marketing, and sustainable development in the economic market (Hyytia, 2022).

5. Conclusion

This article presents an approach to analyzing the relationship between green marketing and cooperation. Firstly, tabular presentation analysis and scientific mapping with VOSviewer

visualization maps were used. This bibliometric analysis also includes a systematic literature review that targets main keywords to explain essential subtopics and general definitions.

5.1 Summary of main results

This research aims to explore the evolving relationship between collaboration and green marketing within the academic literature, highlighting emerging trends, patterns, and key terms that characterise the current and future dynamics of the field. The study sets a solid foundation by examining the most influential publications and contributors to the dialogue on collaboration and green marketing.

The findings demonstrate the study's dedication to deepening the understanding of collaboration and green marketing. The trend observed in publications and citations highlights a growing interest and impact in the domain over the past thirty years, with a notable increase in the last five years. This rise in citations may signal that the research findings are becoming increasingly relevant, capturing the attention of the academic community. Publications often take time to achieve their full citation potential, which could explain the surge in recent years. The focus of the publications on green marketing cooperation within realms like Engineering, Environmental Sciences, and Business Economics highlights the strategic development and implementation of green marketing efforts. The inherent complexity of green marketing cooperation demands a comprehensive approach, as evidenced by the contributions across diverse fields.

The landscape of green marketing cooperation is characterised by a diverse group of active authors, with publication counts suggesting a competitive field. The structured network of researchers revealed by the co-citation map indicates a thematic linkage and collaboration across interdisciplinary domains, such as green marketing cooperation. The spread of publications among authors and their co-citation patterns highlights the collaborative and interconnected essence of the research, showcasing multiple vital figures driving the field forward.

Regarding publication venues, the "Journal of Cleaner Production" emerges as a pivotal platform for disseminating research on green marketing cooperation, as evidenced by its published research volume and total citations. This section emphasizes its influence and stature within the field. However, despite their limited article count, journals with fewer publications, such as the International Journal of Operations & Production Management, and Technological Forecasting and Social Change, exhibit high citation rates, suggesting significant influence. This underlines the importance of assessing journals by the research volume and the impact and quality of their contributions to the field.

Internationally, China, the USA, and India have contributed significantly to the literature on green marketing cooperation, with China at the forefront of a robust global collaboration network. The bibliometric map's connections highlight the breadth of Chinese researchers' academic output and the depth of international cooperation, underscoring the global nature of green marketing cooperation research and identifying the primary countries contributing to this field.

The analysis of publication citations sheds light on key focus areas and influential works within green marketing collaboration. The clustering of research activities and the identification of the most impactful works, based on citation metrics, reveal diverse research themes despite the prominence of specific topics and articles. The significant citation counts of leading works affirm the critical role of green marketing collaboration research in advancing discussions on sustainability and environmental management in business practices.

Keyword analysis reveals that "green supply chain management," "sustainability," "green products," and "environmental performance" are central themes in green marketing cooperation. The tight interlinkages between these and other terms, such as "pricing," "supply chain coordination," and "green marketing," indicate a keen focus on integrating economic strategies with environmental considerations. This integration of ecological concerns into business and economic models has given rise to a vital research domain aimed at optimising supply chains for both economic efficiency and ecological impact, highlighting the complexity and breadth of green marketing beyond simply promoting eco-friendly products.

Conclusively, keyword classification in this research offers researchers a comprehensive overview of the academic landscape, enabling the identification of key themes, trends, and gaps within the existing body of literature. This initial exploration was invaluable during the early stages of research, laying the groundwork for a deeper understanding of the subject matter.

5.2 Research limitations

Despite the incredibly detailed and valuable information, this research has two principal limitations and one consideration. However, future research can take advantage of these limitations. First, bibliometric analysis based solely on the Web of Science has limitations. The database may only capture part of the scope of research due to incomplete coverage, and it may favor specific fields or exclude publications that are not in English (Mongeon & Paul-Hus, 2016). Researchers often combine various databases to gain a more comprehensive understanding of research trends and influence, thereby overcoming these limitations. Our research prioritized the collection of authentic English articles, which is why we only utilized WOS.

Secondly, future research could employ various methodologies utilizing different software tools or combinations thereof. For instance, using SciMAT software enables the generation of diverse maps that depict the average relevance of keywords over distinct time intervals. Additionally, this software facilitates the analysis of trends in keyword relevance, their evolutionary processes, and their overlaps during specified periods (Reza Mazandarani & Royo Vela, 2022).

6. Directions for Future Research

A review of previous research suggests that future studies should concentrate on areas such as resource participation and infrastructure development, establishing and enforcing effective laws and regulations, collective impacts and functions, and broadening research fields. Broadening research includes exploring green production expansion, collaborative resource provision, shared educational and cultural development, and fostering Corporate Social Responsibility (CSR) Initiatives.

The first issue that warrants further investigation is a better understanding of Regulatory Compliance (antecedents, challenges, and consequences) related to green marketing cooperation. Despite this assertion, previous studies contend that environmental regulations and guidelines support effective green marketing strategies (Fakheri et al., 2022; Miao et al., 2022; Rauter et al., 2019). However, these studies do not empirically analyse the regulatory measures necessary to oversee green marketing claims, thereby protecting the interests of consumers, vendors, and the environment from potentially deceptive green claims concurrently. Researchers in this area can focus on the empirical analysis of the effectiveness of current regulatory frameworks governing green marketing. This gap includes how well current laws prevent misleading environmental claims and protect consumers. Studies could evaluate the impact of regulations on business practices and suggest ways to enhance regulatory frameworks to better support sustainable marketing practices.

Another trending keyword that needs more attention is related to the collective impact activities (see Tables 2, 6, and Figure 8). This research direction concerns the effects of collective efforts on green marketing's return on investment (ROI) (Shi et al., 2022) and broader environmental and social goals (see Table 2). It suggests examining how different stakeholders (companies, NGOs, and governmental bodies) can collaborate to tackle complex sustainability challenges. Such studies might assess the effectiveness of collective campaigns and initiatives, measuring their impact on consumer behavior and environmental outcomes.

Furthermore, the general findings of this research show that other research areas need to be expanded. One pertinent domain pertains to the advancement of green products. Academic inquiry in this field may serve as a practical framework for designing and introducing these products aimed at minimizing environmental impacts while addressing the fundamental needs of consumers (Tables 5, 6, and Figure 8). Collaboration within the supply chain also represents a critical area

requiring exploration across multiple dimensions. Although extensive research has been conducted in this domain, a significant need remains to develop a comprehensive understanding of cooperation strategies within the supply chain to attain sustainable practices, from raw material procurement to product delivery to consumers. This aspect warrants further attention. Another subject that needs more attention is cooperation in educating and creating consumer awareness. Further research can Investigate the most effective ways to inform consumers about the benefits of green products and how to encourage sustainable consumer behavior. Lastly, additional research into the role of Corporate Social Responsibility (CSR) within frameworks of marketing collaboration could illuminate novel aspects of the topic for scholars. Investigating how CSR initiatives, particularly those associated with green marketing, can augment corporate reputation, engage stakeholders, and yield measurable environmental advantages is essential.

However, given the dual advantages of competition and cooperation inherent in cluster structures, testing the designed models within this context in future studies to explore cooperation in marketing is advisable. This type of research could explore collaboration models where the competitor companies share technology, logistics, or even marketing platforms to reduce costs and environmental impacts, potentially leading to new innovative practices in green marketing. Consequently, these insights aim to guide future research efforts and provide practical strategies for managers to effectively implement green marketing initiatives and benefit from them in partnership, supply chain collaboration, regulatory compliance, knowledge sharing, and CSR initiatives.

This study acknowledges its reliance solely on the Web of Science (WOS) database. While WOS is well-regarded for its rigorous indexing and relevance to sustainability research, its exclusive use is recognized as a limitation. Future research is encouraged to incorporate multiple data sources, such as WOS, Scopus, and Google Scholar, to provide broader coverage and deeper insight.

The bibliometric mapping in this study was conducted using VOSviewer. However, future investigations may benefit from employing additional bibliometric techniques, such as clustering, and utilizing a range of software tools to enhance the comprehensiveness, validity, and overall quality of the analysis.

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