

A Scientometric Analysis of Research Productivity and Collaboration Patterns of Green Marketing Literature

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ABSTRACT

Objectives: The evaluation of the study is a scientometric analysis of research productivity and collaboration patterns of green marketing literature indexed in the core collection of the web of science for a period of 16 years (2006-2021). **Methodology:** Green marketing is a focused topic of research across national and international levels. To analyse the research productivity in the field, the term green marketing, environmental marketing, ecological marketing, etc. were used for retrieving the articles in advanced search mode of the database Web of science, a core collection covering the period from 2006-2021. The data retrieved were in plain text format for further analysis and interpretation. The data were analyzed by using the Scientometrics indicator to measure the research progress such as main information about the collection, document types, prolific author *h*-index and *g*-index, three field plots and country collaboration map. Besides, the Biblioshiny and Microsoft Excel software was used for mapping networks and tabulations. **Results:** To analyze, the green marketing research output increased trend during 2006-2021, and a total number of (7181) articles were taken from the database. The researcher's output was in the form of journal articles (6300) followed by reviews (561); article proceedings paper (158), and so on. The top position in the journal of cleaner production with the *g*-index is (135) and the *h*-index is (86), then energy policy (99) and (62) on the *h*-index the last position of the journal index of green marketing in Environmental and Resource Economics the top position of the citation per paper value of 262.07, followed by the second position of citation per paper Chen Y. S value of (181.64). The top three authors, Dangelico RM., Sarkis J., Chen YS., and five subs-area, green marketing, China, environmental sustainability, sustainability, and sustainable development, had a strong relationship with green marketing itself. Furthermore, these authors preferred to publish in three sources, journal of cleaner production, sustainability, business strategy and the environment, international journal of production economics. The top five subject areas, sustainability, green marketing, sustainability development, and renewable energy, had a relationship with five sources, the Journal of cleaner production, sustainability, energy policy, renewable and sustainable energy reviews, business strategies and the environment. Furthermore, these subject areas had a strong relationship with the top two most productive countries USA and China. From China to USA collaboration with (142) frequency and followed by China from Australia collaboration with (57) frequency. **Conclusion:** This present study is about the scientometric analysis of research productivity and collaboration patterns of green marketing literature based on current literature and will highlight the progress and development of global research in the green marketing field.

Keywords: Scientometrics, Green Marketing, Citation Analysis, Three field plots, Research productivity.

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INTRODUCTION

The term Scientometrics has been introduced by Nalimov and Mulchenko and defined as Scientometrics as the application of those quantitative methods which are dealing with the analysis

of science viewed as an information process scientometric is the measurement of science communication.

Consumers are more informed and discriminating about the products they purchase than ever before. This is especially true when assessing the environmental impact and sustainable practices of the brands they support. As a result, many of the world's most valuable and successful businesses are pursuing green marketing initiatives. Continue reading to learn what green marketing is, see examples of green marketing practices, and consider the potential benefits of environmentally conscious



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campaigns for a company. Green marketing is becoming more popular as more people become concerned with environmental issues. Indeed, more than three-quarters of consumers 77% cited a brand's sustainability and environmental responsibility as very important or moderately important in their brand selection in 2020. While green marketing can be beneficial, while green marketing messages and practices may be more expensive than traditional marketing messages and practices, it may also be profitable due to rising demand. Products made in North America, for example, tend to be more expensive than those made overseas using cheap labor, but due to local sourcing and supply chain, they have a much lower carbon footprint than goods flown in from overseas. The environmental benefit outweighs the price difference for some consumers and business owners.

Green marketing

The term "green marketing," also known as "ecological marketing" or "environmental marketing," refers more specifically to the promotion of environmentally friendly goods, services, and initiatives. Green marketing encompasses a wide range of environmentally friendly practices and strategies, some of which are as follows: Utilizing recycled-material eco-friendly product packaging to reduce the production-related emissions of greenhouse gases, using environmentally friendly business methods and marketing initiatives highlighting a product's environmental advantages. Profits can be put toward carbon offsetting or renewable energy projects.

Green marketing strategy

This apart from creating an environmentally friendly product, business owners can use other tactics to develop a business strategy that capitalizes on the benefits of green marketing. A green marketing strategy could include the following elements:

- Using eco-friendly paper and inks for print marketing materials; avoiding printed materials entirely in favor of electronic marketing.
- Adopting responsible waste disposal practices using eco-friendly or recycled materials for product packaging;
- Seeking official certifications for sustainability; and employing alternative packing and shipping methods.
- Using renewable energy and sustainable agriculture practices; and taking steps to offset carbon emissions through investment.

Review of Literature

Loan, F.A., Bisma, B. and Nahida, N. (2022), Performed a research output in the field of cyber security has shown an increasing trend during 2011-2020, and the maximum number of scholarly publications was published in 2020 (1,581), i.e. more than 715% of 2011 (221) (Loan *et al.*, 2022). A good number of countries

(93) have contributed globally to cyber security research, and the highest share in research publications was reported by the USA at 23.55%, followed by China at 23.24%, South Korea at 5.31%, the UK at 5.28% and India at 4.25%. The authorship patterns in cyber security publications show a collaborative trend, as most articles have been published by multiple authors. A Total of 5,532 (90.14%) of articles have been published in co-authorship, whereas only 605 9.86% articles have been published by single authors. Keyword analysis shows that the most common keyword research by the authors is cyber security and its variants such as cyber security and cyber-security 1,698 followed by security 782, computer security 680 and information security 329.

Draissi, Z., Zhanyong, Q. and Raguindin, P.Z.J. (2022), have made a scientometric quantitative analysis using CiteSpace (Draissi *et al.*, 2022). Specifically, this article applied basic analysis, journal co citation analysis JCA, author co citation analysis ACA and document co-citation analysis DCA, cluster analysis, citation burstness detection, scientific research cooperation analysis and co concurrence analysis of keywords of 3,125 documents from Web of Science core collections for the period 2000 to 2020. Through the document co-citation analysis and the keywords' co-occurrence, this article identifies influential scholars, documents, research institutions, journals and research hotspots in research on the skills mismatch phenomenon. The results showed that the publications had ballooned, and the phenomenon has become an interdisciplinary research subject.

Roychoudhury, S., Das, A., Panner Selvam, M. K., etc., (2022), Attempted analysis of Radiotherapy, a popular cancer management procedure, negatively impacts reproductive health, particularly by reducing the fertility potential (Roychoudhury *et al.*, 2022). The purpose of this study was to analyze the research trend in radiotherapy associated with male infertility over the past 20 years 2000-May 2021. SCOPUS database was used to retrieve relevant scientometric data (publication per year, affiliation, journals, countries, type of document and area of research) for different subgenres of radiotherapy and male infertility. A total of 275 articles were published related to radiotherapy and male infertility, with the United States being the most dominant country in research output in this field.

Mahala, A. and Singh, R. (2021), the past studies of top Indian universities in terms of total publications in the last five years 2015-2019 (Mahala *et al.*, 2021). The University of Delhi, Banaras Hindu University, Anna University Jadavpur University and Punjab University have been selected. The study identified the most prolific authors, collaborating countries, collaborating institutions and the impact of their output in terms of citations per paper and relative citation impact.

Saleem, F., Khattak, A., Ur Rehman, S., and Ashiq., M. (2021), It investigated that the most recent on green marketing was compiled using a bibliometric analysis of articles published

between 1977 and 2020 (Saleem *et al.*, 2021). The findings were then examined and presented in light of the field's growth trends, influential and productive nations, institutions, writers, papers, and research journals, patterns of keyword authorship, and international partnerships.

Bharadwaj, A.K., Garg, A., Ram, S., etc., (2020), Analyzed the term green products is used commonly to describe the products that seek to protect or enhance the environment during production, use or disposal by conserving resources and minimizing the use of toxic agents, pollution, and waste. Hence, green products offer potential benefits to the environment and human health (Bhardwaj *et al.*, 2020). Therefore, environmentally conscious consumers have shown an enhanced inclination for them. Consumer preferences, Consumer preferences, environmental activism, and stringent regulations have forced sustainability-oriented firms to shift their focus to producing green products. The present study uses bibliometric tools and various indicators to discern research progress in the field of green products over the period 1964-2019

Albort Morant., G., Henseler, J, Leal., etc., (2017), have evaluated the topic of green innovation GI has increasingly attained organizational relevance due to its contribution to the satisfaction of environmental needs while concurrently enabling companies to differentiate themselves from their competitors, and hence attain sustainable enabling competitive advantages. In this context, we conducted a detailed analysis of 618 papers on green innovation from the web of science database for the 1971-2015 period.

Objectives of the study

- To analyze the bibliometric Profile of green marketing research.
- To examine the document-wise distributions of green marketing research.
- To find out the top ten source impact and prolific author publications.
- To apply the scholar indices for measuring the contributions of three field plots of Keywords, Authors, Sources, and countries on green marketing research output.
- To know the country collaboration map of research contributions.

MATERIALS AND METHODS

The data was exported from the web of science, as plain text that included all the bibliometric information including title, abstract, authors, keywords, references, and citation data which are needed for analysis. The study was taken a period from 2006 to 2022). The following search strategy was used in the Web of Science database to retrieve the relevant data on green marketing

research output. The total number of data retrieved from 7181 publications. Biblioshiny software was used for the data analysis, visualization and mapping networks.

ANALYSES AND RESULTS

The analysis and interpretation of data are presented in the following broad categories: the main collection of the information, document types, source impact, three field plots and country collaboration map.

Main information about the collection

Table 1 the above gives descriptive results of green marketing research publications. The papers were widely spread, with 2059 individual sources represented. The majority of articles are multi-authored, with only 896 being single-authored. multi-authorship is increasingly common in sciences. The total number of articles is 7181 published and the collaboration index is 2.96.

Document types

Table 2 and Figure 1 presents the distribution of published literature according to type. The researcher's output was in the form of journal articles with 6300 followed by review 561; article proceedings paper 158, and so on. The majority of the literature appeared in scholarly journals utilizing which they disseminate their research findings.

Table 1: Bibliometric profile of green marketing research.

Description	Results
Documents	7181
Sources Journals, Books, etc.	2059
Keywords Plus	11905
Author's Keywords	17666
Period	(2006-up to 25/11/2022)
Average citations per document	42.27
Authors	18920
Author Appearances	23865
Authors of single-authored documents	896
Authors of multi-authored documents	18024
Single-authored documents	1089
Documents per Author	0.38
Authors per Document	2.63
Co-Authors per Documents	3.32
Collaboration Index	2.96

Source: Biblioshiny software.

Source Impact

Table 3 and Figure 2 presents the distribution of the top ten source impacts of green marketing research output. The top position in the journal of cleaner production with the *g*-index is 135 and the *h*-index is 86, then energy policy 99 and 62 on the *h*-index the last position in the journal index of green marketing in Environmental and Resource Economics.

Table 2: Document types-wise research output.

Document types	
Article	6300
Article; Book chapter	15
Article; Proceedings paper	158
Article; Retracted publication	1
Book review	19
Correction	3
Editorial material	59
Letter	2
Meeting abstract	31
News item	17
Reprint	3
Review	561
Review; Book chapter	12
Total	7181

Source: Biblioshiny software.

Table 3: Top 10 Prolific sources contributing to green marketing research.

Sl. No.	Source	<i>h</i> _index	<i>g</i> _index
1	Journal of cleaner production	86	135
2	Sustainability	36	54
3	Energy policy	62	99
4	Renewable and sustainable energy reviews	46	99
5	Business strategy and the environment	46	76
6	Ecological economics	35	61
7	Journal of business ethics	36	51
8	Environmental and resource economics	18	31
9	Energy economics	28	46
10	International journal of production economics	26	44

Source: Biblioshiny software.

Highly Cited Authors

Table 4 and Figure 3 illustrated prolific author’s publications and citations per paper of Green Marketing research output globally. It was a sound that was Sarkis J. The first position of the citation per paper value of 262.07 followed by the second position of the citation per paper Chen Y.S. and the value of 181.64.

Three-Field plots

The published literature on green marketing is shown in Figure 4 with an emphasis on the connections between the most popular authors, sources, and keywords. The analysis's findings revealed the top green marketing researchers, preferred publishing sources, and subfields of the field. Five sub-areas, including green marketing, China, environmental sustainability, sustainability, and sustainable development, were closely related to the top three writers, namely Dangelico RM, Sarkis JS, and Chen YS. Additionally, these authors preferred to publish in three sources, including that the international journal of production economics, sustainability, business strategy, and journal of cleaner production.

Keywords, sources and countries

Figure 5 shows the relationship among subject areas keywords sources and countries in green marketing research. The top five subject areas, sustainability, green marketing, sustainability development and renewable energy had a relationship with five sources, the Journal of cleaner production, sustainability, energy policy, renewable and sustainable energy reviews, business strategies and the environment. Furthermore, these subject areas had a strong relationship with the top two most productive countries USA and China.

Country Collaboration Map of Green marketing research output

Figure 6 shows the county collaboration map on green marketing literature. From China to USA collaboration with 142 frequency and followed by china from Australia collaboration with 57 frequency. There are several collaboration was found the country collaboration map.

DISCUSSION

It is observed that the papers were widely spread, with 2059 individual sources represented. The majority of articles are multi-authored, with only 896 being single-authored and multi-authorship is increasingly common in Sciences. The total number of articles is 7181 published and the collaboration index is 2.96.

It is identify that the distribution of published literature according to type. The researcher’s output was in the form of journal articles with 6300 followed by review 561; article proceedings paper 158,

and so on. The majority of the literature appeared in scholarly journals utilizing which they disseminate their research findings.

It presents the distribution of the top ten source impacts of green marketing research output. The top position in the journal of cleaner production with the *g*-index is 135 and the *h*-index is 86, then energy policy 99 and 62 on the *h*-index the last position

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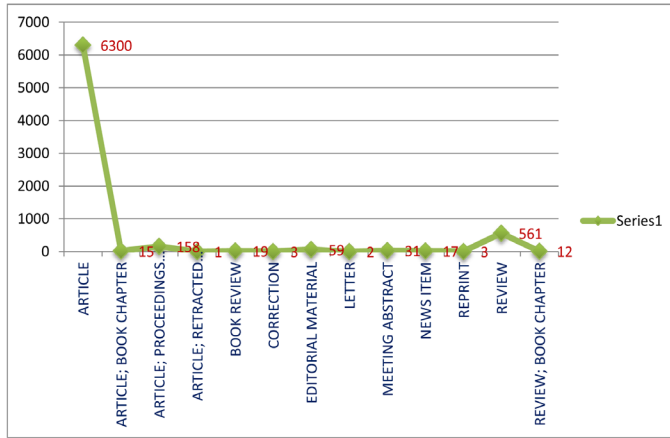


Figure 1: Document types wise research output.



Figure 3: Top 10 Prolific Authors research publication of green marketing.

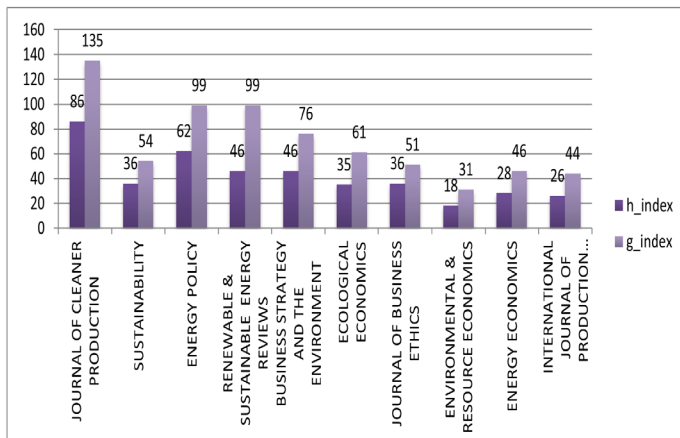


Figure 2: Top 10 source impact of green marketing research output.

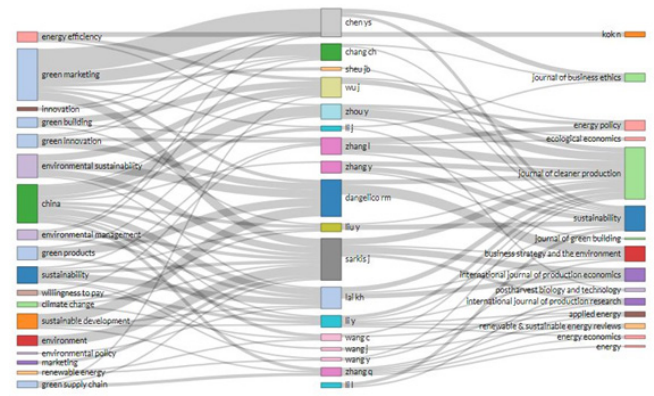


Figure 4: Relationship between authors, sources, and keywords based on a three-field plot.

Table 4: Top 10 Prolific Author's research publication on green marketing.

Sl. No.	Prolific Author	No. of Publications	Total Citations	Citation per paper
1	Wang J.	20	991	159.36
2	Zhang L.	19	863	126.96
3	Liu Y.	16	335	55.9
4	Sarkis J.	15	2764	262.07
5	Li Y.	13	346	56.35
6	Wu J.	13	544	90.58
7	Zhang Y.	13	921	142.66
8	Zhang Q.	12	344	78.67
9	Zhou Y.	12	462	78.35
10	Chen Y.S.	11	1855	181.64

Source: Biblioshiny software.

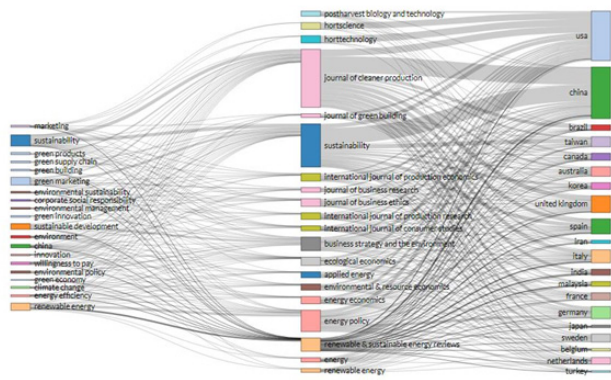


Figure 5: Three field plots of the relationship among keywords Source and Countries.

Country Collaboration Map



Figure 6:Country collaboration Maps.

per paper the value 262.07 followed by the second position of the citation per paper Chen Y.S. and the value of 181.64.

It was observed that the published literature on green marketing focuses on the relationship among top keywords, authors, and sources. The results of the analysis identified the top authors in green marketing, preferred sources for publications, and sub-areas of green marketing. The top three authors, i.e., Dangelico RM., Sarkis J. Chen YS. And five sub-areas, i.e., green marketing, China, environmental sustainability, sustainability and sustainable development had a strong relationship with green marketing itself. Furthermore, these authors preferred to publish in three sources, i.e., the Journal of Cleaner Production, sustainability, Business Strategy and the Environment, and the International Journal of Production Economics.

It is identifying the relationship among subject areas keywords, sources, and countries on green marketing research. The top five subject areas, sustainability, green marketing, sustainability development and renewable energy had a relationship with five sources, Journal of Cleaner Production Sustainability, energy policy, renewable and sustainable energy reviews, business strategies and the environment. Furthermore, these subject

areas had a strong relationship with the top two most productive countries USA and China.

The country collaboration map on green marketing literature. From China to USA collaboration with 142 frequency and followed by China from Australia collaboration with 57 frequency. There are several collaboration was found in the country collaboration map.

CONCLUSION

The present study evaluated the growth of green marketing literature output with a scientometric approach published from 2006 to 2022 and indexed in the Web of science multidisciplinary online database. The author conducted the study comprehensively to recognize the primary information about the collection. Document types, source impact factor, and author's productivity, and journal productivity, county collaboration map, research output. It was predicted that the number of scientific publications related to green marketing research still multiply in the future. The current research was confined to the publications included under the Web of Science database. Further research can be carried out using other bibliographic databases like the Web of Science or Google Scholar. In addition, a comparative study of research output by various databases can be carried out to encourage signing more MoUs with leading research institutions and universities to support collaborative research. The research institutions motivate the researchers to publish more by providing incentives and awards training the young researchers in research methodology, and preparing papers for publication in journals.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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