

A BIBLIOMETRIC STUDY OF SUSTAINABILITY AND ECO-FRIENDLY PRODUCTS' DEVELOPMENT, PRESENT STATUS, AND FUTURE.

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Abstract

Eco conscious goods are necessary for a green future. There is a lack of knowledge about consumer intention towards sustainable goods. The research gaps impedes translation of availability of eco friendly goods into actual consumer. The study examines the corpus of research on green products and consumer attitudes toward them using bibliometric analysis. I created tables using R Studio and performed a globalization of the topic mapping using VosViewer. The result shows that available literature defined in four parts ; In the first section, Most locally cited scientific studies about environmentally friendly products. In the second section, The frequency of journals having the most papers on environmentally friendly items. In the third section, Authors offering more articles on environmentally friendly goods. The fourth section depicts the nature of collaboration that is evident in the publications of green products..By delving into these intricacies, the research aims to contribute valuable insights to marketers, retailers, and policymakers navigating the ever-evolving landscape of consumer preferences and sustainability in the realm of personal care products. Join me on this intellectual journey into the minds of modern consumers as we unravel the threads connecting green intentions, retail dynamics, and online influences.

keywords: Sustainability; environment sustainability; green products; consumer; intention; behavior; bibliometric

1. Introduction

Global spending has increased significantly as economies and enterprises grew and evolved (Perez-Castillo, D.; Vera-Martinez, J. 2021). There is enormous concern about the harmful consequences that this occurrence has had on the environment (Sun, Y.; Li, T.; Wang, S. 2021). In this setting, the value of environmentally friendly products becomes clear because they fulfill the same functions as traditional objects while lowering their environmental impact (Michaud, C.; Llerena, D. 2011). During the last few decades, several studies on environmentally friendly products have been conducted to lessen the effects on the environment of consumption and contribute to developing a sustainable community (Witek, L.; Kuźniar, W. 2020). A more contemporary definition of the word "green product" is items that employ recycled materials, generate environmental advantages, or prevent hazardous environmental harm while they are in use (Lakatos, E.-S.; Nan, L.-M.; Bacali, L.; Ciobanu, G.; Ciobanu, A.-M.; Cioca, L.-I. 2021). It is essential to comprehend the topic of environmentally friendly product consumption study because it has been estimated that unsustainable consumer decisions generate around 30% of environmental problems (Arruda Filho, E.J.M.; Cardoso, B.L.; Barboza, M.N.L. 2017). Businesses are becoming more depending on environmentally friendly product research to help them in modifying their products and procedures to be most sustainable in reply to growing demand for these items.

The ongoing degradation of the environment has brought attention to the need to conserve it, which has led to ethical consumption defined as "green consumerism" (Moisander, 2007). The notion of green consumption is paying more and more attention among academicians as well as practitioners. It has also changed consumers' inclinations, attitudes, and behavioral intentions towards environmentally friendly products. (Kim and Chung, 2011). Furthermore, they demonstrate strong awareness and desire not only for green-labeled products. However, this also applies to businesses and marketers who promote and advertise environmentally friendly goods. Green intake, an extension of 'ethical consumerism' (Carrington et al., 2010), has rapidly expanded in advanced nations while acquiring a solid footing in developing countries such as India.

Keeping this in mind, we seek to address the vacuum in the study by presenting a comprehensive overview of the scientific literature on green product use. We outline the known research, highlighting gaps and prospective research topics. While there are numerous quantitative approaches for Learning about literature that can describe contemporary patterns, routes, and the status of creativity, bibliometric evaluation was chosen as greatest fit for current attempt due to diverse varieties of feasible environmentally friendly goods. Because bibliometric is not necessarily equal empirical findings with identical units and more research can be evaluated simultaneously. The approach taken in this study is distinctive by its emphasis on quantifiable assessment of article properties (e.g., publications, keywords, citations and so on).

Our next section covers the technique employed in inquiry which is followed by an explanation and analysis of the findings. Because this literature had wide scope and produced numerous outcomes, the results sections separated into the four primary categories. The first section provides the Most locally cited scientific studies about environmentally friendly products. Section two focuses on the frequency of journals having the most papers on environmentally friendly items. In the third section, Authors with more articles on environmentally friendly products. The fourth segment investigates the nature of collaboration that is evident in the publications of green products. Finally, the paper offers broad findings and suggestions for additional study. Despite the rising quantity of investigation into the subject, no studies have sought to describe the existing environment, validate patterns over time, and identify gaps that require additional investigation. The subject of using environmentally friendly products is very timely, so sustainability worries develop daily, and people all around the world become more aware of how the environment is deteriorating.

2. Materials and Methods

Bibliometric assessment is a widely used research technique utilized in a variety of topic areas. The creation of databases has made this feasible and technology that makes it possible to use this quantitative assessment technique. This approach requires a lot of processing power, especially for data extraction, statistical evaluation, and computations, in order to identify trends in certain field of research (Donthu, N.; Kumar, S.; 2021).

As a first stage in bibliometric analysis, the scope and quantity of research to be studied must be identified correctly. Otherwise, the results would be inadequate irreproducible, and may contradict the study's primary purpose. As a result, it is necessary to carefully choose the keywords and databases for gathering of data.

Various databases can be used to collect data for analysis. Scopus was chosen as the database for this since it is thorough and extensively used in bibliometric assessments of environmentally friendly topics.

We took into consideration the significance of looking for four indications when gathering data. ("Green personal care products" OR "Environment-friendly products" OR "Eco-friendly products" OR "Sustainability"). Then I used filters, In the Year I chose "2012-2024". In the subject area, I choose "social sciences". My document type will be "Articles and conference papers". I used "English" as a language and "India" as a country. I choose "journal" as a source type. My keywords were "sustainability and environment sustainability." Access Type -"Open Access". I found 445 databases after that.

This article employed Scopus to compile the literature datasets. however , Scopus is among the most extensive and well-standardized literature databases available for data export. Consequently, instead of using, say, Web of Science, which would have greatly expanded our datasets, we opted for the more comprehensive but smaller database. From

2012 to 2024, we gathered scholarly journal articles and reviews written in English from the Scopus database. We regretfully choose to exclude important worldwide scientific contributions written in languages other than English, such as Spanish or French, by only including reviews and articles written in English. Since 2024 was the final year of publication, we decided to use 2012 as the beginning date. The longitudinal scale of the data sample enables us to explore the evolution of concepts used in green products. The title, abstract, and keywords of a bibliographic work provide an overview of the study and serve as the key academic details from a published work. Consequently, we presume that the phrase is a major conceptual emphasis of the underlying work when it appears in these bibliographic sites. Because of this, any scientific papers written in English that use the bibliographic locations (title, abstract, keywords) in Scopus are included in our selection of the literature on green products. After this filtering procedure, we were left with a database of 446 articles that included the reference pairings and the complete datasets for green products.

3. Results and Discussions

3.1 Table 1. Most locally cited scientific studies about environmentally friendly products.

Document	DOI	Year	Local Citations	Global Citations	LC/GC Ratio (%)	Normalized Local Citations	Normalized Global Citations
SINGH S, 2022, SUSTAINABILITY	10.3390/su142114508	2022	3	1	300.00	14.45	0.09
SINGH R, 2022, SUSTAINABILITY	10.3390/su142114163	2022	3	1	300.00	14.45	0.09
PRAJAPATI D, 2022, SUSTAINABILITY	10.3390/su14095066	2022	3	18	16.67	14.45	1.61
PRAJAPATI D, 2022, SUSTAINABILITY-a	10.3390/su14148698	2022	3	7	42.86	14.45	0.62
PATEL A, 2023, WATER	10.3390/wl5223891	2023	2	1	200.00	55.60	0.29
JOSHI S, 2022, SUSTAINABILITY	10.3390/su142416726	2022	2	5	40.00	9.64	0.45
YAZDANI M, 2019, SUSTAINABILITY	10.3390/su11133704	2019	2	8	25.00	6.33	0.33
ADNAN RM, 2021, SUSTAINABILITY	10.3390/su13115877	2021	2	29	6.90	21.25	1.72
KUMAR A, 2020, BUS STRATEGY ENVIRON	10.1002/bs e.2470	2020	2	83	2.41	21.33	3.11
CHANDEL RS, 2023, SUSTAINABILITY	10.3390/su151411473	2023	1	0		27.80	0.00

The table presents a comprehensive overview of various documents, including their titles or authors, Digital Object Identifiers (DOIs), publication years, and citation statistics. Each entry in the "Local Citations" represents the number of citations obtained by the relevant work from sources within its geographic or local context, whereas the "Global Citations" column represents citations received from sources around the world. The "LC/GC Ratio (%)" shows the proportion of local citations against global citations, with a larger ratio indicating a more localized impact and a lower ratio indicating broader international recognition. Normalized local and global citations provide standardized measurements that account for aspects such as document age and discipline citation methods, allowing for fair comparisons between documents or fields. These citation metrics enable researchers to assess the effect and reach of each paper, as well as discover trends and patterns among both local and global research communities.

When studying the publications published by Singh S and Singh R in 2022, it is clear that, despite having an LC/GC ratio of 300%, their overall citations are quite low. This implies a limited impact in both local and global contexts. In contrast, Prajapati D's documents from the same year had a considerable impact, as demonstrated by a large number of global citations. This balanced LC/GC ratio demonstrates acknowledgment locally as well as globally, demonstrating their importance in the realm of sustainability. Moving on to Patel A's document in 2023, the significant difference in local and worldwide citations shows a substantial effect within a given location or field, maybe addressing concerns of specific significance to a localized group. Furthermore, Chandel RS's document from the same year excludes global citations, yielding an undetermined LC/GC ratio. However, the document's highly normalized local citations suggest a possible local impact, showing recognition within a certain geographic or disciplinary community. To summarize, analyzing the citation patterns and normalized statistics enables a detailed analysis of each document's significance in both local and global contexts.

3.2 Table 2. The frequency of journals having the most papers on environmentally friendly items.

Sources	Articles
SUSTAINABILITY (SWITZERLAND)	221
BUSINESS STRATEGY AND THE ENVIRONMENT	21
WATER (SWITZERLAND)	19
ENVIRONMENT, DEVELOPMENT AND SUSTAINABILITY	11
INTERNATIONAL JOURNAL OF SUSTAINABLE DEVELOPMENT AND PLANNING	8
GEOJOURNAL OF TOURISM AND GEOSITES	7
PROBLEMY EKOROZWOJU	5
CLEANER AND RESPONSIBLE CONSUMPTION	4
ECOLOGICAL QUESTIONS	4
GROUNDWATER FOR SUSTAINABLE DEVELOPMENT	4

The data offered provides useful insights into how publications are distributed throughout various journals in the field of sustainability and environmental studies. At the forefront, the journal Sustainability (Switzerland) appears as a major source with 221 articles, demonstrating its critical position as a leading publication venue in the subject. Business Strategy with the Environment follows suit, with 21 papers highlighting its importance as a platform for study on the linkage of business strategies with environmental factors. Water (Switzerland) also attracts attention with 19 papers, making a significant contribution to research on water-related issues such as governance and sustainability. Other publications, such as Environment, Development, and Sustainability, International Journal of Sustainable Development and Planning, and Geo Journal of tourist and Geosites, offer outlets for research into sustainable development, urban planning, and tourist sustainability, respectively. Furthermore, journals such as Problemy Ekorozwoju, Cleaner and Responsible Consumption, Ecological Questions, and Groundwater for Sustainable Development focus on specific environmental niches, covering everything from Polish environmental issues to responsible consumption practices and groundwater management. Together, these periodicals enrich the scholarly conversation on sustainability and environmental difficulties by providing varied perspectives and answers to important global issues.

3.3 Table 3. Authors offering more articles on environmentally friendly goods

Authors	Articles	Articles Fractionalized
KUMAR A	13	2.03
SINGH R	11	1.62
KUMAR R	10	1.43
SINGH SK	9	1.55
KUMAR S	8	1.59
SINGH S	8	1.11
CAVALLARO F	7	1.31
LUTHRA S	7	1.38
SHARMA S	7	1.19
KUMAR P	6	0.81

The data sheds light on the publication habits of writers who contribute to research on environmentally friendly goods. Among the listed authors, Kumar A is the most productive, having published 13 publications and a relatively high fractionalized score of 2.03, signifying considerable collaboration on their research. Singh R follows closely after, with 11 papers and a fractionalized score of 1.62, indicating a significant but slightly less collaborative strategy. Kumar R and Singh SK both have impressive publishing records, with 10 and 9 publications, respectively, with fractionalized scores showing moderate degrees of collaboration. Kumar S and Singh S, both with eight papers, exhibit comparable trends in moderate collaboration, but with minor changes in fractionalized values. Further down the list, authors like Cavallaro F, Luthra S, and Sharma S have each authored seven publications, with fractionalized numbers indicating a moderate level of collaboration. Finally, Kumar P stands out with the fewest articles, totaling 6, and the lowest

lack of worldwide citations, indicates possible local influence due to its high normalized local citations. Collectively, these findings underscore the necessity of taking into account the most locally referenced scientific articles about environmentally friendly items when assessing the breadth and relevance of academic contributions. Citation metrics give quantitative measures, but they must be supplemented with qualitative judgments to gain a more nuanced view of study effect.

A rich landscape of scholarly engagement and inquiry is revealed in the second section, which analyzes the distribution of articles across various journals in the sustainability and environmental studies domain. Sustainability (Switzerland) stands out as a key publication venue, reflecting its crucial role in disseminating research within the field, while journals like Business Strategy and the Environment and Water (Switzerland) emphasise the interdisciplinary nature of environmental studies by examining the connections between sustainability and water-related issues, as well as between business strategies and environmental concerns. Additionally, a variety of specialty journals address particular aspects of sustainability, urban planning, and tourist sustainability, such as Environment, Development, and Sustainability, International Journal of Sustainable Development and Planning, and GeoJournal of tourist and Geosites, respectively. Furthermore, specialized magazines such as Ecological Questions, Cleaner and Responsible Consumption, Problemy Ekorożwoju, and Groundwater for Sustainable Development provide focused insights into certain environmental issues and solutions. When taken as a whole, these journals support a thorough and nuanced academic conversation on environmental and sustainability challenges, offering a range of viewpoints and practical answers to urgent global crises in an interdisciplinary and cooperative way.

The data in the third section provide a thorough summary of the dynamics of author collaboration and publishing trends in the field of green product research. The fractionalized value shows that Kumar A is the most prolific author, with a high number of publications and a notable degree of collaboration. This emphasizes how crucial collaboration and teamwork are to expanding our understanding of this field. Singh R comes in second, having a strong publishing history and a little lower degree of teamwork. Significant contributions are also made by Kumar R. and Singh SK, indicating a moderate degree of cooperation in their scientific activities. Furthermore, with differing levels of cooperation, writers like Kumar S, Singh S, Cavallaro F, Luthra S, and Sharma S demonstrate continuous involvement in the topic. It is noteworthy that Kumar P has a lower fractionalized score and fewer publications, indicating a preference for autonomous work. All things considered, the data emphasizes the collaborative character of research on eco-friendly items, highlighting variety of authors' contributions and significance of teamwork in promoting sustainable solutions and tackling environmental issues.

The fourth section of results displays the results of the VosViewer software's assessment of the submitted data's abstracts, titles, and keywords. This graphic shows a network depiction of the terms' interactions. Each phrase was examined using the software, which also calculated the linkages, occurrences, and overall link strengths. The bubble's size represents the frequency of occurrences, and it is evident from the image that compared to the others, the top four phrases were far more expressive. The most frequently occurring term was "sustainability." The phrase "India" was the second most common. "sustainable development" was the third term with the highest frequency. The phrase "sustainable development goal" was the fourth. The degree to which academics, organizations, and institutions collaborate to produce scholarly articles and research findings about ecologically sustainable products is referred to as the nature of collaboration evident in the publications of green products. Using co-occurrence, I discovered 12 clusters and 407 entries. Therefore, a significant limitation of the current body of literature is the omission of the acquisition as the ultimate dependent parameter, which is also suggested by our results. Research is particularly interested in this last element as a potential roadblock to a successful purchase, even though alternatives' accessibility, affordability, and ease of use are also significant factors. To balance the literature, we advise more research in this area. Particular quantitative study offers a wealth of opportunities for translating well-meaning aspirations into a practical consumption pattern that addresses particular environmental impacts.

Finally, several significant managerial implications can be discovered as a consequence of the thorough assessment of the scientific literature. In recent times, there has been a surge in the demand for eco-friendly items. Businesses that comprehend and endorse sustainable development and acquire a competitive edge. If a business wants to preserve its brand and image, consumers must believe that it is doing it responsibly. In addition to providing greener products, companies can highlight their dedication to social responsibility and capitalize on the favorable image. Companies may benefit from higher margins, be less susceptible to rival marketing tactics, and have more opportunities for brand extension when they establish a strong brand. A smart company can meet customer expectations more profitably by viewing environmental challenges as potential possibilities for new ventures rather than as threats. Businesses should put their expansion first by bringing in fresh concepts for eco-friendly products, which will educate customers about this subject. By delving into these intricacies, the research aims to contribute valuable insights to marketers, retailers, and policymakers navigating the ever-evolving landscape of consumer preferences and sustainability in the realm of personal care products. Join me on this intellectual journey into the minds of modern consumers as we unravel the threads connecting green intentions, retail dynamics, and online influences.

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