



A Bibliometric Analysis Of The Evolution, Current Position, And Future Of Environmentally Friendly Goods And Sustainability

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Citation: Divya Goel et.al (2024). A Bibliometric Analysis Of The Evolution, Current Position, And Future Of Environmentally Friendly Goods And Sustainability, *Educational Administration: Theory and Practice*, 30(1), 6153-6159

Doi: 10.53555/kuey.v30i1.9564

ARTICLE INFO

ABSTRACT

Environmentally friendly products are essential to a sustainable future. The translation of green product availability into real consumer and market acceptance is hampered by a lack of a comprehensive understanding of customer intentions toward green products, as well as research gaps. The paper uses bibliometric analysis to examine the body of research on green products and how customers relate to them. 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 with highest publications related to environmentally friendly products. In the third section, Authors with more articles on green products. 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

The ongoing deterioration of the natural environment has elevated the issue of environmental protection, contributing to ethical consumption commonly referred to as green consumerism (Moisander, 2007). The concept of green consumption is gaining increasing attention among academicians as well as practitioners. It has also transformed consumers' preferences, attitudes, and behavioral intentions towards green products. (Kim and Chung, 2011). Besides, they are exhibiting marked awareness and preference not only for green-labeled products but also for stores and marketers that promote and advertise green products. Green consumption, an outgrowth of 'ethical consumption' (Carrington et al., 2010), has rapidly expanded in advanced nations while acquiring a solid footing in developing nations such as India.

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). In recent decades, several studies on green products have been conducted to lessen the environmental impact of consumption and contribute to a sustainable society (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 damage during their

useful life (Lakatos, E.-S.; Nan, L.-M.; Bacali, L.; Ciobanu, G.; Ciobanu, A.-M.; Cioca, L.-I. 2021). It is critical to understand the topic of green 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). Companies are increasingly depending on green product research to assist them modify their products and processes to be more sustainable in response to growing demand for such items.

With this in mind, we seek to address the vacuum in the literature 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 studying literature that can describe current trends, routes, and the status of creativity, bibliometric analysis was chosen as the greatest fit for the current attempt due to the diverse range of feasible green goods. Because bibliometric does not require equal empirical results with identical units, a larger number of studies 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 this inquiry, followed by an explanation and discussion of the results. Because this study had wider scope and produced a large number of results, the results section was separated into 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 with highest publications related to environmentally friendly products. In the third section, Authors with more articles on green products. The fourth segment investigates the nature of collaboration that is evident in the publications of green products. Finally, the article presents general conclusions and recommendations for future research. Despite the rising quantity of research on the topic, no studies have sought to describe the existing environment, validate patterns over time, and identify gaps that require additional investigation. The topic of green product consumption is very timely, since sustainability worries develop daily, and people all around the world become more aware of how the environment is deteriorating.

2. Materials and Methods

Bibliometric analysis is a popular research tool utilized in a variety of topic areas. This is made possible by the development of databases and technology that enable the application of this quantitative evaluation method. This method takes extensive use of computational resources, especially for data extraction, statistical analysis, and computations, in order to identify trends in a 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 data collection.

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

In the search for data, we considered the need to search for four indicators ("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 regrettably 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/w15223891	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	10.1002/bse.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" column denotes the number of citations that the respective document received from sources within its local or regional context, while the "Global Citations" column indicates the citations originating from worldwide sources. The "LC/GC Ratio (%)" provides insight into the proportion of local citations compared to global ones, with a higher ratio suggesting a more localized impact and a lower ratio indicating broader international recognition. Normalized local and global citations offer standardized measures, accounting for factors like document age and disciplinary citation practices, thus enabling fair comparisons across different documents or fields. These citation metrics collectively allow researchers to evaluate the influence and reach of each document, discerning trends and patterns within both local and global research communities and identifying areas of significant impact or influence.

When analyzing the documents authored by Singh S and Singh R in 2022, it becomes apparent that despite their high LC/GC ratio of 300%, their overall citations remain relatively low. This suggests limited impact within both local and global contexts. In contrast, Prajapati D's documents from the same year showcase a notable impact, evidenced by a significant number of global citations. This balanced LC/GC ratio indicates recognition both locally and internationally, emphasizing their significance in the field of sustainability. Moving to Patel A's document in 2023, the remarkable disparity between local and global citations suggests a strong influence within a specific region or field, potentially addressing issues of particular relevance to a localized community. Meanwhile, Chandel RS's document in the same year lacks global citations, resulting in an undefined LC/GC ratio. However, the document's highly normalized local citations hint at potential local impact, indicating recognition within a specific geographic or disciplinary community. In summary, understanding the citation patterns and normalized metrics allows for a thorough examination of the relative influence of each document within its local and global contexts.

3.2 Table 2. the Frequency of journals with highest publications related to environmentally friendly products.

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

This section discusses the findings of utilizing the VosViewer software to analyze the abstracts, titles, and keywords of all of the stated data.

In the network visualization, items are represented by their label and, by default, a circle. An item's weight determines the size of its label and circle. The label and circle of an item increase in size as its weight increases. For some things, the label may not appear. This is done to prevent overlapping labels. The item's color is defined by the cluster to which it belongs. The distance between two journals in the image approximates their relatedness in terms of co-citation relationships. In general, the closer two journals are to each other, the greater their relationship.

The nature of collaboration evident in the publications of green products refers to the extent and manner in which researchers, institutions, and organizations work together to produce scholarly articles and research findings related to environmentally sustainable products. I used co-occurrence and minimum number of occurrence of a keyword is 3. Then out of 3347 keywords, 407 meets the threshold. For each of 407 keywords, the total strength of the co-occurrence links with other keywords calculated and 12 clusters found. This figure shows a network depiction of term interaction. The software was used to examine each term, calculating the links, overall link strengths, and occurrences. The size of the bubble shows the number of occurrences; the top four terms were noticeably more expressive than the others. The most frequently-used term was "sustainability". The second most frequently used term was "India". The third most frequently used term was "sustainable development". The fourth word was "sustainable development goal".

4. Conclusions and Limitations

In this study, we employed bibliometric analysis to offer a thorough summary of research on the use of green products. This strategy was found to be the most suitable for the research proposal because of the vast array of potential green products. The results section was further split into four pieces due to the study's broad scope. The findings from each of the four results subsections are presented sequentially here, followed by an explanation of the study's limitations, potential future research directions, and managerial implications.

In the first section, the analysis of citation patterns and normalized metrics offers valuable insights into the impact and influence of various documents within their respective local and global contexts. While some documents, such as those authored by Singh S and Singh R in 2022, exhibit high LC/GC ratios, their overall citation counts suggest a limited impact on both local and global scales. Conversely, Prajapati D's documents from the same year demonstrate a balanced LC/GC ratio and significant global citations, underscoring their recognition in the field of sustainability both locally and internationally. Patel A's document in 2023 reveals a notable regional or field-specific influence, indicated by the pronounced disparity between local and global citations. Meanwhile, Chandel RS's document in the same year, despite lacking global citations, suggests potential local impact based on its high normalized local citations. Collectively, these findings emphasize the importance of considering most locally cited scientific studies about environmentally friendly products which assess the reach and significance of scholarly contributions. While citation metrics provide quantitative measures, it's essential to complement them with qualitative assessments for a nuanced understanding of research impact.

In the second section, the analysis of article distribution across various journals in the sustainability and environmental studies domain reveals a rich landscape of scholarly engagement and inquiry. Sustainability (Switzerland) emerges as a cornerstone publication venue, reflecting its pivotal role in disseminating research within the field. This is complemented by journals such as Business Strategy and the Environment and Water (Switzerland), which underscore the interdisciplinary nature of environmental studies by exploring the intersections between business strategies and environmental concerns, as well as water-related issues and sustainability. Moreover, a range of specialized journals like Environment, Development, and Sustainability, International Journal of Sustainable Development and Planning, and GeoJournal of Tourism and Geosites cater to specific facets of sustainability, urban planning, and tourism sustainability, respectively. Additionally, niche-focused journals like Problemy Ekorozwoju, Cleaner and Responsible Consumption, Ecological Questions, and Groundwater for Sustainable Development offer targeted insights into specific environmental challenges and solutions. Collectively, these journals contribute to a nuanced and comprehensive scholarly discourse on sustainability and environmental issues, providing diverse perspectives and actionable solutions to address pressing global concerns in a collaborative and interdisciplinary manner.

In the third section, the data provides a comprehensive overview of the publication patterns and collaboration dynamics among authors in the field of research on green products. Kumar A emerges as the most prolific author, demonstrating both a high publication count and a significant level of collaboration, as indicated by the fractionalized value. This underscores the importance of teamwork and partnership in advancing knowledge in this domain. Singh R follows closely, showcasing a substantial publication record with a slightly lower level of collaboration. Kumar R. and Singh SK also contribute significantly, reflecting a moderate level of collaboration in their research endeavors. Additionally, authors such as Kumar S, Singh S, Cavallaro F, Luthra S, and Sharma S exhibit consistent engagement in the field, with varying degrees of collaboration. Interestingly, Kumar P stands out with fewer publications and a lower fractionalized value, suggesting a preference for independent work. Overall, the data highlights the collaborative nature of research on environmentally friendly products, emphasizing the diverse contributions of authors and the

importance of cooperative efforts in advancing sustainable solutions and addressing environmental challenges.

In fourth section of results, This section presents the findings from the VosViewer software's examination of the provided data's abstracts, titles, and keywords. This graphic shows a network depiction of the terms' interactions. The software was used to examine each term and compute the links, overall link strengths, and occurrences. The bubble's size represents the frequency of occurrences, and it is evident from the image that the top four terms were far more expressive than the rest. 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 existing literature is the omission of the purchase as the ultimate dependent variable, 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 stand to gain 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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