



Green awareness and green product: A direction for sustainable consumption

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ABSTRACT

Various parties are trying to prevent and overcome this problem in various ways. People are beginning to receive news, invites, education, and ads to raise their awareness of environmental sustainability. Consumers are becoming more conscious of the damaging effects that their purchases have on the environment. With green awareness increasing among consumers, they take steps to support the sustainability of the environment, one way is to use environmentally friendly products or green products. This study aims to find out how trends in research on how green awareness encourage consumer interest in buying and using green products. Descriptive bibliometric analysis is the research methodology employed. The Scopus database was utilized by researchers to locate data. Through four refinement procedures (identification, screening, eligibility assessment, and inclusion), 102 publishing data were acquired. The VOS Viewer tool will be used to examine the data. Compared to previous years, 2022 has published the most articles (28 publications). Citation trends related to green awareness and green products occurred in 2016 with 456 citations. China is the most influential nation in this field, with 29 publications and 14 connections to international collaboration. Research on Green Products and Green Awareness is centered on 1) consumption, green consumption, and manufacturer; 2) green purchase behavior, green purchase, and environmental knowledge; 3) policy maker, TPB, and perception.

KEYWORDS: awareness; green awareness; green product

1. Introduction

Sustainability and environmental degradation are two topics that many people in different nations and even the world are concerned about (Tan et al., 2019; Ogiemwonyi and Harun, 2020). In the 21st century, more and more environmental problems have emerged (Candrianto et al., 2023; Sana, 2020). Numerous environmental issues, including pollution and global warming (Bayu et al., 2022) by various types of waste, air pollution, water pollution, and rising sea levels are problems that must be faced by the world community today (Jain et al., 2023). These environmental problems make the topic of sustainable development an important topic not only for academics but also for producers (Zhang et al., 2020).

Degradation of the environment is intimately linked to human activity, both through production and consumption activities that cause various impacts. One of them is unsustainable consumption behavior. Our current issues with resource depletion, contaminant of the environment, and climate change are largely the result of unsustainable consuming habits (Ahamad and Ariffin, 2018). The global community's environmental issues demand that people be able to make sustainable judgments (Jain et al., 2023).

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Agenda 21, a program initiated by the United Nations (UN) to address environmental and development issues around the world, brought forth the idea of sustainable production and consumption for the first time. This activity called for action, the promotion of consumer habits that reduce environmental harm, and efforts to meet humankind's basic needs. This activity also discussed efforts to create national strategies and policies to alter unsustainable consumption patterns (Ahamad and Ariffin, 2018).

Sustainable consumption is not easy to define as there are many definitions and concepts expressed by researchers and organizations. In general, sustainable consumption is the utilization of products and services to satisfy fundamental human needs and improve quality of life while reducing the use of natural resources, hazardous materials, waste, and pollution emissions in order to protect the necessities for the next generation (Ahamad and Ariffin, 2018). The commitment to preserve the environment has changed the way of consumption to a sustainable way of consumption as a form of contribution to mitigate the threats to the environment. To accomplish the Sustainable Development Goals, or SDGs, green consumerism is essential in the modern world in order to generate ecologically friendly products and encourage sustainable practices (Ogiemwonyi and Jan, 2023).

Along with the increasing environmental problems, people's knowledge and awareness to protect the environment are also increasing (Andika et al., 2023; Ali et al., 2023). Individuals are becoming more aware of this as customers, they have a responsibility to the environment (M. F. da Costa et al., 2020; Ricci et al., 2018). People are now increasingly aware that their consumption activities can cause environmental damage (White et al., 2019). This awareness of environmental damage motivates them to carry out consumption activities that pay more attention to environmental impacts by using environmentally friendly products (Tan et al., 2019). People's awareness of living a healthy lifestyle also motivates them to become consumers who care about the environment in addition to the environment by choosing environmentally friendly products or products made from natural ingredients (Wayan et al., 2023).

More consumers today are becoming more sensitive to the impacts of their consumption activities so that People are increasingly concerned about the environment (White et al., 2019; Tan et al., 2019). Nowadays, a growing number of customers are eager to adopt more ecologically responsible consuming practices (Mahmoud et al., 2022). People who care about the environment have positive behavior toward the environment. They make more efforts to minimize environmental exploitation and strive to contribute to environmental sustainability. They will make wiser choices such as selecting green products (Candrianto et al., 2023).

Being aware of the environment is crucial in human behavior and habits where environmental awareness characterizes a person's capacity to comprehend the connection between human activity and environmental quality as well as his preparedness to participate actively in environmental efforts (Mahmoud et al., 2022). Green awareness when viewed from consumer behavior is a behavior related to the application of eco-friendly goods. Green Awareness is related to consumer knowledge about how a product reacts to the environment (Alamsyah et al., 2020). Consumers who have green awareness can be interpreted as consumers who reduce conventional consumption and replace it with the behavior of consuming environmentally friendly goods (Ricci et al., 2018) so that they not only have a positive impact on themselves but also their environment (Alamsyah et al., 2018).

Amid the rise of environmental issues, green products, also referred to as ecologically friendly items, are available as a form of effort in addressing these environmental issues where consumers begin to consume green products as well as producers who begin to produce them (Ogiemwonyi and Jan, 2023). Given that these green products have been demonstrated to have less adverse impacts (Maniatis, 2016a) than other traditional goods, buying environmentally friendly goods is one method to support environmentally conscious growth (Kerber et al., 2023).

Green products are those that come from environmentally safe production procedures and have little negative effects on the environment when used responsibly. Green products

are generally used to define goods that, through resource conservation, waste reduction, and pollution minimization, aim to preserve and protect the environment during the production process (Sana, 2020). Green products are products that use natural materials, resulting in less waste and less impact on the environment (Policarpo and Aguiar, 2020). From the production process to the distribution process to consumers, green products or environmentally friendly products pay attention to aspects of environmental sustainability (Wayan Ekawati et al., 2019).

The rise in the manufacturing of products that are friendly to the environment (green products) is of course based on a concern for the environment (green awareness) both on the part of the company and from the consumer side (Candrianto et al., 2023). Apart from consumers, various parties such as researchers, governments and companies have made efforts to reduce the negative impact of a production process, one of which is by designing environmentally friendly products or green products (C. S. R. Costa et al., 2021).

Consumers are now starting to switch to using environmentally friendly products and even invite their relatives to do the same. Their awareness of environmental impacts drives their behavior toward purchasing green products (Alamsyah et al., 2020). The use of green products items has effects on the economy in addition to the environment such as better economic growth and development, better security, healthy lifestyles, fair distribution of resources, increased employment, and social responsibility. Quality of life also improves due to reduced environmental problems (Maniatis, 2016a).

Green awareness consumers have will affect their behavior in a variety of ways, including through alterations in lifestyle, a rise in the desire for ecologically friendly items, and an increased awareness of environmental degradation (Lestari et al., 2021). As previously stated by (Bayu et al., 2022) and (Ricci et al., 2018), green awareness affects the intention and use of goods with eco-labels or green products. Green products are often seen favorably by customers who are aware of environmental issues (C. S. R. Costa et al., 2021). The findings of studies carried out by (Sarairah, 2023) demonstrate that consumer intentions to purchase eco-friendly products are significantly positively impacted by environmental concerns and environmental knowledge. Consumption patterns that change to consumption patterns of environmentally friendly products due to changes in consumer perspectives based on green awareness are also called green consumerism (Alamsyah et al., 2020; Zafar et al., 2021).

Purchases of green products by consumers are rising. This behavior is an effort to realize consumer concern for the environment (Wayan et al., 2023). Green product purchases by consumers are impacted by various factors, one of which is environmental awareness (Kerber et al., 2023). People who have an awareness of the environment are associated with increasing their intention to buy environmentally friendly goods or green products (Policarpo and Aguiar, 2020; Lestari et al., 2021). This study aims to document the state of the practice in the field of green awareness and green product research between 2011 and 2023.

There are several studies that have conducted literature reviews on "green awareness" and "green products", but researchers have not found research that conducts bibliometric analysis related to this topic. Therefore, researchers conducted a bibliometric analysis related to this topic to explore how the research trends on this topic and provide references to keyword groups so that it can be a reference for further research that is relevant and related to the topic of green awareness and green products.

2. Methods

In searching for data sources that will be used by researchers related to "Awareness and green products", the Scopus database is used by researchers due to its extensive interdisciplinary scope. The researcher takes multiple steps to refine the data that has been gathered. These steps include identification, screening, eligibility assessment, and inclusion.

The identification step is the first step taken to identify data sources that are relevant to the topic to be researched, while the screening step aims to reduce irrelevant or duplicate data. Next, the feasibility assessment step is used to evaluate the quality and relevance of each data source that has been screened. Finally, the inclusion step is performed to decide which data sources to include in further analysis (Han et al., 2020).

Researchers employ specific keywords to look for data in the Scopus database during the first step, known as the identification step. The keywords entered are ("Green Product" OR "Green Purchase") AND ("Awareness"). Based on the outcomes of this identification, 559 publication data were obtained. Furthermore, the researchers conducted a screening process where the researchers used a filter based on the requirements, which included writing publications in English and publishing them as journal articles. 427 articles that matched the aforementioned requirements were found among the screening's results. This indicates that 132 publications have been eliminated and will not be processed further.

The filtered publications are then subjected to an eligibility process. The researcher personally carried out this approach in relation to papers that qualified to be included. Researchers examined 427 publications' abstracts and titles in order to evaluate those that incorporated or included awareness of green products. The context of awareness and concern for the environment is expressed by various terms such as "environmental concern", "environmental concern" or "environmental awareness" so that researchers choose documents related to consumer awareness of the environment even though with different terms and their relation to intentions, behavior, use of environmentally friendly products or green products. 102 publications that were appropriate for inclusion in the following step were gathered at the conclusion of this third stage.

On July 28, 2023, during the inclusion stage, this data was retrieved. Descriptive analysis of publication patterns pertaining to awareness and green products was conducted using Vosviewer for bibliometric analysis and descriptive data obtained from the Scopus database. The Scopus database's year limit was not specified by the researcher. Using Microsoft Excel, a graph will show the quantity of publications as well as their linear trend.

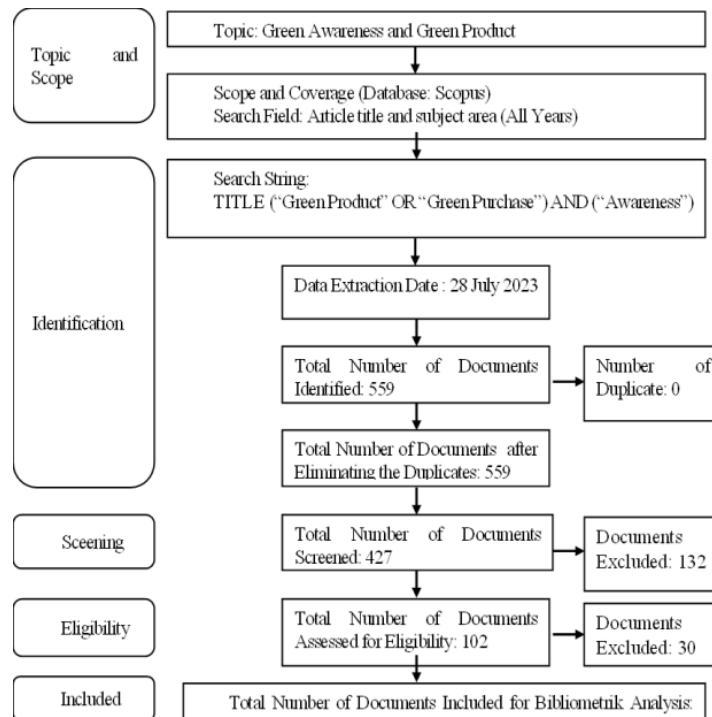


Figure 1. Data collection process

Microsoft Excel software is used to create a diagram that shows the annual amount of publications. Then, using Microsoft Excel software, the average citation per article is also

determined. It is simple to determine a publication's h-index and g-index using PoP software.

Researchers utilize the VOSviewer application to see how different countries cooperate, although Microsoft Excel software is useful for displaying the geographical distribution of countries. Researchers utilize Microsoft Excel software to create journal ranking graphs that are based on quartile values. A total of 102 publications' worth of data from the Scopus database will be categorized according to journal rankings in Scimago Journal & Country Rank.

The Vosviewer program was utilized to analyze events using keywords in order to target studies connected to environmental awareness and green products. In order to illustrate the research topic, the researcher set a threshold of at least 10 papers using common terms.

3. Results and Discussion

3.1 Publication Trends

Figure 2 displays publication patterns relevant to green products and environmental awareness from 2011 to 2023. Figure 2 below shows how 102 publications in total are arranged according to the year of publication.

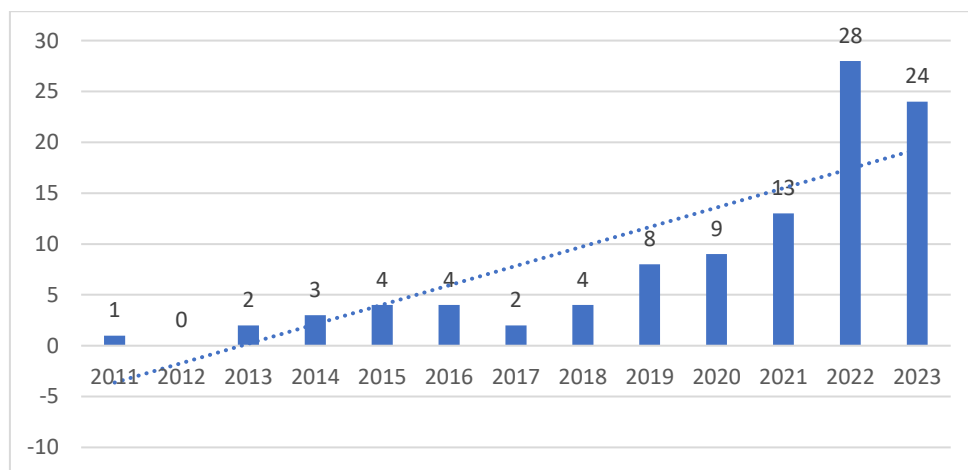


Figure 2. Publications from 2011 to 2023 in number

Figure 2 illustrates that, in comparison to other years, 2022 has produced the greatest amount of publications with 28 articles. The trend line indicates that publications have grown annually, despite little variation in the total number of publications between 2011 and 2018. The number of publications increased by 115 percent between 2021 and 2022, indicating a fast increase in that period.

From 2011 to 2023, there is a tendency for the number of publications about green products and environmental awareness to rise. Especially in 2022. Even in 2023, which is still running for eight months, it already has a considerable number of publications. Over time, environmental problems continue to develop and become one of the important problems faced by every country so sustainable development becomes an important subject that needs to be discussed and researched. Governments, companies, communities, and researchers continue to make discoveries to make new policies that are wiser and more effective in addressing environmental problems (C. S. R. Costa et al., 2021). It can be predicted that the trend of publications related to Green Awareness and Green Products and their relation to sustainable development will continue to increase.

3.2 Citation Trends

Citation trends related are shown in Table 1. Table 1 below shows how the 102 publications were classified according to the year of publication. These groupings will then be viewed based on the total number of publications in a given year, as well as the values of NCP, TC, C/P, and other factors.

Table 1. Citation analysis of publications

Year	T	NCP	TC	C/P	C/CP	h	g
2023	24	10	19	0,8	1,9	3	3
2022	28	22	156	5,6	7,1	7	11
2021	13	12	68	5,2	5,7	5	7
2020	9	8	306	34,0	38,3	5	9
2019	8	7	218	27,3	31,1	4	8
2018	4	4	300	75,0	75,0	3	4
2017	2	2	280	140,0	140,0	2	2
2016	4	4	456	114,0	114,0	4	4
2015	4	4	196	49,0	49,0	4	4
2014	3	3	91	30,3	30,3	3	3
2013	2	2	115	57,5	57,5	2	2
2012	0	-	-	-	-	-	-
2011	1	1	168	168,0	168,0	1	1

Take notes. C/P stands for average citations per publication, C/CP for average citations per cited publication, h for h-index, g for g-index, TP for total of publications, NCP for number of cited publications, and TC for total citations

As can be seen from Table 1 above, 2020 has the greatest value (NCP) of any year, with 22 being 2020. Subsequently, papers published in 2016 received 456 citations, which is a higher number of citations than publications published in any other year. Even though 2022 will see more publications than in past years, 2016 in particular had a significant impact on research. However, certain years—like 2021—have a relatively low quantity of citations. Although there are more publications referenced in 2021 than in previous years, there are only 68 citations overall. The year with the fewest citations is 2021.

Publications from 2022 have the highest h-index and g-index values, with an h-index of 7 and a g-index of 11. Thus, 2022 is likely to have a significant influence on this research as well. Twenty-two papers in 2022 have received 156 citations in total, which means that at least 22 publications have received eight citations apiece.

The TC value in Table 1 shows citation patterns. As can be shown, the 2016 article was cited 456 times, making it the year with the most citations. However, the h-index and g-index values for that year were not very high in comparison to previous years. With an h-index value of 7 and a g-index value of 11, 2022 has the greatest h-index and g-index values. This indicates that 2022 will have a significant impact on studies pertaining to green products and environmental consciousness. Together with having the greatest h-index and g-index of all the preceding years, 2022 turned out to be the year with the most publications. Table 2 below lists the top 10 articles with the most citations that were published in 2022.

Table 2. Articles that received the most citations in 2022

No	Author (year)	Citation	Journal Ranking
1	(Ogiemwonyi, 2022)	27	Q1
2	(Zameer & Yasmeen, 2022)	21	Q2
3	(Huang et al., 2022)	17	Q1
4	(Dangelico et al., 2022)	13	Q1
5	(Zeynalova & Namazova, 2022)	12	Q1
6	(Sun et al., 2022)	11	Q1
7	(Liu et al., 2022)	10	Q1
8	(Sh. Ahmad et al., 2022)	7	Q1
9	(Khan et al., 2022)	7	Q1
10	(Majhi, 2022)	6	Q1

In Table 2 above, research was conducted (Ogiemwonyi, 2022) was the most cited in 2022. The goal of this research is to better understand and shed light on Generation Y's environmentally conscious product behavior. This research makes use of the Green Contextual Factors (GCF) and the Theory of Planned Behavior (TPB) model construction. The study's findings suggest that TPB and GCF have a favorable impact on Generation Y's environmentally conscious behavior. Generation Y's green behavior is heavily influenced by variables like price sensitivity. Green behavior control comes next. The findings demonstrate that green consumers of Generation Y are eager to support sustainable social progress. In order to create appropriate green strategies and efficient policies to comprehend Generation Y consumers, officials in the green industry can also benefit from the knowledge provided by this research. Most of the publications with the highest citation counts were released in Q1 journals.

The year with the most citations was 2016, despite having a lower h-index and g-index than in 2022. In 2016, four articles were released. The articles that were published in 2016 are displayed as follows in Table 3.

Table 3. Number of citations in 2016

No	Author (year)	Citation	Journal Ranking
1	(Mohd Suki, 2016)	185	Q1
2	(Maniatis, 2016a)	165	Q1
3	(Joshi & Rahman, 2016)	97	Q1

According to Table 3 above, research by Mohd Suki (2016) was the most cited in that year. The purpose of this study is to evaluate how consumer attitudes toward green brands, consumer awareness of green products, and consumer usage of green brands affect consumers' intentions to purchase green products. One of the study's findings was that the most important factor influencing a product's intention to be purchased was knowledge of green brands. With 185 citations, this paper is the most cited study published in 2016. Most of the publications that were mentioned were released in Q1 journals.

3.3 Geographical Distribution and Intercountry Relations

The countries of origin of the writers of the publications are indicated in Figure 3 below. The following figure shows the nation of origin's geographical distribution for the author.

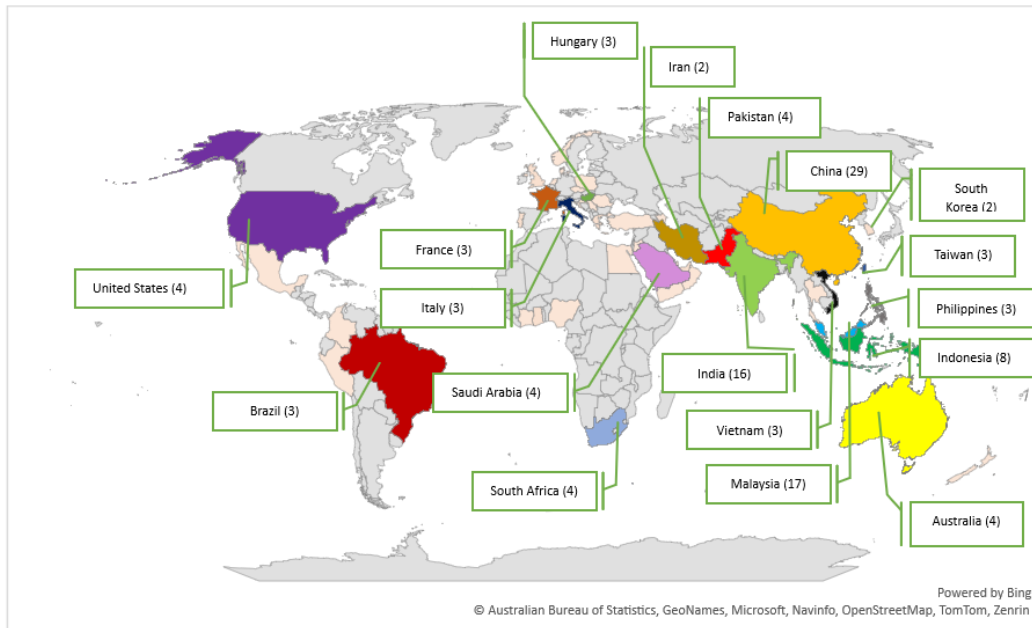


Figure 3. Publications' geographic distribution

China is the nation with the most influence on this research, as indicated in Figure 3 above. This is seen from the amount of publications from China which has published 29 documents, in the second place is Malaysia which publishes 17 documents, and followed by India with 16 publications. Based on the data distribution, it can be seen that documents about environmental awareness and green products have been published in Australia, America, Asia, Africa, and Europe. When compared to publications from other continents, the Asian continent has produced over 100 documents, making it the most influential in this sector.

The following Figures 4 and 5 show the pattern of international cooperation. At this point, the researchers did not establish a threshold. This implies that even in the absence of collaborative relationships, countries having a single document pertaining to this subject will be shown. The 46 nations are shown as follows in Figure 4 below.

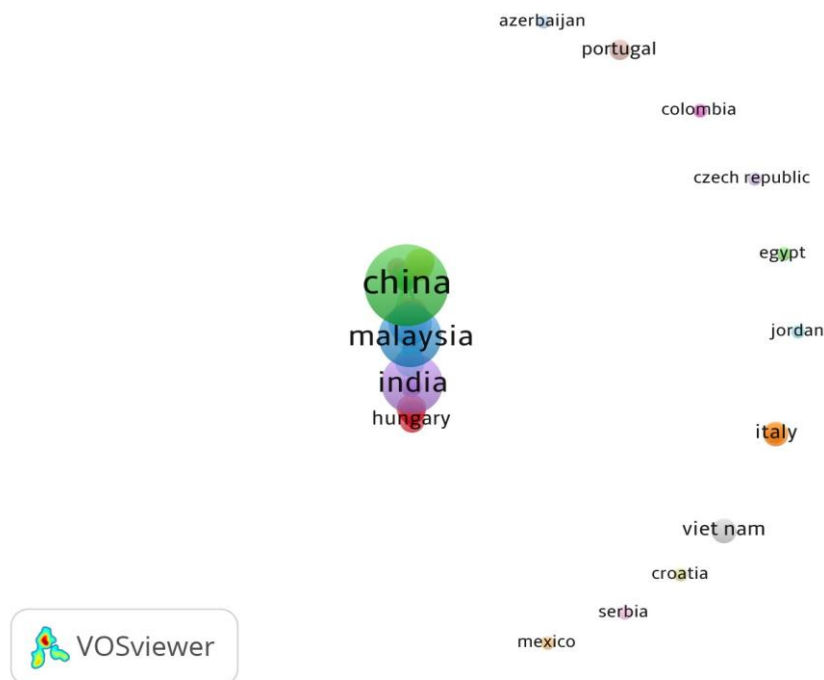


Figure 4. Occurrence of countries

Figure 4 above shows the results obtained from the VosViewer application which displays countries with at least one publication document both countries that have a cooperative relationship or not. Countries that do not have a collaborative relationship are displayed in the outer circle such as Italy, Portugal, Colombia, Vietnam, Croatia, and other countries. While the countries in the center are countries that have collaborative relationships between countries. Visualization of countries with collaborative relationships is shown in Figure 5.



Figure 5. Patterns of country collaboration

Thirteen nations with cooperative partnerships are shown in Figure 5. As seen in Figure 5 above, China, India, and Malaysia have circles with bigger circle diameters than other countries; this suggests that these nations have more cooperative connections with other nations. Based on the VOSviewer display, China, India, and Malaysia have cooperated with 28 other nations, which means that each of the three nations has worked with nearly every nation on show.

China, Malaysia, and India are the three nations with the most publications about green product funds and green awareness. China has published 29 documents with a total of 14 links. Malaysia with 17 publications has 10 links and India which has 16 publication documents has a total of 6 links. Although India ranks third in the number of publications, India's total links are still below Saudi Arabia which has a total of 10 links, Pakistan with a total of 9 links, and South Africa with a total of 7 links. That means Saudi Arabia, Pakistan, and South Africa have more cooperation patterns than India even though the number of Indian publications is more than the three countries.

3.4 Distribution of Journal Rankings

The quartile value (Q) provides information on the distribution of journal rankings. The distribution of journal rankings is displayed as follows in Figure 5 below.

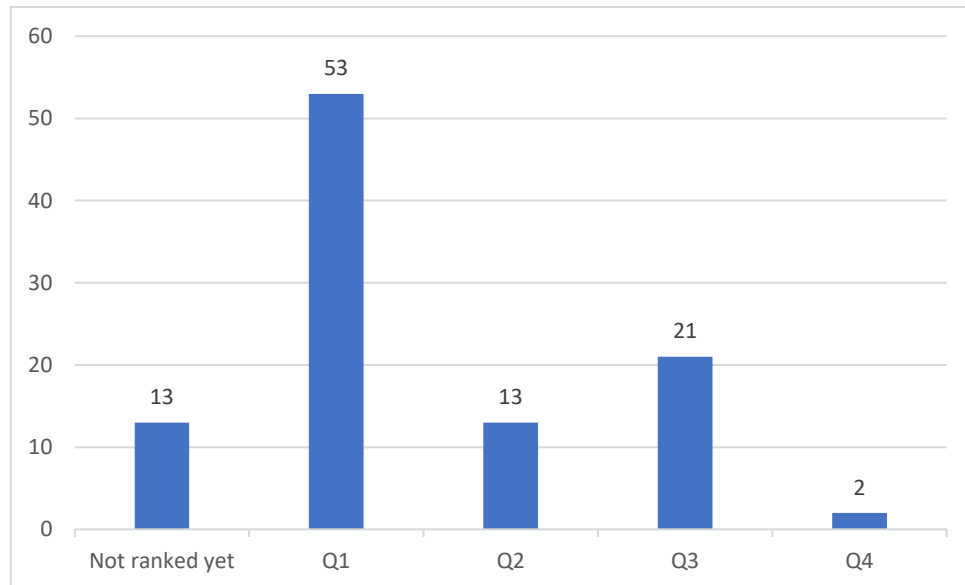


Figure 6. Ranking based on journal quartile score

The majority of articles, or 53 journals, are classified Q1, as seen in Figure 6 above. On the other hand, Table 3 below shows the number of articles in the journal when seen from that perspective.

Table 4. Three journals with the most articles

Name of Journal	The quantity of publications	Quartile Rank
Sustainability (Switzerland)	17	Q1
Journal of Cleaner Production	7	Q1
Journal of Environmental Protection and Ecology	4	Q3

Table 4 above shows that the journal "Sustainability (Switzerland)" which has a Quartile 1 (Q1) journal rank has published 17 articles. Another Q1-ranked journal with seven publications is the Journal of Cleaner Production. You can use the aforementioned list of journals as a reference when writing publications about studies on green products and awareness.

3.4 Research Focus

At this point, researchers set a threshold: shared keywords displayed with a minimum of 5 publications. This means that, with the aid of VOSviewer, keywords that have been used jointly in 5 or more publications will appear together on the joint appearance of keywords. as indicated in Figure 7, from 90 keywords after lowering the barrier to just 30 keywords.

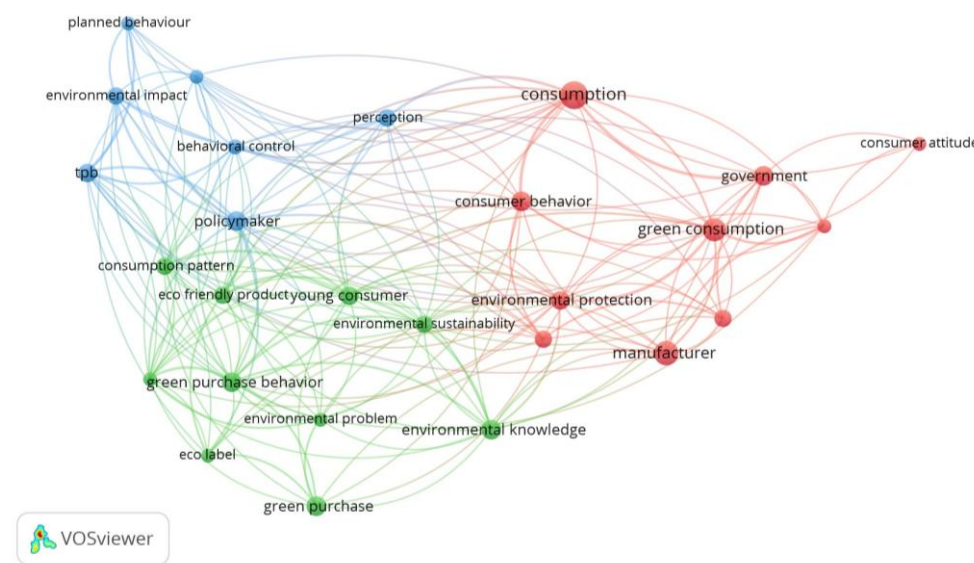


Figure 7. Co-occurrence of Keyword (Threshold of Occurrence ≥ 5)

The clusters that are shown—Figure 6 above, which has multiple colors—make clear the research focus. Three clusters are present. Ten things make up the first cluster (shown in red), ten items make up the second cluster (shown in green), and seven items make up the third cluster (shown in blue).

In the first cluster, it can be seen that the three biggest keywords are related to consumption activities. The emergence of environmentally friendly products is one of the efforts made to respond to various environmental problems that occur today. Sustainable environmental issues encourage producers to take steps and strategies that favor the environment, one of which is green product innovation (Serrano-García et al., 2023). Nowadays, more and more consumers have an awareness of the environment which ultimately affects their consumption behavior. Customers started to alter their purchasing habits and behavior to incorporate more green or ecologically friendly products. The

demand and supply of green products create an increase in green consumption. In addition, according to the results of research conducted by (Ogiemwonyi and Jan, 2023) revealed that green consumption is positively influenced by idealism, relativism, environmental ethics, moral responsibility, and readiness to use eco-friendly items; in turn, the willingness to use eco-friendly products is largely influenced by environmental ethics and moral obligation.

In cluster 2 there are keywords green purchase behavior, green purchase, and environmental knowledge. The knowledge that a person has will certainly affect their behavior. The same thing with consumers. The environmental knowledge that consumers have affects their behavior. They will be more selective in shopping and choosing the products they will use. The findings of studies carried out by (Alamsyah et al., 2020) say that in addition to eco-labels, and perceived quality, environmental knowledge also has a positive connection with consumer knowledge of green issues. This consumer behaviour is also known as green purchase behaviour. The investigation carried out by (Ogiemwonyi et al., 2023) said that the factors that directly influence green purchase behavior are environmental attitude (EA), environmental responsibility (ER), subjective norms (SN), and awareness of consequences (AC). Indirect factors are environmental concern (EC), environmental responsibility (ER), and knowledge of consequences (AC) through EA.

The biggest keywords in cluster 3 are policy maker, tpb, and perception. In connection with environmental issues that are a problem for the world community, policies related to environmental sustainability are also one of the topics that are widely discussed by academic scholars, industrial practitioners, and policymakers. Various studies on green products discussed from various angles provide very useful information for policymakers. The Theory of Planned Behavior (TPB) is a theory that frequently appears in studies pertaining to green products and is used as a means of supporting the explanation of how consumer behavior and intents in using and purchasing environmentally friendly items, or green products, emerged. TPB serves as a model to investigate how consumers behave when they are concerned about the environment (Hartanto et al., 2023). The findings of studies conducted by (Witek and Kuźniar, 2021) demonstrates how the TPB model may account for consumers' intents to purchase green products. Consumer perception is also a topic that is discussed about green products. The knowledge that consumers have will affect perceptions and the way consumers view green products.

4. Conclusions

With 28 publications, 2022 has published the most articles when compared to previous years, according to the findings and discussion. Even though 2022 is the year with the most publications, there is only a four-document difference between the total publications in 2023 and 2022 (which was still seven months ahead of schedule when this data was collected in 2023). Therefore, it is expected that there will be more publications in 2023 than there were in 2022.

With 456 citations, 2016 saw the emergence of the citation trend pertaining to green products and awareness. With 29 publications and 14 international collaboration connections, China is the most significant nation in this sector. 53 of the 102 articles that were published were in Q1 journals. Research on green awareness and green products focuses are, 1) consumption, green consumption, and manufacturer; 2) purchase behavior, green purchase, and environmental knowledge; 3) policy maker, tpb, and perception.

The study's limitations are; 1) the analysis of the data is limited to the Scopus database, so there are still many studies related to similar topics that are not included in this database; 2) this study only discusses how green awareness owned by consumers encourages consumers to choose or buy green products, so there are still many other factors that can be studied; 3) this research only looks at green products from the consumer side, so there can still be research from the producer side such as the topic of green marketing, green product production, green product labeling and other topics related to the producer side;

4) there might be small variations because the study's data were collected on July 28, 2023, and it cannot represent research conducted since then.

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Author Contribution

Conceptualization, S.B.B., N.A., R.H.; Methodology, S.B.B., N.A., R.H.; Software, S.B.B., N.A., R.H.; Validation, S.B.B., N.A., R.H.; Formal Analysis, S.B.B., N.A., R.H.; Investigations, S.B.B., N.A., R.H.; Resources, S.B.B., N.A., R.H.; Data Curation, S.B.B., N.A., R.H.; Writing – Original Draft Preparation, S.B.B., N.A., R.H.; Writing – Review & Editing, S.B.B., N.A., R.H.; Visualization, S.B.B., N.A., R.H.

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Conflicts of Interest

The authors declare no conflict of interest.

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