

Visualization of Green Business Research Around the World Over Two Decades: A Bibliometric Perspective

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Abstract

Green business is a new concept by bringing goodness from the economic side and balance with nature. Green business is defined as the concept of meeting customer needs without causing social and environmental problems, generating economic prosperity, and significantly reducing the risk of environmental damage and ecological scarcity. This study aims to present a comprehensive knowledge map of green business worldwide based on data from the Scopus database. The analysis was carried out on available data from 2001 – 2021, namely 483 academic documents. This study provides data exposure on annual publications, publication types, author productivity, affiliations, countries, research subject areas, research collaborations, and a map of research themes on green business. This research contributes to the mapping of green business research themes based on knowledge development based on the Green business, Economic, Environment, Sustainability cluster classification, hereinafter abbreviated as GEES.

Keywords

author network, bibliometric, green business, research themes

1. Introduction

Having a sustainable advantage is important for business people (Rashidirad & Salimian, 2020). However, it is often unfortunate that the source of sustainable advantage rests on the exploitation of resources which leads to scarcity (Rosenberg et al., 2018). Based on these exploitative conditions, various criticisms emerged that the business model should pay more attention to the balance between profit, social welfare, and the environment (B. G. Hwang et al., 2017).

Green business is a new concept by bringing goodness from the economic side and in balance with nature. Green business is defined as the concept of meeting customer needs without causing social and environmental problems, generating economic prosperity, and significantly reducing the risk of environmental damage and ecological scarcity. (Sehnm et al., 2021; Hwang et al., 2017). From this definition, the green business concept becomes a new opportunity to achieve a sustainable competitive advantage (Mrkajic et al., 2019; Khan et al., 2021).

Priority on the concept of balance, both economic achievement and environmental sustainability, has made the green business model more widely applied by business people (Hasan et al., 2019; Yacob et al., 2019). Previous research has shown the need for conditioning various factors so that green businesses can run well, including having full support from top management, providing training to employees, supply chain efficiency, and environmental dynamism. (Cui et al., 2019). In today's global era, rapid development and modernization make business people more aware of the importance of green business (Perboli & Rosano, 2019). The green business concept emphasizes that business processes must also have an impact on natural and environmental sustainability (Raub & Martin-Rios, 2019). The implementation of the green business concept by paying attention to the balance of nature is also in line with the goals of the Sustainable Development Goals (SDGs) where development should maintain a sustainable improvement in the economic welfare of the community, maintain the quality of the environment, and ensure the implementation of justice and the implementation of good governance that can maintain the improvement of the quality of life of generations to come. to the next generation (Guarini et al., 2021).

Research on green business has been conducted and developed at an international level. However, no one has yet provided a large-picture map visualized on a global scale using data from many published studies, particularly for the last two decades (2001-2021). So far, there have been no publications that directly discuss the impact of scientific research and the mutually beneficial interactions between researchers on the topic of a green economy in sustainability.

The bibliometric method is used to see the relevance of the research. Where is a method for measuring and analyzing scientific references with a combination of statistical and mathematical methods (Purnomo et al., 2020). Bibliometrics is a statistical technique used to analyze bibliometric publication data such as reports, reviews, books, peer-reviewed articles, magazines, conference proceedings, and publications. Bibliometric methods are used to present the relationship between quantitative methods and the research domain (IGI Global, 2022).

The question raised in this research is how to map the research themes and researcher relations based on the word green business globally in the last 2 decades (2001 – 2021)? Based on a bibliometric approach, this research aims to study and form a map of research themes visually and to show the relationship between researchers around the world in green business research.

This scientific article is organized into several parts, namely: the first part is an introduction that discusses the background of the research, questions, and research objectives, the second part is a research method that explains the scientific approach used in research, the third part is the results and discussion that explains the research findings. and the fourth section summarizes the essence and implications of the research. At the end of the article is accompanied by an acknowledgment and reference.

1.1 Objectives

Based on a bibliometric approach, this study builds a map of research themes visually and shows the relationship between researchers in the theme of green business research globally in the last two decades (2001-2021)

2. Methods

This study maps the status of green business and sustainable research visually at the international level indexed by Scopus in the last two decades, namely 2001 – 2021. Research with a bibliometric approach is carried out with data from the document search service feature on the Scopus Database. (Purnomo et al., 2020; Pratama et al., 2021; Maulana et al., 2021).

The Scopus website provides analysis functions that display bibliometric information. This study took data on the Scopus website with the identification of Green Business keywords starting from January 2001 to December 2021. Found 483 academic documents published. The command that is applied when mining data on Scopus is (TITLE-ABS-KEY ("Green Business") and PUBYEAR > 2000 and PUBYEA < 2022. The analytical services taken from the Scopus web are visualization of annual publications, publications by type, individual researcher, affiliation, publication by country, and subject area of green economy for sustainability research.

Furthermore, scientific literature analysis was carried out using the scientometric method using the VOSviewer application version 1.6.16 in the analysis of co-occurrence and co-authors. Co-authorship analysis was conducted to obtain information on international collaborative research networks for green business research topics. The study also

conducted an in-depth co-occurrence analysis of keyword relationships to generate a mapped network. research theme (Van Eck & Waltman, 2019; Boyack et al., 2018).

3. Results and Discussion

This section describes the search results and data processing consisting of data from annual publication, publication by sources, individual researcher, affiliation, publication by country, subject area, research theme map, and author network of green business research around the world for two decades (2001-2021).

3.1 Green Economy for Sustainability Research Annual Publication

The trend of green business publications has increased from year to year. This can be seen from the graph presented in Figure 1. Publication data for the last five years shows that 2021 is the year with the most publications, with 57 documents. Followed by 2020 with 51 documents. The year 2019 had 46 publications. In 2018 there were 38 publications and in 2017 there were 47 publication documents. Research on green business becomes very interesting because it is closely related to the goals of the SDGs (The 17 Goals SDGs, 2022). In addition, this also proves that there is awareness about the importance of business management that pays attention to the balance of nature and the environment (Potkány et al., 2018).

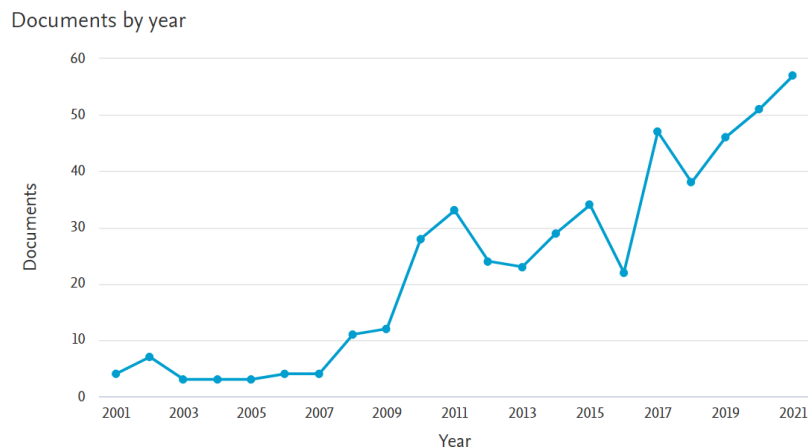


Figure 1. Green Business Research Annual Publication

3.2 Publication by Type in Green Business Theme

Publication documents that discuss green business for the past two decades (2001-2021) were found as many as 483 documents in the Scopus Database. The document consists of various types which can be seen in table 1 and figure 2 below. Most publications are scientific articles with 312 documents, this shows that there is an increasing interest in research with the theme of green business. Green business is a new concept in meeting economic needs that are very concerned about the environment and protect resources from generation to generation (Leonidou et al., 2017). The next most common type of document is a conference paper with 89 documents, this also shows the increasing interest of researchers in the theme of green business research. And the third order is a book chapter with 41 documents.

Table 1. Publication by Type in Green Business Theme for Two Decades

No	Document Type	Documents
1	Article	312
2	Conference Paper	89
3	Book Chapter	41
4	Review	16
5	Book	10
6	Other	15
Total		483

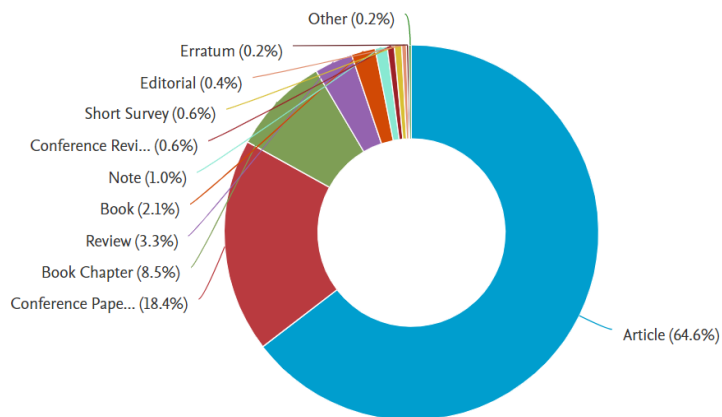


Figure 2. Green Business Publication by Type for Two Decades

3.3 The Most Productive Researcher in Green Economy for Sustainability Theme

Of the 483 documents presented in the Scopus database, 159 authors were found with the theme of green business. The ten most prolific writers over the last 2 decades can be seen in table 2 and figure 3.

Table 2. The Most Productive Author in Green Business for Two Decades

No	Author Name	Documents
1	Leymann, F.	7
2	Nowak, A.	7
3	Recker, J.	5
4	Abuzeinab, A.	4
5	Arif, M.	4
6	Couckuyt, D.	4
7	Fettke, P.	4
8	Kolbe, L.M.	4
9	Loos, P.	4
10	Atewamba, C.	3

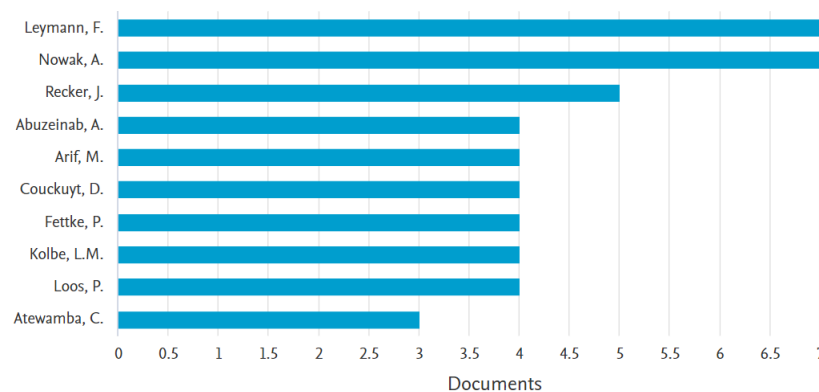


Figure 3. The Most Productive Author in Green Business for Two Decades

In the five most prolific researchers over the last two centuries, Leyman and Nowak from Germany are prolific authors on the theme of green business research with 7 publication documents each. Next is Racker, J from Hamburg, Germany with 5 publication documents. The next most active authors are Abuzeinab and Arif with 4 publication documents each. Researchers from Germany show their productivity in green business research, this is in line with various studies that show Germany has a special concern for the implementation of green business and various state policies that

direct business actors to focus on the use of natural resources, the impact of environmental damage, natural capital, and environmental quality of life (Ringel et al., 2016; Lutz et al., 2017)

3.4 The Most Productive Affiliation on Green Business Research

The ten most productive affiliates in green business research over the last two decades from the Scopus database can be seen in Figure 4.

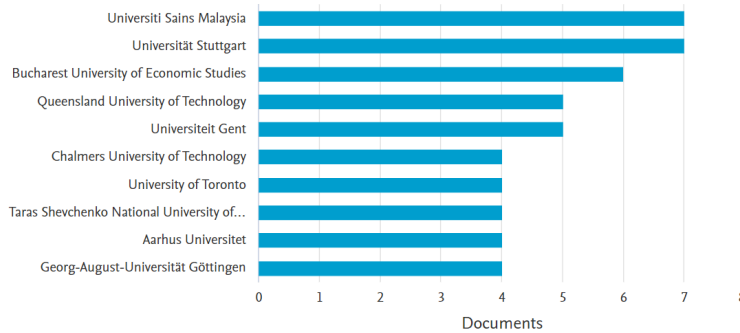


Figure 4. The Most Productive Affiliation on Green Business Research

Universiti Sains Malaysia and Universität Stuttgart from Germany became the most productive affiliates on the theme of green business research with each having 7 publication documents. Furthermore, Bucharest University of Economic Studies from Romania is in third place with 6 publication documents. Next is the Queensland University of Technology from Australia and Universiteit Gent from Belgium, each of which has 5 publication documents on green business.

3.5 The Most Productive Country in Green Business Research

From 483 documents in the Scopus database, the ten most productive countries in green economy research in sustainability can be seen in Figure 5. The United States is the most productive country with 85 published documents. This is in line with the Low Carbon and Environmental Goods and Services Sector (LCEGSS) dataset, which shows that the estimated US green economy is representing \$1.3 trillion in annual sales revenue and employs nearly 9.5 million workers; both of which have grown by over 20% between 2012/13 and 2015/16. Comparison with China, OECD members, and the G20 countries suggests that the US is estimated to have a greater proportion of the working-age population employed (4%) and higher sales revenue per capita in the green economy (Georgeson & Maslin, 2019). Next, the United Kingdom with 45 publication documents, China with 33 publication documents, India with 31 publication documents, and Germany with 30 publication documents.

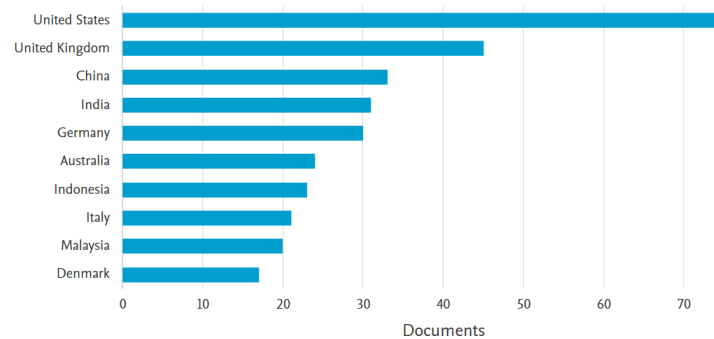


Figure 5. The Most Productive Country in Green Business Research

Details of the ten most productive countries in research on green business over the last two decades based on the Scopus database can be seen in table 3.

Table 3. Top 10 Country/ Territory in Green Business Research

No	Country/ Territory	Documents
1	United States	75

2	United Kingdom	45
3	China	33
4	India	31
5	Germany	30
6	Australia	24
7	Indonesia	23
8	Italy	21
9	Malaysia	20
10	Denmark	17

3.6 The Subject Area That Most Researches Green Economy for Sustainability Theme

Data mining on the Scopus database shows more than 21 subject areas in green business research over the last 2 decades. The five subject areas with the most published documents are presented in table 4 and the pie chart of all subject areas is presented in figure 6.

Table 4. Top 5 Subject Area in Green Business Research

No	Subject Area	Documents
1	Business, Management and Accounting	205
2	Environmental Science	148
3	Social Sciences	132
4	Engineering	121
5	Economics, Econometrics and Finance	87

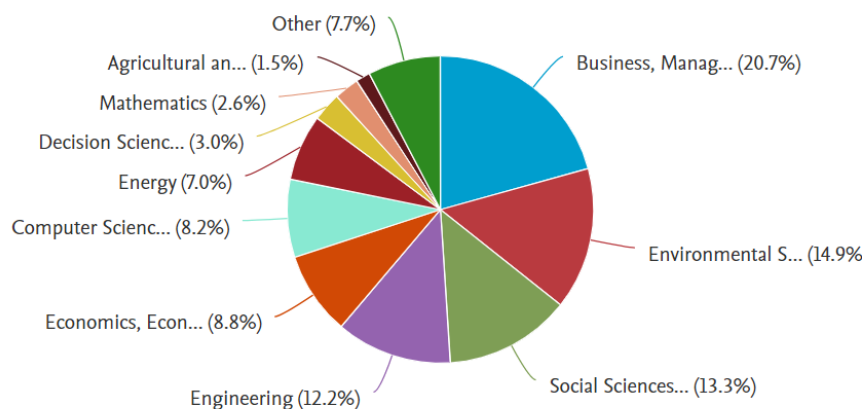


Figure 6. Subject area that most researches Green Business

Research on green business is closely related to the balance between business management, economic growth, and nature conservation. A green economy results in human well-being and social equity and reduces poverty, while also significantly reducing the risk of environmental degradation and ecological scarcity (Georgeson & Maslin, 2019). This explains that published documents in the Business, Management, and Accounting subject areas are at the top based on the analysis on the Scopus database.

3.7 Global Research Network on Green Economy for Sustainability

The topic of green business has been investigated by several research groups. Author network map built with VOSviewer software. The criteria used for the formation of the network is a minimum of 5 documents publication. From 483 documents, the results of a network formed from 3 researchers, namely Recker, Jan from Universitat Hamburg, Germany, where one of the titles of his research on green business was "Green Business Process Management: Towards the Sustainable Enterprise" in 2012. Further researchers Those who meet the threshold and collaborate are Leymann, Frank, and Nowak, Alexander from the University of Stuttgart, Germany with one of their

collaborative research entitled "The differences and commonalities between green and conventional business Process Management" in 2011. Map of the network of researchers on green business for two decades (2001 – 2021) is presented in Figure 7.



Figure 7. Global Research Network on Green Business Research

3.8 Global Research Theme Map on Green Economy for Sustainability

The evaluation and visualization process related to the green business research theme map was constructed using the VOS Viewer software. A review of the Green Economy for Sustainability research theme map was identified by keyword linkages between publications. The criteria for the number of keywords in a published document is 10 repetitions so a threshold of 43 interrelated keywords is found in 483 publication documents. A map of the Green Business research network over the past two decades is shown in Figure 8.

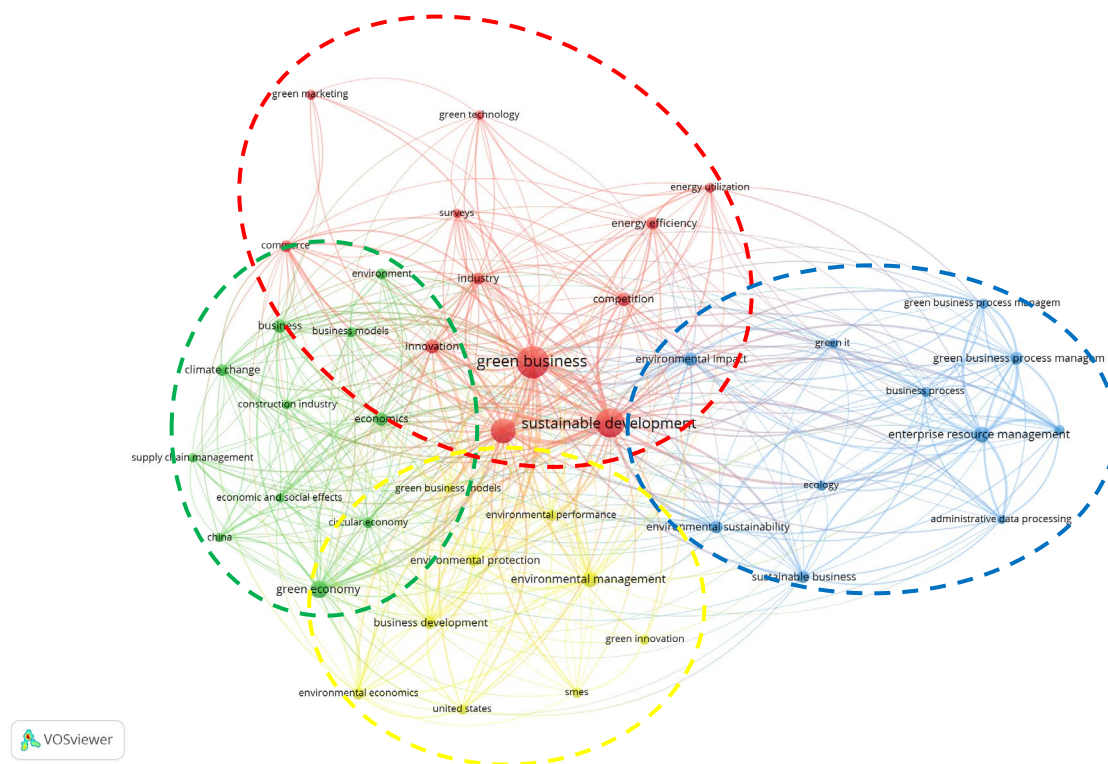


Figure 8. Global Research Theme Map on Green Business

From Figure 8, four clusters are formed on the theme of Green Business research, the grouping of themes is composed of 483 documents with 2542 keywords. The four clusters consist of Green business, Economic, Environment, Sustainability, hereinafter abbreviated as GEES.

1. Green Business (Red): The keywords in this cluster are green marketing, green technology, sustainability, sustainable development, and energy efficiency
2. Economic (Green): The keywords in this cluster are circular economy, economic and social effect, business models, environment, and green economy
3. Environment (Yellow): The keywords in this cluster are environmental protection, environmental management, environmental economics, green innovation, and environmental performance
4. Sustainability (Blue) Cluster: The keywords in this cluster are sustainable business, environmental sustainability, ecology, enterprise resource management, and business process

4. Conclusion

This study shows the visualization of research maps and relationships between researchers on the theme of green business around the world based on data from the Scopus database. The results of data mining show as many as 483 publication documents in the last two decades, namely 2001 – 2021. The results of data processing show an annual publication graph that tends to increase from year to year. Most publications occurred in 2021 with 57 documents. The growth of publications shows the alignment between research awareness and SDGs goals where business management should also pay attention to ecological balance and sustainability. The most dominant type of publication is scientific articles, whereas many as 312 documents or 64.6% of the 483 publication documents. The most productive researchers in this research theme are Leymann, F, and Nowak, A from Germany who both have 7 published documents. Universiti Sains Malaysia and Universitat Stuttgart from Germany were the most productive affiliates with 7 publication documents each. While the most productive country is the United States with a total of 75 published documents. The subject area with the most publications is Business, Management, and Accounting with 205 documents, which is 20.7% of the total 483 publications during the two decades 2001-2021. A total of 3 researchers demonstrated a very strong collaboration network with a threshold of 5 publication documents, namely Recker, Jan; Leymann, Frank, and Nowak, Alexander.

The implications of this research are theoretical and practical contributions. In theory, this study shows a visualization of the research theme map which consists of 4 clusters of results from processing the Scopus database in the last two decades (2000-2020), namely: Green Business, the grouping of themes is composed of 483 documents with 2542 keywords. The four clusters consist of Green business, Economic, Environment, Sustainability, hereinafter abbreviated as GEES. Practically, the results of this research theme map can be used as a basis for the business management that focuses more on ecological balance. Further researchers can develop research using other data sources such as the Web of Science, this is considering the limitations of this research data from the Scopus database.

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