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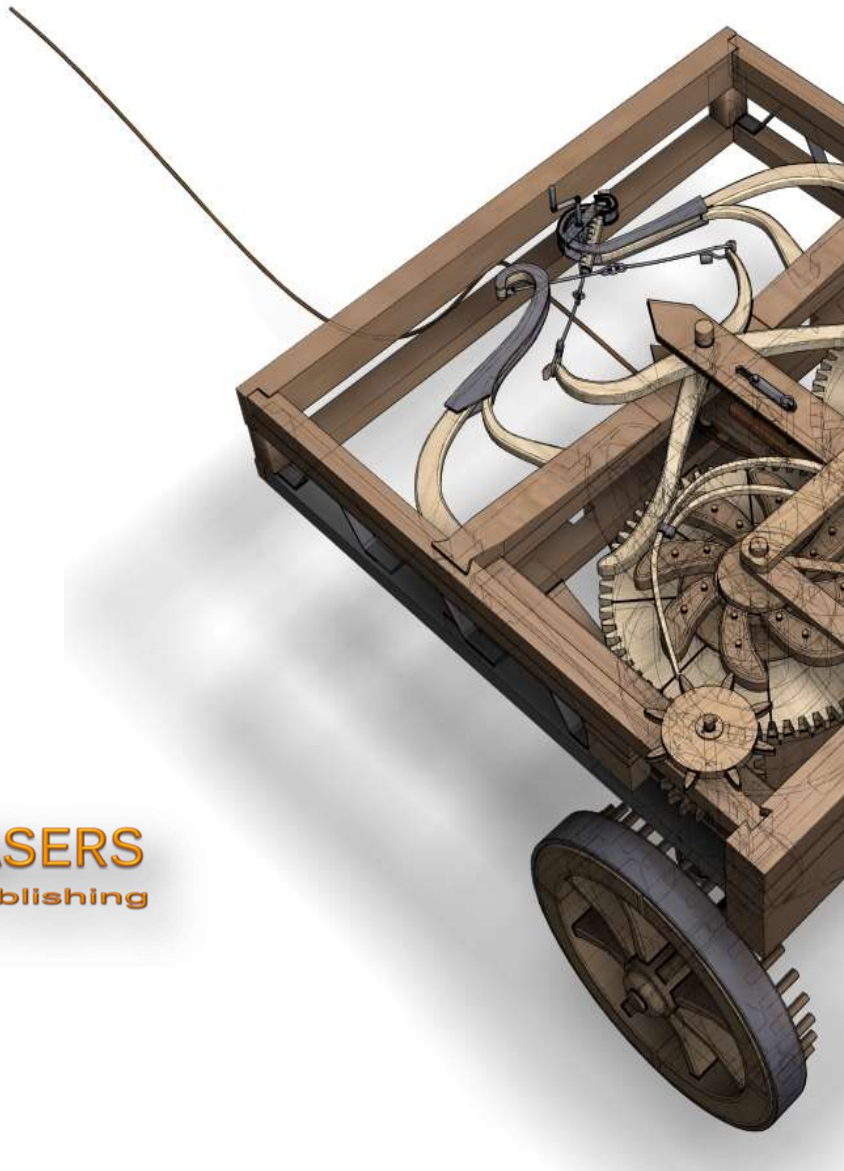

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Call for Papers
Fall Issue 2024
Journal of Environmental Management and Tourism

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Authors are encouraged to submit high quality, original works that discuss the latest developments in environmental management research and application with the certain scope to share experiences and research findings and to stimulate more ideas and useful insights regarding current best-practices and future directions in Environmental Management.

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How Scholars Think about Greenwashing Over the Last Two Decades. An Overview through a Bibliometric Analysis

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Abstract: Bibliometric analysis is a widely recognized approach for examining extensive scientific data sets. However, its application is relatively new, particularly in greenwashing within the environment. As a comprehensive concept, sustainability encompasses various aspects, and greenwashing has emerged as a specific branch that has garnered increased attention and research in recent years. The study's primary purpose is to deploy the bibliometric method to analyze greenwashing literature from 2003 to 2023 using the Web of Science Core Collection and VOSviewer software to identify and visualize the intellectual landscape of the field. The number of scientific publications related to the topic confirms the importance and popularity of the subject. In this period, a total of 807 publications on the topic of greenwashing were identified, and three different periods were set. Most publications and citations primarily come from the USA, China, and other developed European countries. In terms of journals, prominent publications hold positions in the top 10, such as the Journal of Business Ethics, Journal of Cleaner Production, Business Strategy and The Environment, and Sustainability. The topic mainly concerns social and natural sciences branches, emphasizing corporate social responsibility and environmental concerns. Regarding keywords, four clusters can be distinguished as being in the center of governmental, consumer, corporate, and management issues. The ongoing trends predict a persistent rise in worldwide publications regarding greenwashing.

Keywords: bibliometric analysis; greenwashing; sustainable development; Vosviewer; environmental business; science mapping.

JEL Classification: G38; M10; M14; M31; F64; Q56; O50; R11.

Introduction

A series of severe historical events - first the Covid-19 pandemic in 2019 (Barbier and Burgess 2019; Ranjbari *et al.* 2021), then the war in Ukraine in 2022 and the resulting food and energy crises (Zhou *et al.* 2023; Esfandabadi *et al.* 2022), third the rising inflation (Liadze *et al.* 2023), and the increasing despair and uncertainty of the people for the near term, shaped science, and consumer perceptions (Johnstone and Schot 2023). However, sustainability has remained central to the international political agenda, business and consumers over the past decades and has been recognized as a critical driver (Mandarić *et al.* 2022). Sustainability involves maintaining equilibrium between society, environment, and economy, often referred to as the triple bottom line. (Joshi *et al.* 2023) Nevertheless, there are several obstacles to achieving this. One such obstacle is greenwashing (He *et al.* 2022; Choudhury *et al.* 2023; Nygaard 2023), which is a barrier to economic development in a sustainable way (Jakubczak and Gotowska 2020), environmental management issue and an ethical question too (Szabo and Webster 2021).

The phenomenon of greenwashing is attracting considerable research attention from academics, scholars, governments, and non-governmental organizations (Montero-Navarro 2021; Wang 2023; Pendse *et al.* 2022) and not wholly unexplored; the current body of research remains limited (Choudhury *et al.* 2023).

This study is designed to provide a deeper understanding of greenwashing through knowledge mapping, more precisely, bibliometric analysis.

The article's novelty lies in its comprehensive analysis of the literature on greenwashing over twenty years, encompassing the years 2022 and 2023, a remarkable approach due to the significant increase in publications during the intervening years. Furthermore, the study recontextualizes the keywords associated with the topic, shedding light on current and emerging trends and ongoing research interests, thereby providing a thorough and insightful overview that underscores the potential directions for future research endeavors.

1. Research Background

Greenwashing is a complex phenomenon; therefore, the literature on greenwashing is composed of several dimensions. On the one hand, the research attention concentrated on the understanding of greenwashing with the definitions of the phenomenon (Delmas and Burbano 2011; Lyon and Maxwell 2011; Baum 2012; Bowen and Aragon 2014; Parguel *et al.* 2015; Lyon and Montgomery 2015; Tateishi 2018; de Freitas Netto *et al.* 2020) the taxonomy: forms, causes and type (Delmas and Burbano 2011; Yang *et al.* 2020; de Freitas Netto *et al.* 2020; Bernini and La Rosa 2023). As there is no widely recognized definition of greenwashing due to its lack of established theory, various scholars and experts have made efforts to define it in different contexts, all highlighting the misleading communication from companies to consumers that creates false positive impressions (de Freitas Netto 2020; Moodaley and Telukdarie 2023).

As Delmas and Burbano (2011) outlined, companies' inclination to greenwashing can be traced to three primary influencing factors: external, organizational, and individual. External influence may encompass inadequately structured and formulated legislation (Zhang *et al.* 2023), tension resulting from market pressures (Delmas and Burbano 2011), or expectations derived from institutional regulations, such as the Sustainable Development Goals established by the United Nations (Lashitew 2021; Nishitani *et al.* 2021). Organizational driving forces include tension from meeting consumer demands and maintaining a competitive advantage against rivals, the incentive framework and ethical atmosphere, organizational resistance, reluctance to change, and the efficacy of internal communication within the firm (Delmas and Burbano 2011; Gregory 2021). At an individual level, envisioned yet unimplemented green actions fall under greenwashing.

The form of it can be distinguished as a claim type of greenwashing and execution greenwashing (de Freitas Netto 2020). Greenwashing claims can be divided into two major types of deceptive claims. First are false appeals, meaning demonstrably false claims based on objective evidence. The second is vague claims, which are overly broad or poorly defined statements that create an incorrect impression. (Parguel *et al.* 2015; Schmuck *et al.* 2018; de Freitas Netto 2020). Executional greenwashing involves incorporating nature-evoking elements in advertisements to artificially enhance a brand's ecological image (Parguel *et al.* 2014; Parguel *et al.* 2015; de Freitas Netto 2020).

On the other hand, through the theoretical background, the researcher concentrates on the consequences of greenwashing. The causes can affect several areas: consumers (Martínez *et al.* 2020; Topal *et al.* 2020; de Jong *et al.* 2020; Wang *et al.* 2020; Szabo and Webster 2021; Bladt *et al.* 2023; Rahman and Nguyen-Viet 2023) corporations (Wu *et al.* 2020; Pimonenko *et al.* 2020; Uyar *et al.* 2020; Yang *et al.* 2020), stakeholders (Torelli *et al.* 2020; Ferrón-Vílchez *et al.* 2021; Pizzetti *et al.* 2021), society (Kurpierz and Smith 2020; Uyar *et al.* 2020; Yang *et al.* 2020).

The above shows the complexity and many faces of the subject, so this study is designed to provide a deeper understanding of the field through knowledge mapping, more precisely, bibliometric analysis.

Knowledge mapping has been extensively applied in bibliometric analysis (Gaviria-Marin *et al.* 2019; Gan *et al.* 2022; Farooq 2023). The bibliometric analysis approach was employed to assess the publication trends and patterns within the literature on greenwashing. The methodology devised by Archambault and Gagné in 2004 and Teixeira in 2014 will direct the current implementation of bibliometric techniques (Tavares-Lehmann and Varum 2021),

Bibliometric analysis is a well-known and rigorous quantitative method for analyzing large volumes of scientific publications to analyze publishing trends, conference papers, and other academic documents. (Donthu *et al.* 2021; González-Torres *et al.* 2020; Ellegaard and Wallin 2015). Thanks to digitalization, the method's popularity can be attributed to the accessibility (Saleem *et al.* 2020) of scientific databases such as Crossref, Web of Science, Scopus, and software, for example, VOSviewer, CiteSpace, Biblioshiny from medicine through

mathematics to business sciences (Petcu *et al.* 2023, Manoj Kumar and Goerge 2023). In the case of greenwashing, there are a few bibliometric analyses that are closely linked to the topic (Andreoli *et al.* 2017; Montero-Navarro 2021; Moodaley and Telukdarie 2023; Pendse *et al.* 2023; Wang *et al.* 2023), but still, aspects that need to be addressed.

The current paper aims to identify and visualize the intellectual landscape of the field, the publishing trends, and patterns in greenwashing from 2003 to 2023 by evaluating the frequency of citations, the country distributions of the nations, most cited authors, critical journals in the topic, existing or non-existing authorship patterns, main terms, and most used keywords. Hence, this study aims to concentrate primarily on greenwashing from a business and management perspective by answering the coming six research questions (RQs):

RQ1. What were the publishing trends in greenwashing between 2003 and 2023?

RQ2. What is the geographical distribution in the field of greenwashing?

RQ3. Which journals have been frequently preferred by researchers for greenwashing?

RG4.Which authorship and collaborative research patterns have been most common in greenwashing research?

RQ5.What are the hot keywords in greenwashing research so far?

RQ6. Which further research directions should be taken on this topic considering the latest research for 2023?

To this end, the rest of the paper is structured as follows: Section one describes the methodology used for the research. Section two presents the results of the bibliometric analysis that consists of co-occurring and co-citation analysis; then, the emerging trends of "greenwashing" are displayed. Finally, the conclusions and limitations of this study can be considered.

2. Materials and Methods

This research significantly enhances greenwashing studies by collecting and examining all publications on greenwashing found in journals indexed in the Web of Science Core Collection database (WoS). To present the results systematically, a bibliometric analysis approach was employed to scrutinize the attributes of these publications.

2.1 Database

Several databases exist to conduct indexing and abstracting (Pranckutė 2021). Hence, it is an existing multidisciplinary and subject-specific database which abstracts high-quality articles in case of this paper it was used data from WoS by Clarivate because, based on Liu (2021 p. 849), “WoS is one of the largest and “most authoritative bibliographic databases”. The Web of Science encompasses general, cited references and advanced search features, offering various tools to manipulate search results (Hu *et al.* 2018; Chen *et al.* 2024; Santos *et al.* 2023). It is internationally recognized for adhering to the highest quality standards and is widely accepted and utilized for the analysis of scientific publications (Mongeon and Paul-Hus 2016; Li *et al.* 2018; Birkle *et al.* 2020; Rashid 2023) furthermore, WoS was used in the bibliometric analysis in numerous social science studies too (Amirbagheri *et al.* 2019; Camón Luis and Celma 2020; Escamilla-Fajardo 2020; Rocio *et al.* 2023). The study opted for the WoS Core Collection database to maintain neutrality and provide enlightening research information. (Kasperiuniene and Zydziunaite 2019; Kuc-Czarnecka and Olczyk 2020; Yan and Zhiping 2023; Zhang *et al.* 2023).

2.2 Software

Knowledge mapping is an influential methodology in bibliometrics (Jin *et al.* 2019), as it enables the examination of intellectual connections within a dynamically evolving realm of scientific knowledge (Baier-Fuentes 2019). This study adopted VOSviewer to achieve the research objectives. VOSviewer is digital bibliometric software that is internationally acknowledged among scholars (Baier-Fuentes *et al.* 2019; Niknejad *et al.* 2021; Kuzior-Sira 2022; Mostafa Hatami *et al.* 2022; Trang *et al.* 2023; Răcășan *et al.* 2023; Sangari *et al.* 2023; Chetanraj and Senthil Kumar 2023) which is suitable for constructing and visualising bibliometric networks (van Eck and Waltman 2010; Perianes-Rodriguez *et al.* 2016; Smyrnova-Trybulska 2018; Borgohain *et al.* 2022).

2.3 Search Strategy

In the WoS Core Collection, the following search query (Table 1.) was run on 7 January 2024: “greenwashing*” (topic) OR “greenwash*” (topic) OR “green washing*” (topic) OR “green wash*” (topic) OR “green-washing*” (topic) OR “green-wash*” (topic) AND 2003 – 2023 (Year published) AND “Articles” (document types) AND

"English" (Language). Following the search as mentioned earlier rules and manual checking to eliminate duplicates or articles unrelated to the research topic, a total of 807 articles were finally obtained for this paper. Regarding the Citation report, these 807 publications give 12.853 citing articles without self-citations.

Table 1. Literature retrieval rules

	Details
Retrieval Time	7 January 2023
Data Source	Web of Science - Core Collection
Topic	"greenwashing*" OR "greenwash*" OR "green washing*" OR "green wash*" OR "green-washing*" OR "green-wash*"
Time interval	2003 to 2023 (last 20 years)
Number of sources	807
Citing articles (without self-citations)	12,853
Time cited (without self-citations)	17.211 (25.37 average per item)
H-Index	71

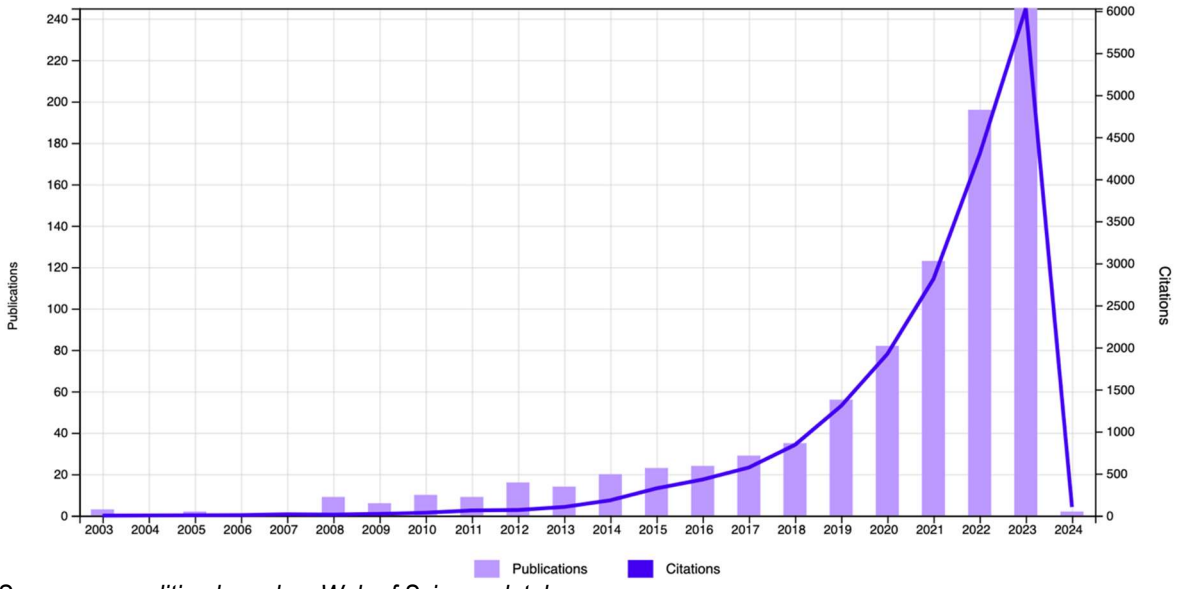
Source: own edition based on Web of Science database.

3. Analysis and Findings

3.1. Publishing Trends

This section unveils the principal outcomes of the performance bibliometric analysis applied to records associated with greenwashing in business and management research published between 2003 and 2023. The number of publications and citations about greenwashing for two decades is shown in **Figure 1**. Based on this, three main periods can be defined: P1 between 2003-2011, a stagnating growth; P2 between 2012-2018, a slow growth; P3 between 2019-2023, and exponential growth.

Figure 1. Times Cited and Publications Over Time



Source: own edition based on Web of Science database.

Between 2003 and 2011 (P1), there was a period of awakening with fluctuating slow growth, where the number of publications ranged from a minimum of 0 to a maximum of 10. During this period, a total of 34 publications were produced, constituting 4.21% of all publications. From 2011 to 2018 (P2), a slow and more stable growth phase was observed, with the number of publications ranging from a minimum of 13 to a maximum of 333, showing continuous growth except for 2015 and 2017. This period encompassed a total of 146 publications, accounting for 18.10% of all publications. From 2019 onwards, an exponential growth trend is noticeable, especially in 2021, where the number of publications increased by 58.71% for the year 2022, and then from 2022 to 2023, the growth rate was 25.58%. These 627 publications represent 77.69% of all publications. This growth rate is also supported underlined by Wang *et al.* (2023). In the P1 period, the most cited article was

Social Accountability and Corporate Greenwashing from Laufer WS, in 2003, with 675 citations (the second most cited article out of 807). From P2, the most cited article (819 times), based on WoS, is Delmas and Burbano's (2011) work, "The Drivers of Greenwashing," which can be considered foundational for the subject. From P3 the most cited article is Greenwashing in environmental, social and governance disclosures by Yu, Van Luu and Chen from 2020 with 167 citations. Another important paper on the topic which is not a core part of scientific databases and cannot fail to be mentioned is the work of Terrachoice's Marketing: "Six Sins of Greenwashing" (2007) and "The Sins of Greenwashing: Home and Family Edition" (2010) (Nemes *et al.* 2022). Based on Google Scholar, Terrachoice occurs 2220 times in the database, and for example, the most cited article from Delmas and Burbano (2011) occurs 2990 times.

To answer the first question: What were the publishing trends in greenwashing between 2003 and 2023? the publishing trends in greenwashing between 2003 and 2023 are an emerging topic that has gained importance mainly in 3 years. During the P3 period, publications on the bibliometric analysis of greenwashing were published in 2017 (Andreoli *et al.*), 2021 (Montero-Navarro) and 2023 (Telukdarie; Pendse *et al.*; Wang *et al.*), but **Figure** 1 displays that the high number of articles published in 2023 (216) is an incentive for further analysis of the topic. It has taken a long time since Jay Westerweld coined the concept of greenwashing in 1986 (Ranjbari *et al.* 2021) for the phenomenon to receive significant attention from the scientific world.

3.2. Influential Countries

Besides the publishing trends, the geographical distribution of the area likewise gives a better understanding of how greenwashing trends have evolved over the last 20 years. Numerous countries are contributing significantly to studies on greenwashing; therefore, the following section focuses on the output of the most prominent countries between 2003 and 2023. Table 2 presents the results of the top 10 nations in terms of publications in the field of exploration. The ranking is based on the number of published papers. Table 2 reveals that the two leading countries for publications on the subject are the USA and China, accounting for 38.29% of all publications greenwashing.

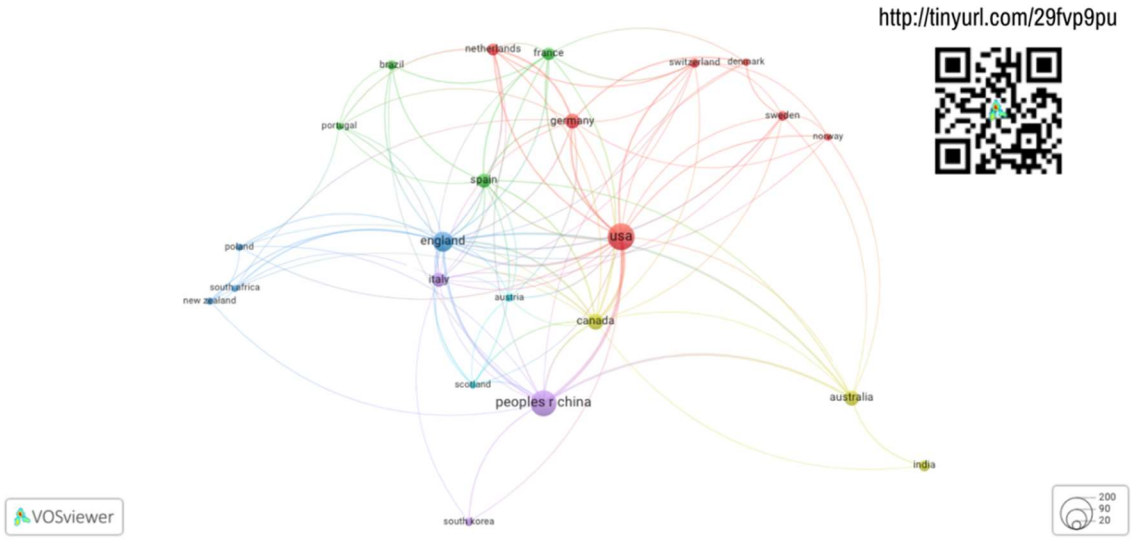
Table 2. Top ten countries based on the number of publications

Rank	Country	Documents	%	Citations
1	USA	159	19.83 %	7345
2	People republic of China	149	18.46 %	2415
3	England	88	10.90 %	2168
4	Canada	55	6.82 %	2274
5	Australia	49	6.07 %	1023
6	Germany	48	5.95 %	1034
7	Italy	44	5.45 %	1160
8	Spain	43	5.33 %	555
9	France	34	4.21 %	1415
10	Netherlands	31	3.84 %	777

Source: own edition based on Web of Science database.

The USA and China are considered the two most prominent countries concerning publications on the topic. The first publication in the USA dates to 2003, while in the case of China, it occurred in 2013. Looking at the last two years (2022 and 2023), it is evident that the topic has gained significant attention in China. The USA published 53 publications in the two years, while China published 109. Therefore, the awareness and research on greenwashing started earlier in the USA. Still, China has also intensified its focus on the phenomenon in recent years, as reflected in the number of citations. In terms of continents, the top 10 ranking includes Europe (England, Germany, Italy, Spain, France, and the Netherlands) in first place with 288 publications, North America (USA, Canada) in second place with 214 publications, Asia (China) in third place with 149 publications, and Australia in fourth place with 49 publications. In this perspective, South America and Africa are not yet the focus of interest for greenwashing in these regions.

Figure 2. Countries co-authorship network



Source: Authors' research via VOS Viewer
Primary data: WOS

Research collaboration can be effectively captured through co-authorship networks, as co-authorship is a highly visible and well-documented scientific collaboration (Ullah *et al.* 2022). Co-authorship involves two or more contributors collaboratively presenting their research findings on a specific topic (Hosseini 2020). As a result, co-authorship networks can be seen as social networks that include researchers, illustrating their collaboration. In these networks, countries are represented as nodes. Nodes are connected if the respective country has co-authored at least one publication, with or without additional co-authors. Furthermore, link weights can be introduced to convey the intensity or strength of research collaboration.

The threshold value for the number of publications per country was manually established at 10 to focus the analysis on the most active countries in this field. Out of the 86 countries, 23 surpassed this threshold. Using these 23 countries, the total strength of bibliographic coupling links with other nations was calculated.

In Figure 2, the circles' sizes indicate the number of publications from different countries, while the lines' thickness represents the collaboration level. For example, the strength of collaboration between the United States and China was depicted as 15, which is shown as a thick line. Conversely, the collaboration strength between the United States and Poland or South Korea was weaker 1.

The 23 countries included in the analysis were divided into 6 clusters, with the cluster marked in red having the largest number of elements. In this cluster, the USA has the highest total link strength, reaching 61, showcasing the outstanding scientific role of the United States. England follows with a total link strength of 57, and China has 47. This is supported by their relatively central positions on the graph. It is also essential to note Austria's central role and Australia's peripheral position despite being the fifth-highest contributor to publications.

In summary, the United States, China, and several developed European countries (such as England, Germany, and Italy) play a significant role in the topic. In contrast, African and Southern European countries lag. Furthermore, the leading countries engage in substantial collaboration with each other.

3.3. Journals

Another essential aspect of the bibliometric review was looking at the most influential journal contributing to greenwashing over the last twenty years. The purpose is to examine which journal articles related to greenwashing primarily appear and in what quantity, thereby investigating the importance of the topic; additionally, it aims to analyze the quality of the journals where these articles are published. Therefore, Table 3 displays the top 10 journals that most frequently publish articles related to the topic. Regarding the number of published articles, Sustainability - Basel leads with 59 publications, constituting 7.32% of the 807 publications. The Business Strategy and Ethics journal, classified as Q1 and having the highest impact factor, ranks third with 35 publications. These top ten journals contribute to 28.50% of the articles in the database. The table also highlights that the journals belong to Q1 and Q2 quartiles, with impact factors ranging from 2.7 (Environmental Communication: A Journal of Nature and Culture) as the lowest to 13.4 (Business Strategy and The Environment)

as the highest among the top 10 journals with the most publications. Greenwashing remains a pertinent and trending topic for exploration in these journals.

Table 3. Top 10 most active journals in the greenwashing topic

Rank	Journal	Record count	%	Impact factor (2022)	Journal Quartile	Country
1	Sustainability – Basel	59	7.32	3.9	Q2	Switzerland
2	Journal of Cleaner Production	36	4.46	11.1	Q1	United Kingdom
3	Business Strategy and The Environment	35	4.34	13.4	Q1	United Kingdom
4	Journal of Business Ethics	28	3.46	6.1	Q1	Netherlands
5	Corporate Social Responsibility and Environmental Management	20	2.47	9.8	Q1	United Kingdom
6	Environment Development and Sustainability	13	1.61	4.9	Q2	Netherlands
7	Environmental Communication A Journal of Nature and Culture	10	1.24	2.7	Q2	United Kingdom
8	Finance Research Letters	10	1.24	10.4	Q1	Netherlands
9	Journal of Sustainable Finance & Investment	10	1.24	4.3	Q1	United Kingdom
10	Energy Economics	9	1.12	12.8	Q1	Netherlands

Source: own edition based on Web of Science database

Co-citation analysis relies on the volume of published documents, the frequency of citations those documents receive, and the overall link strength associated with those citations. The table generated through this analysis ranks sources or journals within the discipline (Znidaršič *et al.* 2021). Additionally, co-citation analysis enables an examination of the consensus regarding the collective research agenda in a specific research field or journal. It facilitates the identification of emerging trends over time. A co-citation is registered when two articles reference the same source (Lazer *et al.* 2009). When the cited literature was analyzed for journal co-citations, the minimum number of citations of a source was 20; of the 18499 sources, 333 met the threshold. Table 4. supports the findings presented in Figure 3. The results indicate that an article published in the most prolific journals is likely to be cited within articles published in the journals listed in Table 3. As shown in Table 3 of co-cited journals, five of the ten most productive journals stand out. This suggests that these five journals may serve as the leading specialist journals in the research field of greenwashing.

Table 4. Top 10 co-citated journals

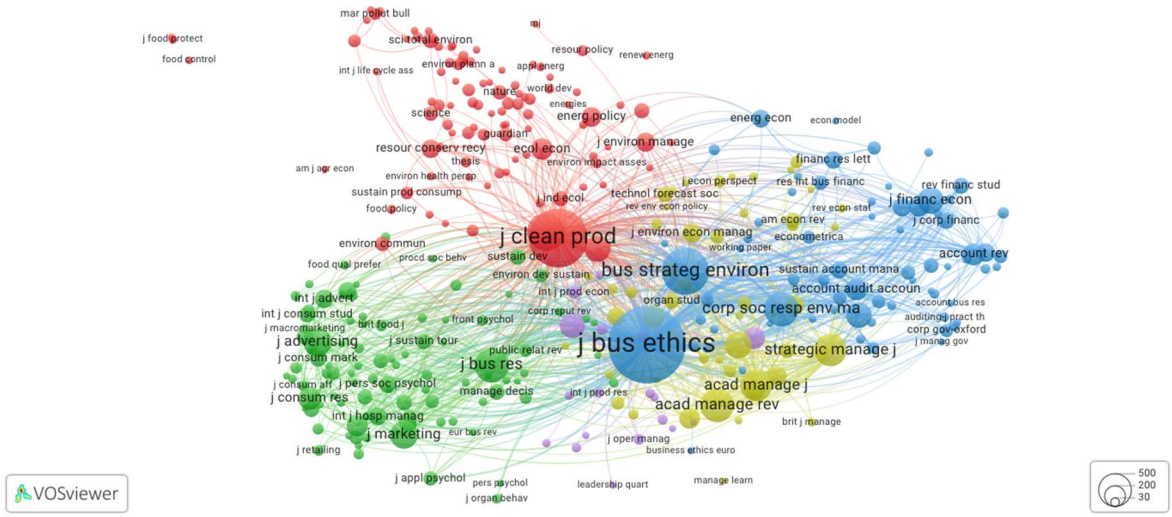
Rank	Journal	Citations	Total link strength
1	Journal of Business Ethics	2612	125402
2	Journal of Cleaner Production	1506	69391
3	Business Strategy and The Environment	973	55295
4	Sustainability	625	26326
5	Corporate Social Responsibility and Environmental Management	522	31509
6	Journal of Business Research	519	27657
7	Academy of Management Review	489	28182
8	Strategic Management Journal	454	28668
9	Academy of Management Journal	447	26587
10	Journal of Advertising	348	15016

Source: own edition based on Web of Science database

The leading role of the Journal of Business Ethics is also because four of the ten most cited authors (Laufer 2003; Parguel *et al.* 2011; Walker and Wan 2012; Chen and Chang 2013) have published their work in this journal.

In Figure 3, five clusters can be distinguished based on the analysis conducted with VOSviewer. The first cluster (in red - 100 items) includes environmental, policy sustainability, and energy journals, encompassing the Journal of Cleaner Production and Sustainability. The second cluster (in green - 97 items) connects to journals covering business, marketing, advertisement, consumer behavior, and psychology, including the Business Strategy and the Environment, Journal of Business Research, Strategic Management Journal, and Journal of Advertising. The third cluster (in blue - 69 items) is associated with journals focusing on accounting, finance, and corporate social responsibility, which includes the Journal of Business Ethics, Corporate Social Responsibility, and Environmental Management. The fourth category (in yellow - 49 items) consists of journals related to management, business, and organization, with the most cited being the Academy of Management Review and the Academy of Management Journal. The fifth cluster (in purple - 18 items) primarily concentrates on journals with a production theme.

Figure 3. Journals co-citation analysis



Source: Authors' research via VOS Viewer
Primary data: WOS

In the case of these five clusters, the red (environment and policy) and blue clusters (finance, CSR, and accounting) are closest to each other, while the yellow (management and business strategy) and purple (operation and production) clusters are connected beneath the prominent red and blue clusters. The second-largest cluster, mainly listing journals related to marketing and advertising themes, has a relatively distant connection to the other clusters but is close regarding scientific connections within the field. These results also reflect that greenwashing is a highly complex, multidisciplinary topic deserving the attention of researchers, as evidenced by the number of citations.

3.4. Influential Authors and Documents

In the author collaboration network, from the 807 articles 2021 different authors wrote at least one article, 149 authors have published at least two articles, and 39 authors have contributed to at least three or more articles. For each of the 39 authors, the total strength of the co-authorship links with other authors was calculated. The authors with the greatest total link strength were selected. Based on this some of the 39 items (author) are not connected to each other, so that means there are no strong co-authorship relations between the authors regarding greenwashing; hence 2021 authors with 807 publications laid the foundations, which is linked to many different areas and concern (management, marketing, production, public policies and environment) (Montero-Navarro *et al.* 2021), and in other from another point of view, partly due to the novelty of the topic, which has not yet allowed the development of cooperation.

At the same time, it is important to see which authors have written the most articles on the subject and published the works that have received the most citations. To identify the most productive authors on the subject, was first looked at who had written the most publications. As can be seen in Table 5, Zhang the first with 10 publications written in five in 2022 and five in 2023; these ten publications during the two years got 214 citations.

Connecting to greenwashing, Seele and Lyon are the next with five and five publications, but of the most productive authors, Lyon got the most citations (1454).

Table 5. Top 10 most productive author

Rank	Name of author	Number of publications	Citations	Country
1	Zhang, DY	10	214	China
2	Seele, P.	5	280	Switzerland
3	Lyon, T.P.	5	1454	USA
4	Wang, G	4	65	China
5	Castro, I.B.	4	128	Brazil
6	DU, X.Q.	4	271	China
7	Testa, F.	4	382	Italy
8	Montgomery A. W.	4	569	Canada
9	Wang, W.	4	21	China
10	Matthes, J.	4	180	Austria

Source: own edition based on Web of Science database

To indicate the most cited source, the Web of Science Core Collection data was used with the search strategy indicated in the methodology. Among the ten most cited documents (Table 5), the earliest one is authored by Laufer and dates back to 2003, while the most recent is from 2016 (Marquis, Toffel and Zhou). A total of 6 works from the list originate from authors in the USA, further affirming the prominence of the USA in the field. There are 535 citation differences between the first (Delmas and Burbano 2011) and the tenth (Mahoney, Thorne, Cecil, and LaGore 2013) most cited publication, which can be considered a relatively large distinction. According to WoS Categories, these publications mainly pertain to the topics of Business, Management, and Ethics, with a minor focus on Economy, Finance, and Environment. Concerning research areas, these publications fall into the categories of Business & Economics and Social Sciences. When examining Citation topics, most of these publications are related to the Corporate Social Responsibility theme, except for Chen and Chang's publication from 2013. Web of Science offers the most reliable method for assessing an article's impact on the scholarly community. Using the Citing items by classification provides a breakdown of how an article has been referenced, relying on available citation context data and snippets from citing items. The citing item by classification is broken down into five parts: background, basis, discussion, support, and difference.

In most cases, the most cited documents were mentioned in other publications in the background section (834) and the discussion section (346), which guides a study within the field of science. In the case of the discussion section, references were also included, mentioning them because the current study was discussed in more detail. Regarding the basis, 99 mentions of datasets, methods, concepts, and ideas were being utilized, directly taken from the documents mentioned earlier by authors for their work or upon which their work was grounded. However, these documents were mentioned 33 times as supporting references, indicating they exhibit similar results to the respective study. This suggests methodological similarities or, in some cases, the replication of results. Only one instance of divergent references was found concerning Walker and Wan (2012), where the citing study claims that they have different results.

Bibliographic coupling is a technique for measuring similarity that employs citation analysis to establish a relationship between documents based on their citations. This phenomenon occurs when two pieces of literature refer to a common third work in their reference lists, indicating a likelihood that the two works are dealing with a related subject. Documents are deemed to be bibliographically coupled if they both cite one or more shared references. The "coupling strength" level between two documents is greater when they have more citations in common with other documents. (Boyack and Klavans 2010; Yan and Ding 2012; Kleminski et al. 2022). The bibliographic coupling with a unit of analysis (document) was organized to find the field's most significant publication. The minimum number of citations per document is 0, but in this case, 100 citations per document were settled as the threshold for each publication to be chosen for the analysis to ensure that the most relevant documents are targeted for analysis. Out of the total 807 publications, 41 met the minimum criteria, and these documents are ranked based on the most muscular total link strength and citations. Lyon and Montgomery (2015): The Means and End of Greenwash in the Organization & Environment journal, with 357 citations and a total link strength of 211, was the strongest publication.

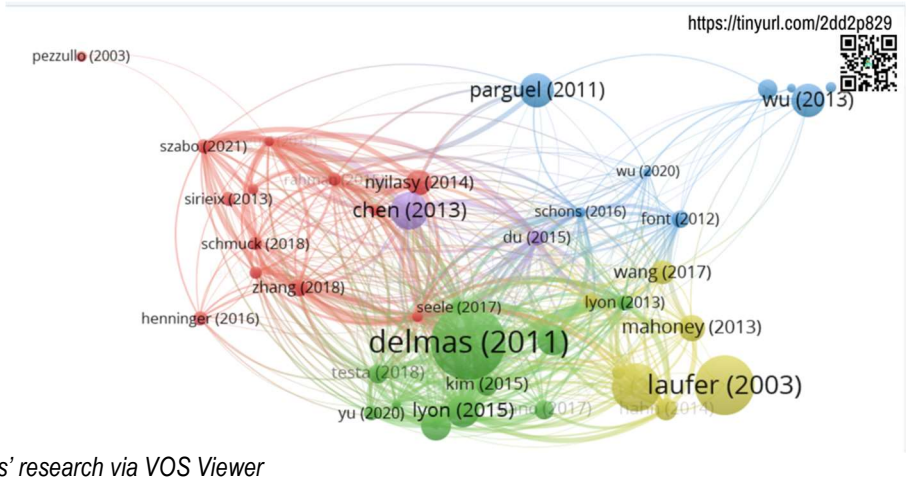
Table 6. Top ten most cited document

Rank	Title	Authors	Number of Citations	Year of Publish	Country	Journal
1	The Drivers of Greenwashing	Delmas, M.A.; Burbano, V.C.	825	2011	USA	California Management Review
2	Social accountability and corporate greenwashing	Laufer, W.S.	658	2003	USA	Journal of Business Ethics
3	Greenwash: Corporate Environmental Disclosure Under Threat of Audit	Lyon, T.P.; Maxwell, J.W.	540	2011	USA	Journal of Economics & Management Strategy
4	Greenwash and Green Trust: The Mediation Effects of Green Consumer Confusion and Green Perceived Risk	Chen, Y.S.; Chang C.H.	421	2013	Taiwan (China)	Journal of Business Ethics
5	How Sustainability Ratings Might Deter 'Greenwashing': A Closer Look at Ethical Corporate Communication	Parguel, B.; Benoît-Moreau, F.; Larceneux, F.	379	2011	France	Journal of Business Ethics
6	Corporate social responsibility in the banking industry: Motives and financial performance	Wu, M.W.; Shen, C.H.	377	2013	Taiwan (China)	Journal of Banking & Finance
7	The Means and End of Greenwash	Lyon, T.P.; Montgomer, A.W.	361	2015	USA	Organization & Environment
8	The Harm of Symbolic Actions and Green-Washing: Corporate Actions and Communications on Environmental Performance and Their Financial Implications	Walker, K.; Wan, F.	344	2012	Canada	Journal of Business Ethics
9	Scrutiny, Norms, and Selective Disclosure: A Global Study of Greenwashing	Marquis,C.; Toffel, M.W.; Zhou, Y.H.	336	2016	USA	Organization Science
10	A research notes on standalone corporate social responsibility reports: Signalling or greenwashing?	Mahoney, L.S.; Thorne, L.; Cecil, L.; LaGore, W.	290	2013	USA	Critical Perspectives on Accounting

Source: own edition based on Web of Science database

The second strongest was Seele and Gatti (2017), with 161 citations and 192 total link strength, "Greenwashing Revisited: In Search of a Typology and Accusation-Based Definition Incorporating Legitimacy Strategies" in the Business Strategy and the Environment. The third one was by Torelli, Balluchi, and Lazzini (2020), "Greenwashing and environmental communication: Effects on stakeholders' perceptions", with 116 citations and 185 total link strength (see on Figure 4).

Figure 4. Bibliographic coupling of documents



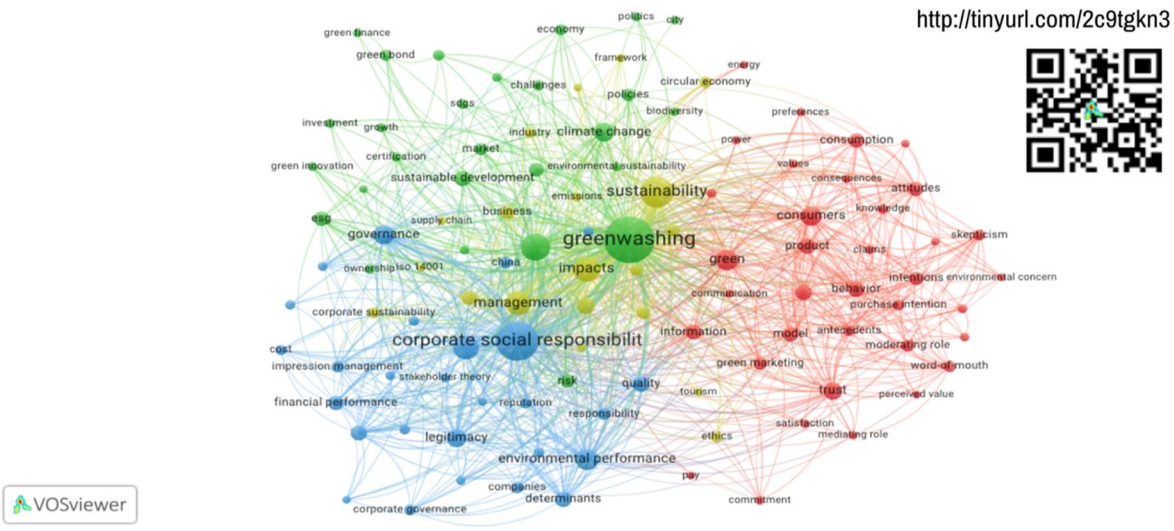
Source: Authors' research via VOS Viewer
Primary data: WOS

Of the five clusters, the first one, represented by red, is the largest cluster, with 13 documents primarily aggregating publications that investigate the effects of greenwashing. The second cluster (green) consists of 11 documents, mainly comprising theoretical foundational works such as those by Delmas and Burbano (2011) and Lyon and Maxwell (2015). The third (blue) cluster contains eight documents concentrating on corporate social responsibility, and the fourth (yellow) cluster has seven documents, predominantly focusing on works related to corporate social responsibility with more focus on the finance area. The fifth (purple) cluster has two elements and can be considered a small group of studies examining the ethical aspects of greenwashing.

3.5. Keyword Analysis

Keywords can encapsulate the core idea of an academic article, and keyword co-occurrence networks enable an in-depth analysis of these articles (Conway 2009; Corrin 2022). Co-occurrence analysis entails establishing connections between keywords that are simultaneously present in a document's title, abstract, or list of keywords (Zupic & Cater 2015). This technique was utilized to uncover thematic groupings, emerging patterns, and significant subjects pertinent to the realm of greenwashing. The fundamental justification for employing co-occurrence is the assumption that the frequent co-occurrence of terms within a body of text signifies thematic or conceptual interconnectedness (Zupic & Cater 2015). The keywords provided by authors and the keyword plus of the papers that occurred more than ten times in all the documents were calculated to the WOS Core Collection data registered with the "full counting" method in the final analysis, and duplications and plurals were corrected in the thesaurus file. Of the 3574 keywords, 110 met the threshold.

Figure 5. Co-occurrence networks of keywords



Source: Authors' research via VOS Viewer
Primary data: WOS

The minimum keyword set (ten) also helped to include more prevalent keywords in the chosen database, and the cleaning of the data using the thesaurus file also contributed to better keyword transparency. The nodes' size signifies the occurrence frequency, while the curves between the nodes represent their co-occurrence within the same publication (Cheng *et al.* 2018).

The shorter the distance between two nodes, the larger the co-occurrences of the two keywords (The font size represents the frequency of occurrence). The keywords that appeared (Figure 5) most were "greenwashing" (occurrence 352 times, total link strength 1580), corporate social responsibility (occurrence 249 times, total link strength 1210), sustainability (occurrence 154 times, total link strength 655), performance (occurrence 116 times, total link strength 626) and impact (occurrence 103 times, total link strength 575).

Figure 5 displays four clusters (red, green, blue, and yellow), indicating the interconnectedness of these words. The occurrence of related words and concepts within these clusters is presented in Table 7.

Table 7. The four keyword cluster items

Cluster 1 – Red	Cluster 2 - Green	Cluster 3 - Blue	Cluster 4 - Yellow
antecedents	biodiversity	accountability	business
attitudes	certification	adoption	circular economy
behavior	challenges	China	corporate sustainability
claims	city	companies	diversity
commitment	climate changes	corporate governance	emissions
communication	city	corporate social responsibility	environment
consequences	climate change	cost	ethics
consumers	competition	determinants	firm
consumption	economy	disclosure	framework
energy	environmental	economic performance	impacts
environmental concern	policy	environmental disclosure	industry
green	environmental	environmental performance	iso 14001
green advertising	sustainability	firm performance	management
green marketing	ESG	governance	organizations
information	green bond	impression management	perspective
intentions	green finance	legitimacy	strategies
involvement	green innovation	media	supply chain
knowledge	greenwashing	pollution	supply chain management
mediating role	growth	quality	sustainability
model	innovation	reputation	tourism
moderating role	investment	responsibility	
pay	market	self-regulation	
perceived risk	ownership	stakeholder engagement	
perceived value	performance	stakeholder theory	
perception	policies	sustainability reporting	
power	politics	transparency	
preferences	regulation		
product	risk		
purchase intention	sustainable-development goals		
satisfaction	sustainable development		
skepticism	sustainable finance		
social media			
trust			
values			
willingness to pay.			
word of mouth			

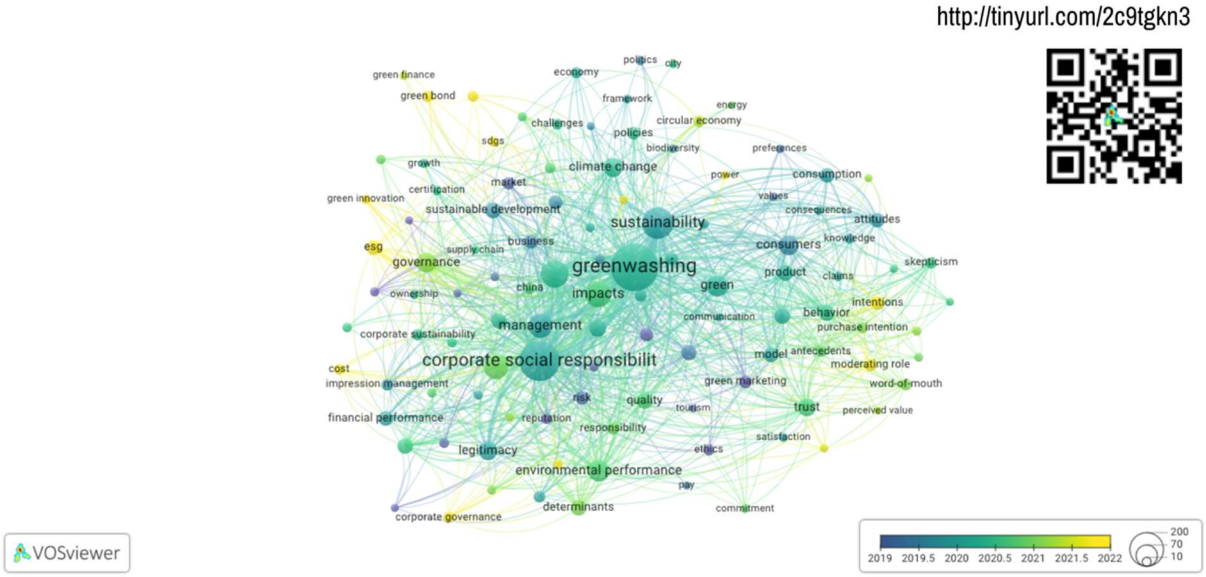
Source: own edition based on Vosviewer software

As evident, the "greenwashing" node holds a central position in the network, highlighting its proximity to the rest of the nodes and, therefore, the current relevance of the topic. The first red cluster encompasses 27 elements and primarily includes keywords related to consumers and marketing. The most cited keywords in this cluster are green (69), consumers (60), and trust (49). In terms of the number of elements, this is the largest cluster, containing 36 elements, but in terms of citations and connections, it represents a sprawling, fragmented area. This is due, on the one hand, to the diversity and complexity of consumer behavior and purchasing decisions, and it also indicates that research in this area has yet to strengthen to the same extent. The second green cluster contains 27 elements, with the most cited concepts being greenwashing (352), performance (116), and climate

change (57). Greenwashing and performance are central in this cluster, while the other keywords show significantly more diverse and distant connections. Terms such as climate change, environmental policy, environmental sustainability, ESG, green finance, green innovation, policies, politics, regulation, risk, and sustainable development goals can be summarized as governance and legitimacy, with a central focus on political regulation and its impact on greenwashing.

The blue cluster also consists of 27 elements, with the most cited concepts in this cluster being corporate social responsibility (259), centrally positioned, along with disclosure (89), and environmental performance (71). This cluster can be interpreted as related to corporate and stakeholder terms. Its connections are primarily with the blue (governance) and yellow clusters. The yellow cluster, which includes 20 elements, holds a central position in the network, showing proximity to the rest of the nodes. This cluster can be characterized as impacts and environmental management, with the most occurrences of sustainability (154), impacts (103), and management (90) keywords.

Figure 6. Overlay - Temporal visualization of keywords



Source: Authors' research via VOS Viewer
Primary data: WOS

Figure 6 offers a temporal visualization of shifting research foci. Most of the research, 77.69%, falls from 2019 through 2023, as demonstrated and reflected in the figure. It becomes evident that studies on the topic initially revolved around keywords such as ethics, green marketing, reputation, and competition. Circles colored yellow indicate a newer year. Yellow keywords include "green bond", "green innovation", "ESG", "cost", "intention", "moderating role", "corporate governance", and "sustainable development goals – SDGs". Therefore, it becomes an opportunity for future research on these keywords. Consequently, the theme of greenwashing is shifting from the perspectives of consumers and corporate social responsibility towards governance, finance, and audit.

Further Research

Based on the Web of Science database and the keyword search results, the following future research opportunities were summarized.

Future investigations into greenwashing should deeply explore the changing trends and obstacles encountered within the realms of sustainability and corporate responsibility. It is crucial to pay specific attention to examining the effectiveness of existing regulatory frameworks in addressing greenwashing practices and proposing potential improvements. Moreover, understanding consumer attitudes and behaviors towards greenwashing is crucial, particularly given today's growing environmental consciousness. This entails delving into the influence of greenwashing across various industries and evaluating strategies to cultivate genuine sustainable behaviors within companies.

Research efforts should also concentrate on the impact of emerging technologies like blockchain and artificial intelligence in promoting transparency and credibility in sustainability claims. An essential aspect to

explore is how these technologies can provide innovative solutions to tackle greenwashing effectively. Additionally, future studies should consider adopting a longitudinal approach to capture temporal changes, considering the rapidly evolving landscape of sustainability trends and environmental issues. It is important to advocate for comprehensive information on emerging continents, despite existing critical issues that demand immediate attention. Comparative analyses across countries and continents can shed light on how diverse cultures and economic conditions lead to different attitudes towards greenwashing. It is imperative to develop a methodology that allows external organizations or businesses to assess the presence of greenwashing in their operations and determine its extent.

Future research endeavors could directly examine the circumstances under which customers are more or less likely to detect discrepancies between corporate social responsibility (CSR) policies and their implementation. A critical distinction should be made between material and immaterial dimensions of CSR, exploring potential cross-effects on how perceived greenwashing on one issue may influence perceptions of corporate hypocrisy on other CSR issues. Delving into the financial ramifications of greenwashing and its impact on company performance and economic outcomes is also essential. Methodologies should be devised to quantify the economic consequences of greenwashing on industries and financial markets.

Evaluating the efficacy of financial disclosures in preventing greenwashing and fostering genuine corporate sustainability is crucial. Furthermore, studying the influence of greenwashing on environmental management practices within organizations is paramount. Developing a methodological framework to evaluate the environmental impact of greenwashing across different industries is necessary. It is also vital to examine the role of environmental certifications in mitigating greenwashing and encouraging authentic sustainable practices. Exploring various themes in sustainable development, environmental impact, CSR, climate change, certifications, emission control, green consumerism, green satisfaction, consumer green attitudes, brownwashing, individual perceptions of greenwashing and hypocrisy at the individual level offers multiple research possibilities.

Another potential future perspective could be investigating the impact of greenwashing on gender and different generations.

Conclusions

This study focuses on the bibliometric analysis of greenwashing-related publications in international scientific journals. It aims to identify and visualize the intellectual landscape of the field, publishing trends, and patterns in greenwashing from 2003 to 2023 by evaluating the frequency of citations, the country distributions of the nations, most cited authors, key journals in the topic, existing or non-existing authorship patterns, main terms, and most used keywords. Greenwashing is a multiplex and challenging to understand barrier to achieving or improving sustainability in developed and developing countries. To achieve the set goal, six research questions were formulated. To answer these, the analysis included 807 publications filtered from the Web of Science database, which were analyzed using the Vosviewer software. The response to the first research question (RQ1) revealed three main phases in publication trends related to greenwashing from 2003 to 2023. These include a slow, emerging growth (P1), followed by a fluctuating growth (P2), and the third period (P3), indicating stable exponential growth. This confirms the relevance of the topic and forecasts further expected growth.

The results of the research question about the geographical distribution of scientific publications in the examined field of greenwashing (RQ2) revealed that, from the perspective of the study, the United States America, China, United Kingdom, Canada, Australia, Germany, Italy, Spain, France, and the Netherlands have significant contributions with substantial publications and international publication networks. Most research, especially in business sciences, originates in the United States, America, and China, given the influential role of numerous prestigious educational institutions and research centers. The central roles of the United Kingdom and the USA are evident in the co-authorship network of countries. At the same time, China, leading both in the number of publications and citations, is relatively positioned towards the periphery. Countries located at the outer periphery of the emerging clusters have looser international publication connections, whereas countries at the cluster centers exhibit stronger scientific research collaboration. The response to the question also outlined the prominent roles of the USA, China, and primarily Southern-Western Europe on the subject; meanwhile, other emerging countries and continents or continental parts are notably absent from the list.

The evaluation of a particular topic is significantly influenced by the ranking of journals since the higher the ranking and indexing of a journal, the more "valuable" the topics and articles published in it are considered. In response to the question (RQ3) regarding which journals primarily feature articles on the topic, these articles appear in scientifically diverse journals. According to the Scimago Journal ranking, with three exceptions - Sustainability-Basel, Environment Development and Sustainability, and Environmental Communication A Journal

of Nature and Culture - these journals belong to the highest scientific category, namely Q1. The classification of journals of this nature may suggest that research on greenwashing is highly favored, not only by authors but also by journal editors. Furthermore, in the case of co-citation networks of journals, five clusters can be distinguished, supporting the multidisciplinary nature of the topic.

Regarding authorship and collaborative research patterns (RQ4) from the author's perspective, in agreement with other scholars (Montero-Navarro *et al.* 2021; Wang *et al.* 2023), Delmas and Burbano (2011) received the most citations (n=825). In contrast to the results of Montero-Navarro *et al.* (2021) and Santos *et al.* (2023), the author contributing the most publications on the topic is Zhang, with ten publications published in 2022 and 2023. The most co-cited authors are primarily Laufer (total link strength 5742, citation 337), as mentioned by Wang *et al.* (2023), followed by Chen, (total link strength 5587, citation 318), and Delmas (total link strength 4629, citation 265).

Beyond identifying which documents have received the most citations so far, it is worthwhile to observe the primary categories to which they belong. These categories primarily involve clarifying theoretical and conceptual issues and examining the effects of greenwashing. Additionally, the topic strongly emphasizes questions related to corporate social responsibility, extending into the realms of management and finance. All these aspects also entail ethical considerations. Employing bibliographic coupling analysis, five distinct clusters were delineated. The three most expansive clusters are predominantly associated with publications addressing the effects of greenwashing, while the second cluster is characterized by theoretical and foundational works. The third cluster is oriented explicitly toward aspects of corporate social responsibility. An observable trend emerges in the overlay visualization, indicating a transition from foundational theoretical publications to more targeted, multidisciplinary, quantitative, or qualitative research-based publications.

The co-occurrence analysis and the frequency of keyword usage contribute to a better understanding of the topic and thinking about future trends (RQ5). The analysis identified the top five keywords ("greenwashing," "corporate social responsibility," "sustainability," "performance," and "impacts"), indicating which areas are most closely related to greenwashing and in which domain most publications have been produced. Additionally, the four clusters identified by Vosviewer highlight that the treatment of the topic from a marketing and consumer perspective is highly fragmented, emphasizing governance in the green cluster, corporate and performance in the blue cluster, and impacts and management in the yellow cluster. The analysis also reveals a shift towards government regulation and banking-finance.

In line with Wang *et al.* (2023), the research findings also reveal that the multiplicity of the phenomenon of greenwashing results in modular research content. Examining keyword changes indicates an initial achievement of multidisciplinary integration in existing greenwashing research. The study subjects exhibit a complex interplay between macro and micro perspectives, accompanied by a growing diversification across cultural contexts and research regions.

This study aids newcomers and senior scientists in the field by swiftly providing an overview of current research trends. It also assists research institutes and government organizations formulate future research plans through knowledge mapping.

This study, like all other bibliometric analyses, encompasses numerous limitations. Initially, the articles were retrieved on a set date from a singular database. Although WoS stands as one of the most reliable data sources, it must be acknowledged that further relevant papers may be indexed in other databases; hence, forthcoming researchers can broaden their search to alternative data sources, such as Scopus, Open Alex, or Google Scholar, introducing the possibility that some may have been omitted in this analysis. Furthermore, the criteria were to analyze peer-reviewed articles in English, overlooking other languages and forms of work like book chapters, papers in process, early access materials, and editorials. Additionally, only Vosviewer was employed for data analysis, whereas alternative digital bibliometric software tools could have assessed the data differently. Finally, as a distinctive feature of bibliometric techniques, the interpretation of the maps remains subjective to a certain extent. Despite the limitations, the research will aid those interested in the topic in further contemplation and its better unfolding.

Credit Authorship Contribution Statement

Katalin Nagy-Kercsó: Conceptualization, Investigation, Methodology, Project Administration, Software, Formal Analysis, Writing – Original Draft, Data Curation, Visualization.
Enikő Kontor: Conceptualization, Supervision, Review, and Editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of use of generative AI and AI-assisted technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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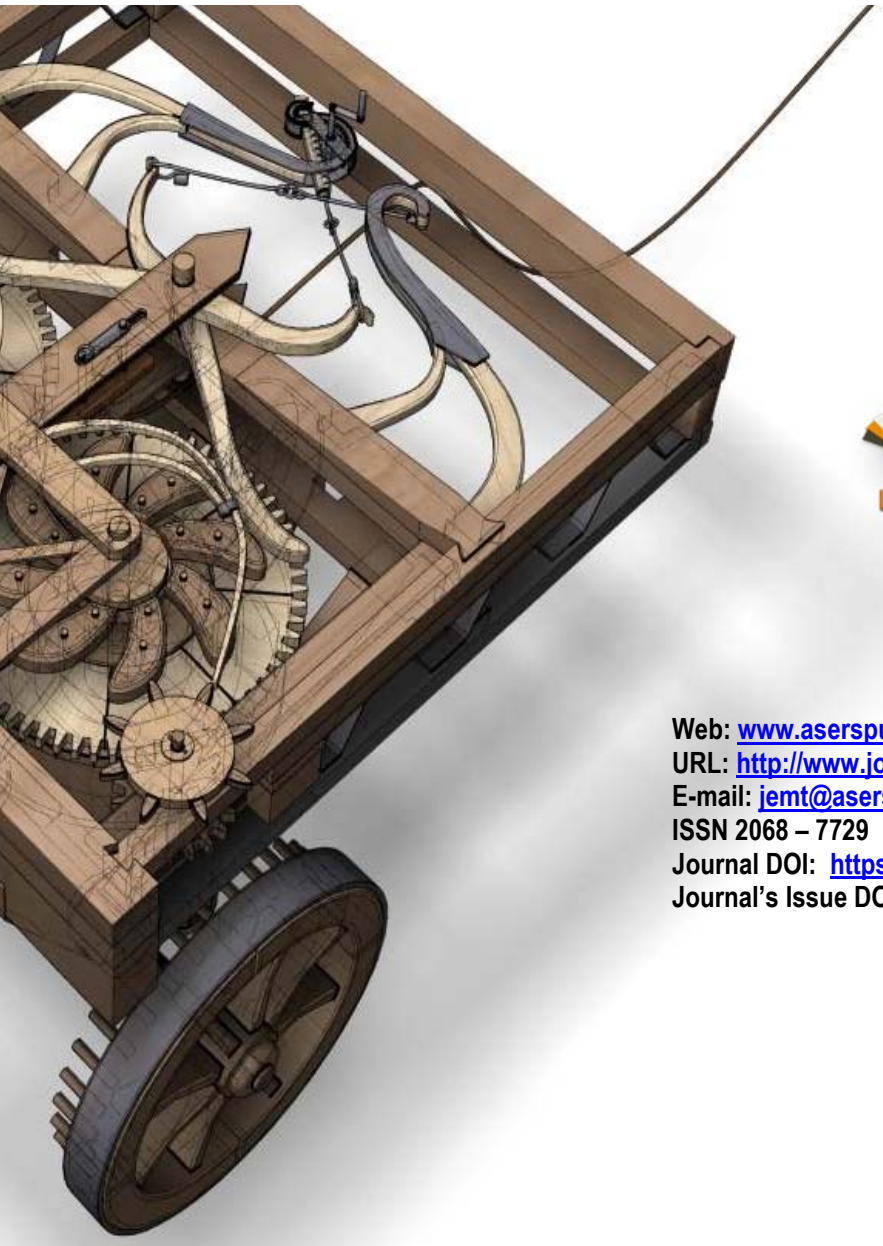

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