2528-9705

Journal of Organizational Behavior Research

Vol.: 10, Is.: 3, Year: 2025, Pages: 188-198

https://doi.org/10.51847/FBpdwcmEUy

Available online

https://odad.org/

A Bibliometric Analysis of Greenwashing Research: Evolution, Trends, and Future Directions

Kurniasih Dwi Astuti[1*], Rudi Zulfikar[1], Lia Uzliawati[1], Windu Mulyasari[1]

[1]Faculty of Economics and Business, University of Sultan Ageng Tirtayasa, Banten 42111, Indonesia.

***Corresponding Author**
E-mail: nien_rz@untirta.ac.id

ABSTRACT

This study examines the phenomenon of greenwashing through a bibliometric approach by analyzing 674 articles published between 2000 and 2025 from the Scopus database. The results show a significant increase in the number of publications and citations, with peak publications reaching 289 articles in 2024 and total citations rising to 18,973. This signals growing global attention to the issue of greenwashing. The study also reveals that China and the United States are the primary research centers, contributing the most and exerting the greatest influence. In contrast, contributions from developing countries, such as Indonesia, remain limited. The focus of greenwashing research is expanding from marketing to include regulation, governance, sustainable finance, and digital technology, including artificial intelligence. A keyword analysis identified eight major clusters, covering topics such as green marketing, corporate social responsibility, ESG, and green innovation. This research offers a comprehensive mapping of trends, international collaborations, and research gaps that can serve as a reference for academics, practitioners, and policymakers aiming to promote transparent and environmentally responsible business practices. However, the study has limitations, including the dominance of data from developed countries, a reliance on English-language publications, and the quantitative nature of bibliometrics, which has not explored qualitative aspects. Therefore, further development of greenwashing research, using a multidisciplinary and inclusive approach, is necessary to strengthen global sustainability governance.

Keywords: Greenwashing, Bibliometric analysis, ESG, Trends.

Introduction

In an era when environmental sustainability has become a strategic value in global business, companies are competing to demonstrate their commitment to environmentally friendly practices. However, behind the vigorous green campaigns, many companies engage in a manipulative practice known as greenwashing. This term refers to a corporate communication strategy that presents an exaggerated or misleading pro-environmental image, while the company's operational practices are far from sustainable. Greenwashing is the act of companies conveying exaggerated, inaccurate, or misleading information or claims about the sustainability practices or environmental impacts of their products, services, or business processes. Another perspective defines greenwashing as the actions of companies making false claims or creating deceptive images of caring about the environment when, in fact, this is not the case (Delmas & Burbano, 2011).

The phenomenon of greenwashing not only impacts public perception but also has serious consequences for management, owners, and stakeholders. For management, greenwashing can backfire strategically, damaging long-term reputation, eroding investor confidence, and increasing the risk of litigation and regulation (Walker & Wan, 2012). Greenwashing has come under increasing scrutiny because it undermines public trust, misleads investors, and creates the illusion of competitive excellence without the underlying environmental improvements. In the context of globalization, companies are not only expected to generate financial benefits but also to demonstrate genuine social

Recieved: 23.06.2025 –Accepted: 05.10.2025 –Published: 15.10.2025

and environmental responsibility. When greenwashing becomes merely a tool for image enhancement, the goal of true sustainability risks losing its meaning.

In addition to being a reputational issue, this practice carries significant ethical, legal, and even financial implications. Research on greenwashing is essential to comprehending its patterns, drivers, and impacts on both internal stakeholders, such as company owners and management, and external stakeholders, such as consumers, authorities, and the general public. According to research like Lyon & Montgomery (2015), market dynamics and lax regulation are the primary causes of greenwashing tactics. But other studies show that media, NGOs, and consumers can act as a corrective factor (Chen & Chang, 2013).

This study is an essential tool for informing stakeholders about erroneous sustainability data, including investors, consumers, and regulators. The public has a right to clear and accurate information as the ultimate consumers so they can make ethical and environmentally conscious choices. When evaluating their sustainability activities and communication strategies, management and business owners can use a solid understanding of greenwashing as a mirror (Spirito *et al*., 2022; Prada *et al*., 2024). The establishment of more trustworthy and responsible corporate governance is also encouraged in order to deliver ESG (Environmental, Social, and Governance) performance. Because it methodically charts the evolution, patterns, and course of greenwashing research, the bibliometric analysis approach proves useful in this situation. Researchers can follow the development of the greenwashing concept over time using the bibliometric approach, which includes the most talked-about subjects, important terms, and changes in emphasis from marketing to governance, regulation, and sustainability accounting. According to a study by De Freitas *et al*. (2022), for instance, since 2010, the focus of the literature on greenwashing has changed from ethical debates to investor perceptions and risk-based strategies. Greenwashing in the MSME sector, digital-based greenwashing (like influencer marketing), and the connection between greenwashing and ESG investment decision-making are just a few examples of under-studied topics (research gaps) that can be found using bibliometric analysis. Researchers can create unique, empirically and normatively relevant topics with this mapping (Haque *et al*., 2021).

Materials and Methods

A quantitative method for measuring, evaluating, and contrasting scientific publications and authors' works is descriptive bibliometric analysis. Identification, screening, eligibility, and inclusion are the four key steps in this process (Moher *et al*., 2009). In the first step, identification, a search is conducted using keywords related to the theme of "greenwashing." The Scopus database was searched, and 1,902 pertinent articles were found. The articles are filtered in the second stage, screening, according to the requirement that they be published between 2000 and 2025. As a result, 699 articles that satisfied the requirements advanced to the following phase. The researchers assess the 699 articles from the previous stage to see if they are appropriate for the final inclusion stage in the third stage, eligibility. According to the researchers' chosen eligibility criteria, the articles had to be published in English. 674 articles that satisfied all requirements and could be included in the final stage were left over after the eligibility stage. To process the research data, researchers employed a variety of applications. Tables like publication and citation trends were shown using Microsoft Excel. Relationships between nations and research topics pertaining to the field of study were visualized using the VOSviewer application. Citation trends like NCP, C/CP, h-index, and others were computed using the PoP application.

Results and Discussion

This section examines patterns in the quantity of publications, citations, and international research partnerships pertaining to greenwashing. The number of scientific publications in this field between 2000 and 2025 is reflected in the publication trend. The trend in the number of citations not only gives a general idea of the amount of research that has been done, but it also shows how much of an impact the research has had on subsequent studies and as a reference for other researchers. Citation trends also show how well-received and accepted the research has been by the scientific community. The patterns of international research collaboration demonstrate how well researchers from various nations work together to conduct studies on greenwashing. Because of the diversity of viewpoints and areas of

expertise, international collaboration can result in research that is of higher quality and has greater impact. Lastly, from 2000 to 2025, research trends center on issues related to greenwashing.

Trends in Number of Publications

The following figure shows the publication trends from 2000 to 2025 related to greenwashing research. The publications are displayed by year of publication.

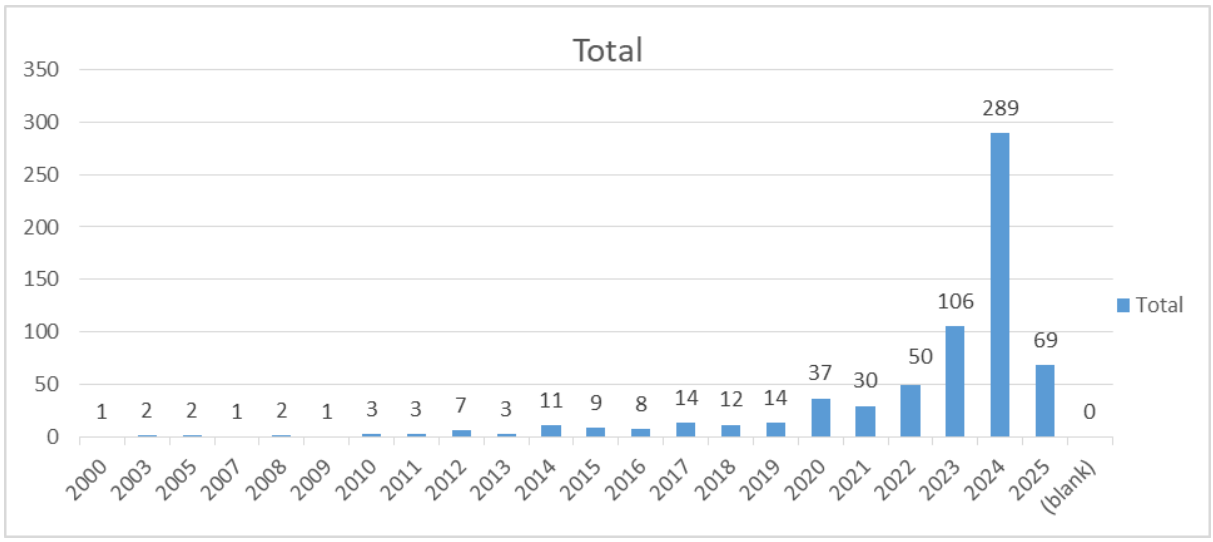

Figure 1. Trends in the number of publications

Based on the figure, the highest number of publications occurred in 2024 with 289 articles. The most significant increase occurred from 2023 to 2024, with an increase of 183 publications. However, the number of publications dropped by 220 in 2025, as the data for the year was still ongoing. From 2000 to 2013, the number of publications remained relatively constant. Early years showed limited publications on greenwashing, but the number increased steadily in the following years, demonstrating that research on greenwashing is gaining growing interest.

Research on greenwashing has increased significantly from 2000 to 2025, driven by several interconnected factors. First, public and consumer awareness of environmental issues has risen considerably, leading to a demand for sustainable business practices and products (Lyon & Montgomery, 2015). This phenomenon encourages companies to demonstrate their environmental commitment, although often, these claims are unsupported by evidence. Second, the detection and analysis of greenwashing have become more sophisticated thanks to advances in science and technology. Business sustainability claims are now validated through blockchain technology, materiality analysis, and life-cycle analysis (Ghisellini & Ulgiati, 2020). Third, the widespread use of the internet and social media has accelerated the spread of greenwashing practices but also facilitated greater public scrutiny and academic research (Delmas & Burbano, 2011). Thus, consumer pressure, technological advancements, and the role of social media have created an ideal environment for the growth of greenwashing-related research.

Trends in Number of Citation

The highest total NCP occurred in 2024 with 2002, coinciding with the publication of 289 articles. The highest h-index value was recorded in 2023 at 28, while the highest g-index value was observed in 2024 at 71. This indicates that the articles published in 2024 had a significant impact on greenwashing research, as evidenced by their high citation rates. In other words, the articles were cited frequently by other researchers, demonstrating their substantial contribution to the field's development and understanding.

1. Trends in the number of citations from 2000 to 2025 related to greenwashing research

Year	Total Publicatio ns	Total Citation	Number Citation Paper	H-Index	G-Index
2025	69	62	13	4	7
2024	289	1063	202	16	71
2023	106	2168	88	28	44
2022	50	1370	43	20	36
2021	30	1198	29	14	30
2020	37	2929	34	22	37
2019	14	520	11	8	14
2018	12	1403	12	9	12
2017	14	1485	12	11	14
2016	8	785	6	5	8
2015	9	1057	9	8	9
2014	11	799	9	6	11
2013	3	421	2	2	3
2012	7	247	6	5	7
2011	3	1864	3	3	3
2010	3	175	3	1	3
2009	1	13	1	1	1
2008	2	13	2	1	2
2007	1	0	0	0	0
2006					
2005	2	533	2	2	2
2004					
2003	2	868	2	2	2
2002					
2001					
2000	1	0	0	0	0
Total	**674**	**18973**	**489**	**168**	**316**

Table 2. Publications with the most citations in 2024

Author	Title	Journal Name	Citations
Celia Santos, Arnaldo Coelho & Alzira Marques	A systematic literature review on greenwashing and its relationship to stakeholders: state of art and future research agenda	Management Review Quarterly	43
Celia Santos, Arnaldo Coelho & Alzira Marques	The greenwashing effects on corporate reputation and brand hate, through environmental performance and green perceived risk	Asia-Pacific Journal of Business Administration	35
Dongyang Zhang	The pathway to curb greenwashing in sustainable growth: The role of artificial intelligence	Energy Economics	27
Simona Galletta, Sebastiano Mazzù, Valeria Naciti & Andrea Paltrinieri	A PRISMA systematic review of greenwashing in the banking industry: A call for action	Research in International Business and Finance	23
Deepti Jog & Divya Singhal	Greenwashing Understanding Among Indian Consumers and Its Impact on Their Green Consumption	Global Business Review	22

Santos *et al*.'s article from 2023, "The greenwashing effects on corporate reputation and brand hate, through environmental performance and green perceived risk," has 43 citations, making it one of the most cited articles. In his study, Santos *et al*. (2023) explain why there has been a surge in interest in greenwashing in recent decades. This is because people are more conscious of the environmental policies that businesses have implemented. But more in-depth, methodical research is still required to understand how this phenomenon developed, particularly how it affects stakeholders. The primary goal of the study is to present a summary and synthesis of the body of knowledge regarding greenwashing. In order to identify the most pertinent research in this field, a bibliometric analysis of articles published up until 2021 will be carried out.

To find gaps and potential areas for further research, recent articles about greenwashing and its relationship to stakeholders were carefully examined. A literature review and bibliometric analysis were performed on 310 articles that were obtained from the Web of Science database using the VOSviewer software. The most important components of the literature on greenwashing were identified in the Santos *et al*. (2023) article. These included authors, articles, journals, institutions, and keyword networks. Furthermore, an analysis of recent publications on the effects of greenwashing on stakeholders allowed for the discovery of patterns, distinctions, and potential areas for further study. This discussion focuses on business-to-business relationships, the taxonomic definition of greenwashing taking into account different practices, and the effects of greenwashing on consumer branding, attitudes, and desires (particularly on purchasing behavior). In addition to offering a comprehensive analysis of the current situation, this study by Santos *et al*. (2023) offers an additional summary of the ways in which greenwashing affects different stakeholders.

Trends in Research Collaboration between Countries

The figure illustrates research collaboration between countries related to greenwashing. The circles represent countries that contributed to scientific publications on the topic. The threshold used for inclusion was a minimum of one publication per country, meaning only countries with at least one publication are displayed in the analysis.

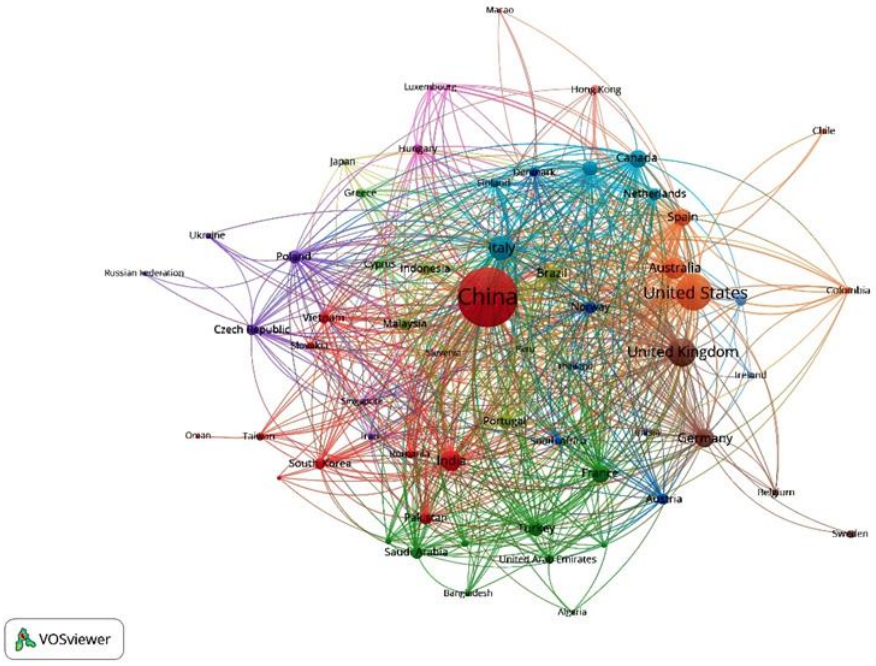

Figure 2. Trends in research collaboration between countries

International cooperation is illustrated by the links between the circles in **Figure 2**. These links demonstrate how scholars interested in greenwashing from different countries work together on their study. One may differentiate between several clusters based on the hue of the circles, which represent different research groups. More

comprehensive and intelligible information about worldwide research collaboration in the context of greenwashing is given in **Figure 3**. A more thorough mapping of the relationships between nations, the degree of cooperation, and the clusters created throughout the research collaboration is shown in this image. This information can be used to better understand the patterns of global research collaboration in the area of greenwashing.

Table 3. Research collaboration between countries in the context of greenwashing

No	Country	Documents	Citations	Total Link Strength
1	China	264	5382	211208
2	United States	104	7370	81732
3	Italy	49	1947	79476
4	United Kingdom	66	2051	62977
5	Australia	37	934	40419
6	India	36	190	39703
7	France	27	1530	31901
8	Spain	24	956	30902
9	Canada	27	1919	28014
10	Germany	29	376	27264
11	Portugal	17	237	20147
12	Switzerland	19	667	19898
13	Turkey	19	503	19875
14	Poland	15	395	18648
15	Brazil	21	900	16371
16	Saudi Arabia	13	73	15259
17	Finland	7	306	14986
18	Pakistan	12	198	14609
19	South Korea	10	151	13272
20	Viet Nam	10	349	13105
21	Malaysia	15	73	13013
22	Norway	13	128	12543
23	Netherlands	13	698	12177
24	Czech Republic	11	204	11665
25	Cyprus	8	204	11266
26	Indonesia	13	19	10003
27	Austria	11	523	9294
28	Colombia	5	134	9183
29	Denmark	7	53	8607
30	United Arab Emirates	8	101	8158

Table 3 shows the research collaboration between countries in the context of greenwashing. The threshold used by researchers is a minimum of 4 publication documents so that only countries that have at least 4 publications are displayed in the analysis.

There are 20 countries that meet this threshold. It can be seen that Indonesia is one of the countries with less than 4 documents, so they are not included in the table. China is the highest country with 264 documents, and 5382 citations. The United States only has 104 documents but the number of citations, 7370, is the highest number of citations. This shows that the United States has a big influence in terms of publication citations. This demonstrates how highly regarded and frequently cited this nation's research is by scholars worldwide. This demonstrates that research on

greenwashing is heavily influenced by both China and the US. It can be argued that these two nations are highly influential and central to this field of study. Accordingly, the figure demonstrates that, among other nations, China and the US have a major impact on cooperative research on greenwashing. With a large number of publications and citations, research from these two nations is acknowledged by the scientific community and makes significant contributions. This data can help us better understand how nations work together and how the greenwashing industry affects the world.

The country with the most research on greenwashing is China. This is because of a special confluence of the government's attention to the outside world, strong environmental pressures, and fast economic growth. Since 2000, China has rapidly industrialized, which has sadly had a detrimental effect on the environment (Economy, 2007). Public awareness of environmental issues increased as a result of significant issues with land degradation, air pollution, and water pollution (Mubayrik *et al*., 2022; Ayari *et al*., 2023). In the global marketplace, Chinese businesses are also making an effort to become ecologically conscious. Greenwashing, in which companies make claims about sustainable practices without sufficient proof, is greatly facilitated by this.

Greenwashing research in China is also motivated by the government's aim to enhance the nation's standing internationally. The Chinese government has made significant investments in environmental programs and renewable energy (Zhang *et al*., 2017). Independent research is necessary to monitor government and corporate sustainability beliefs, as these policies are frequently questioned. Furthermore, domestic and international environmental scandals involving Chinese corporations have promoted awareness of and control over greenwashing tactics. The Chinese government has promoted investment in scientific research, including in the areas of sustainability and the environment, as well as higher education (Cao, 2004). This makes it possible for scholars to investigate the greenwashing phenomenon in great detail. Chinese researchers and researchers from other countries have cooperated internationally to improve the quality and scope of greenwashing research. Therefore, China has become the center of greenwashing studies due to environmental pressure, global goals, and research funding.

Unlike China and the United States, Indonesia is not in the position of countries that publish articles on greenwashing with a minimum number of 4 articles. In Indonesia, the number of studies on greenwashing was relatively limited from 2000 to 2025. This is due to a number of interrelated factors. The main factor is that, compared to developed countries or China, environmental awareness is very low and there is no significant public pressure on this issue (Barr, 2006). Although environmental awareness in Indonesia is increasing, the main attention is often focused on important issues such as deforestation, waste pollution, and natural disasters. As a result, greenwashing may not have been perceived as a pressing issue that requires in-depth academic attention. Moreover, information on possible greenwashing and sustainable business practices may not be readily available to the general public and some academics.

Furthermore, the research infrastructure and resources available for greenwashing studies in Indonesia are very limited. Detailed data on companies' business practices, access to supply chain information, and a deep understanding of global environmental standards are often required for in-depth research on greenwashing (Wijaya & Glasbergen, 2016). The ability of Indonesian researchers to conduct thorough greenwashing studies may be hampered by limitations in data access and sophisticated research methodologies. In Indonesia, the lack of strict laws and regulations on corporate environmental claims may reduce the impetus for greenwashing research. In the absence of good oversight mechanisms, companies may not feel compelled to provide accurate information about their sustainability practices, and consumers may become less wary of possible greenwashing.

Research Focus

The bibliometric analysis, which was carried out using the VOSviewer software, offers important insights into the state of research on greenwashing between 2000 and 2025. To investigate commonly used keywords, this study used three visualizations: network visualization, overlay visualization, and density visualization. Additionally, for source co-citation occurrence, the most commonly used keywords were categorized using VOSviewer **(Table 3)**. The frequency of occurrence is represented by the size of the circles that represent keywords in **Figure 3**, Network Visualization. Bigger circles utilize more frequently used terms to draw attention to significant study subjects. Each cluster is represented by a different hue, and the software automatically groups related keywords into clusters. One of

the main themes, "greenwashing," for example, appears as a wider circle due to its high frequency. The keywords for source citation co-occurrence are shown in **Table 4.** The findings of VOSviewer show 201 entries in 8 clusters. **Figure 3** illustrates the greenwashing research focus. The Vosviewer application was used to display the image with a threshold of 4. This indicates that at least four different documents have used the keywords that are displayed.

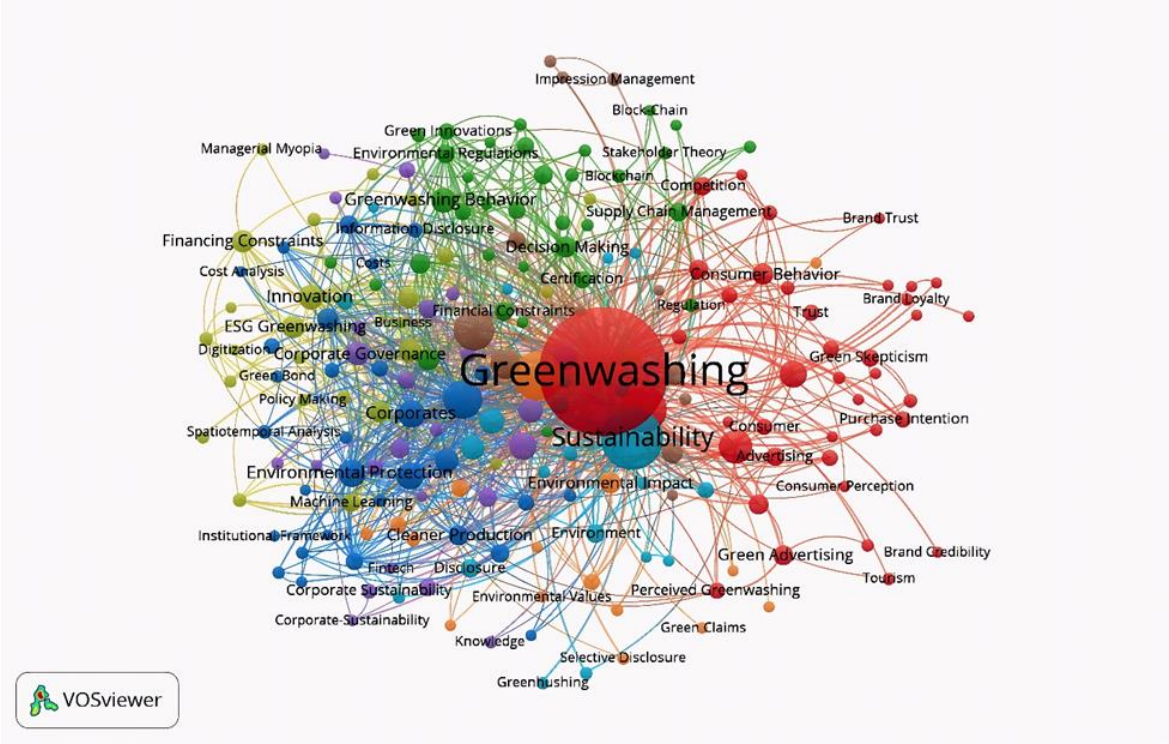

Figure 3. Trending research topics in the field of greenwashing Scopus database processed with VOSviewer

Figure 3 shows three different colors: red, green, blue, and purple. These colors can be used as clusters to divide the research focus within the topic in question. The first cluster, which is distinguished by terms with red rings surrounding them, is the largest of the other groups. This implies that the red cluster is the main subject of investigation. The second research focus is indicated by the green circled keywords that mark the second largest cluster. The third area of study in the field is indicated by clusters in blue. The fourth research cluster is represented by the color yellow. Purple is the fifth area of study. The sixth research cluster is neon blue. The seventh research cluster is the orange-colored cluster. The eighth area of study is brown clusters.

Table 4. Greenwashing Cluster

Greenwashing Cluster			
Cluster 1	**Red**	**39 Keywords**	Advertising, Attribution Theory, Brand Attitude, Brand Avoidance, Brand Credibility, Brand Hate, Brand Loyalty, Brand Trust, Circular Economy, Commerce, Competition, Competitive Advantage, Consumer, Consumer Behavior, Consumer Perception, Consumption Behavior, Corporate Reputation, Corporate Social Responsibility, Expectancy Violation Theory, Fashion Industry, Fast Fashion, Green Advertising, Green Hotel, Green Marketing, Green Purchase Intention, Green Skepticism, Green Trust, Greenwashing, Greenwashing Perception, Legitimacy, Marketing, Perceived Greenwashing, Purchase Intention, Purchasing, Risk Perception, Sales, Signaling Theory, Tourism, Trust

Cluster 2	**Green**	**28 Keywords**	Blockchain, Certification, Construction Industry, Contractors, Decisions Making,Economics, Environmental Regulation, Environmentalism, Evolutionary Game, Financial Constraints, Firm Value, Game Theory, Government, Government Regulation, Green Finance, Green Innovations, Greenwashing Behavior, Institutional Theory, Laws And Legislation, Local Government, Manufacturing, Pollution, Regulation, Regulatory Approach, Stakeholder Theory, Stakeholders, Supply Chain, Supply Chain Management
Cluster 3	**Blue**	**29 Keywords**	Carbon, Carbon Sequestration, Cleaner Production, Conservation Of Natural Resources, Corporate Environmental Performance, Corporate Strategy, Cost Analysis, Costs, Environmental Assessment, Environmental Economics, Environmental Information Disclosure, Environmental Monitoring, Environmental Protection, Green Bond, Green Development, Green Economy, Green Innovation, Heterogeneity, Humans, Industrial Performance, Information Disclosure, Institutional Framework, Media Coverage, Political Connections, Regulatory Framework, Social Responsibility, Spatiotemporal Analysis, State Owned Enterprise, Sustainable Finance
Cluster 4	**Yellow**	**25 Keywords**	Alternative Energy, Business, Digital Transformation, Digitization, Empirical Analysis, ESG Greenwashing, Environm , Finance, Financing Constraints, Firm Size, Governance Approach, Green Products, Industrial Emission, Information Asymmetry, Information Transparency, Innovation, Internal Control, Investor Attention, Machine Learning, Managerial Myopia, Media Attention, Policy Making, Retailing, Risk Assessment, Uncertainlty Analysis
Cluster 5	**Purple**	**23 Keywords**	Artificial Intelligence, Business Strategy, Corporate Governance, Corporate Sustainability, Environmental Management, Environmental Performance, Environmental Responsibility, Environmental Sustainability, Esg Disclosure, Esg Performance, Financial Market, Financial Performance, Financial System, Fintech, Institutional Investors, Investments, Knowledge, Performance Assessment, Regression Analysis, Stakeholder, Stakeholder Engangement, Sustainability Practices, Sustainability Reporting
Cluster 6	**Neon Blue**	**20 Keywords**	Accountability, Business Ethics, Carbon Emission, Carbon Footprint, Climate Change, Corporate Social Responsibility, Disclosure, Emission Control, Environment, Environmental Policy, Environmental, Social, And Governance, Ethics, Greenhouse Gases, Greenhushing, Market Conditions, Organization, Policy, Sustainability, Sustainable Development Goals, Systematic Review, Technology Adoption
Cluster 7	**Orange**	**17 Keywords**	Communication, Content Analysis, Environmental Communication, Environmental Impact, Environmental Issue, Environmental Values, Gas Industry, Green Claims, Legitimacy Theory, Management Practice, Pollution Control, Selective Disclosure, Strategic Approach, Sustainability Communication, Sustainable Development, Transparency, Willingness To Pay
Cluster 8	**Chocolate**	**10 Keywords**	Corporate Greenwashing, CSR, Economic and Social Effects, Environmental Disclosure, ESG, Impression Management, Media, Performance, Social Media,Textual Analysis

Conclusion

Research on greenwashing is becoming an increasingly significant concern in both the business and academic worlds, as public awareness of environmental sustainability grows. Greenwashing, defined as the practice of companies presenting a misleading or exaggerated image of environmental friendliness, has a negative impact not only on corporate reputation but also on the trust of consumers, investors, and other stakeholders.

Bibliometric studies of greenwashing show that the topic is gaining international attention, as evidenced by the dramatic rise in publications over the last 20 years, which went from a small number in the early 2000s to 289 by 2024. With 18,973 citations from 674 papers, the spike in citations further demonstrates the academic community's growing awareness of greenwashing.

Analysis of international collaboration reveals that China and the United States are at the forefront of greenwashing research. China leads in the number of publications (264 documents), while the United States excels in citations (7,370), signifying their influence on global research in this field. However, Indonesia's contributions remain limited, which highlights the need for enhanced research capacity and awareness in countries with less developed research infrastructure.

The identified research focus through keyword analysis shows that greenwashing is no longer studied solely in the context of marketing but has expanded to encompass regulation, governance, sustainable finance, and digital technologies, including artificial intelligence. The primary clusters, such as green marketing, CSR, ESG, and digitalization, indicate that greenwashing research is becoming increasingly interdisciplinary and aligned with technological advancements and global market needs.

This study offers a thorough mapping of trends, research gaps, and international collaborations despite its limitations, which include the preponderance of data from industrialized nations, its reliance on English-language publications, and the quantitative character of bibliometrics. Additionally, it emphasizes the necessity of more inclusive and interdisciplinary methods for researching greenwashing, especially in developing nations.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: The research was conducted in accordance with the principles of research ethics, ensuring respect for the dignity, rights, and welfare of all participants. Informed consent was obtained from all respondents prior to their participation.

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