





## Mapping Two Decades of Greenwashing Research: A Bibliometric Analysis of Global Trends, Themes, and Evolution



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### ABSTRACT

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responsibility, bibliometric analysis,  
sustainability reporting, thematic  
evolution*

Greenwashing has emerged as a critical challenge in corporate sustainability because misleading environmental claims can erode stakeholder trust, weaken reporting credibility, and undermine accountability in sustainable development. Although the greenwashing literature has expanded rapidly, existing reviews remain fragmented and provide limited evidence on the field's intellectual structure, thematic evolution, and emerging directions, particularly within the business and economics domain. To address this gap, this study conducts a bibliometric analysis of 357 Scopus-indexed documents published between 2005 and 2025. Using co-word network analysis, thematic mapping, and thematic evolution analysis, the study identifies the main conceptual clusters, influential publication sources, and temporal shifts in research priorities. The findings indicate that the field has reached a more mature stage, with only 8 core journals forming Bradford Zone 1. Research output is also geographically concentrated, led by China (47 documents; 13.2%), followed by the United States (43; 12%) and the United Kingdom (23; 6.4%). In addition, the Journal of Cleaner Production emerges as the most influential source, with 1,707 citations across 30 papers. Thematic evolution shows a shift from early debates on symbolic environmental communication toward governance-oriented concerns, particularly sustainability reporting, climate accountability, and policy-based anti-greenwashing mechanisms. These findings strengthen the theoretical understanding of how greenwashing research has developed over time and provide practical guidance for managers and policymakers in improving credible sustainability disclosure and designing more effective regulatory responses.

## 1. INTRODUCTION

Greenwashing has become a major challenge to corporate sustainability because misleading environmental and social claims can erode stakeholder trust, distort market perceptions, and weaken the credibility of sustainability reporting and corporate accountability [1-3]. As firms increasingly communicate sustainability commitments in response to global environmental pressures, concerns have grown over the gap between symbolic claims and substantive performance. This issue is especially relevant in the context of the Sustainable Development Goals (SDGs), where unreliable sustainability communication may undermine public trust, weaken regulatory effectiveness, and slow progress toward sustainability transitions [4, 5].

In response to these concerns, regulators, investors, consumers, and civil society increasingly demand transparent reporting, credible disclosure mechanisms, and stronger sustainability governance. International frameworks such as the Global Reporting Initiative (GRI) and the Task Force on Climate-related Financial Disclosures (TCFD) emphasize the importance of robust reporting practices and accountability systems to reduce misleading claims and improve the quality

of sustainability communication [6]. For corporate managers and policymakers, understanding the evolution of greenwashing research is therefore essential for designing more credible anti-greenwashing strategies, governance mechanisms, and regulatory responses [7, 8].

Given the breadth and fragmentation of the literature, bibliometric analysis provides a systematic approach to map the intellectual structure and thematic development of greenwashing research [9, 10]. Bibliometric techniques enable researchers to identify influential sources, geographic patterns, thematic clusters, and longitudinal shifts in the field, thereby offering a more comprehensive view than conventional narrative reviews. Accordingly, this study examines the development of greenwashing and sustainability research through a bibliometric analysis of Scopus-indexed publications from 2005 to 2025.

Despite the growing literature, existing studies remain fragmented across conceptual, behavioral, and governance perspectives, and prior review studies have not consistently provided an integrated mapping of the field's thematic structure, source influence, geographic contribution, and longitudinal development [11]. This study does not claim novelty in bibliometric methodology itself. Rather, its

contribution lies in the scope, integration, and temporal coverage of the analysis. Specifically, this study provides an updated bibliometric mapping of greenwashing and sustainability research using Scopus-indexed publications from 2005 to 2025, and integrates co-word network analysis, thematic mapping, and longitudinal thematic evolution within a single analytical design. In addition, the study combines these science-mapping results with source impact and country contribution analysis to provide a more comprehensive account of how greenwashing scholarship has developed over time. By doing so, the study offers a clearer empirical basis for understanding the field's thematic maturation from early symbolic legitimacy critiques to more recent governance-, disclosure-, and accountability-oriented debates.

This study contributes by providing a structured empirical map of the field, including its core themes, influential sources, geographic distribution, and thematic evolution over time. The findings are expected to support future research agendas and offer evidence-based insights for policymakers and managers seeking to strengthen the credibility and accountability of corporate sustainability practices. This study addresses the following research questions:

RQ1: What are the patterns and trends in the evolution of greenwashing and sustainability research from 2005 to 2025?

RQ2: How has the geographic distribution of greenwashing studies shaped sustainability discourse across national contexts?

RQ3: What does the intellectual landscape of greenwashing and sustainability research reveal through a bibliometric analysis of the Scopus database?

RQ4: What thematic clusters and conceptual structures emerge from co-word analysis and thematic mapping of the greenwashing and sustainability literature?

RQ5: How have the thematic trajectories and conceptual evolution of greenwashing and sustainability research developed longitudinally from 2005 to 2025?

## 2. LITERATURE REVIEW

### 2.1 Conceptual evolution of greenwashing

Greenwashing was initially conceptualized as a discrepancy between corporate environmental claims and actual organizational practices, with early studies emphasizing symbolic legitimacy-seeking behavior and reputational management [3, 12]. In this phase, the central concern was whether firms used sustainability narratives strategically to maintain legitimacy without making substantive environmental improvements.

Subsequent research expanded the discussion by examining how greenwashing affects stakeholder perceptions and behavioral responses, particularly in relation to green advertising, eco-labeling, and corporate reputation [2, 13, 14]. This stream of literature positioned greenwashing not only as an ethical or communication issue, but also as a market and governance problem, as misleading sustainability claims can influence consumer choices, investor assessments, and broader trust in sustainability-oriented markets.

More recent studies have shifted toward structural and governance-oriented analyses, linking greenwashing to sustainability disclosure quality, reporting standards, assurance mechanisms, environmental and financial performance, and sustainability governance practices [1, 4, 15-17]. This progression indicates that greenwashing has evolved

into a multidimensional field of inquiry involving disclosure integrity, accountability systems, and the institutional conditions that shape credible sustainability communication.

### 2.2 Prior review and bibliometric studies

Although the literature on greenwashing has grown rapidly, prior studies remain heterogeneous in scope and methodology. Many studies are conceptual or case-based, focusing on definitional debates, legitimacy concerns, and examples of corporate misrepresentation [2, 3, 12]. These studies are important for theory development, but they often provide limited systematic evidence on the broader intellectual structure and temporal evolution of the field.

A smaller body of review-oriented research has attempted to synthesize greenwashing scholarship, but these efforts tend to emphasize selected topics (e.g., communication, consumer behavior, or reporting issues) rather than mapping the field comprehensively across themes, geographies, and time periods. In addition, existing syntheses often rely on narrative approaches, which may not fully capture relationships among keywords, thematic clusters, and conceptual trajectories over time.

Bibliometric analysis offers a stronger methodological basis for addressing these limitations because it allows the field to be examined at scale using reproducible and transparent procedures [9, 10]. Through techniques such as co-word analysis, thematic mapping, and longitudinal analysis, bibliometric studies can identify dominant themes, emerging topics, and shifts in conceptual focus. However, applications of integrated bibliometric approaches in greenwashing research remain limited, especially those combining thematic structure, geographic distribution, influential sources, and longitudinal thematic evolution in a single analytical framework.

### 2.3 Research gaps and study positioning

First, existing studies are still fragmented across conceptual, behavioral, and governance perspectives, making it difficult to identify the field's overall intellectual structure and conceptual boundaries. Second, prior syntheses have not sufficiently examined the longitudinal thematic evolution of greenwashing research, particularly how the field has shifted from symbolic communication critiques toward governance, accountability, and sustainability transition themes. Third, limited research has simultaneously mapped thematic clusters, geographic distribution, influential sources, and citation structure using an integrated bibliometric design.

This study addresses these gaps by conducting a bibliometric analysis of Scopus-indexed greenwashing and sustainability research published from 2005 to 2025. By combining co-word network analysis, thematic mapping, and longitudinal analysis, this study provides a comprehensive empirical map of the field's conceptual development, identifies dominant and emerging themes, and clarifies how greenwashing scholarship has evolved over time. In doing so, the study strengthens the theoretical foundation for future research and offers practical insights for regulators, policymakers, and corporate decision-makers.

### 2.4 Data sources, size, and accessibility

This study used the Scopus database as the primary source

of bibliographic data because of its broad coverage of peer-reviewed international publications and its structured metadata, which are suitable for bibliometric analysis. Scopus is widely used in bibliometric studies due to its consistency in indexing journal articles, author affiliations, citations, and keywords, thereby supporting reliable performance analysis and science mapping.

The data retrieval process was conducted on October 17, 2025 using the Scopus advanced search interface. The search query was applied to the (“greenwashing” OR “green washing” OR “green-washing” OR “environmental washing” OR “sustainability washing”) AND (“sustainability” OR “corporate social responsibility” OR “corporate social responsibility” OR “environmental responsibility” OR “corporate environmentalism” OR “green marketing” OR “environmental disclosure” OR “sustainability reporting”) field to capture publications explicitly related to greenwashing and sustainability. The search string used in this study was: [insert exact search string as used in Scopus]. To ensure dataset relevance and comparability, the search was limited to publications in the period 2005-2025, written in English, and indexed as journal documents. Only records with complete bibliographic metadata (e.g., title, authors, source, year, author keywords, and citation information) were retained for analysis.

The initial search returned 360 records. A screening and filtering process was then applied to ensure consistency with the study scope. After restricting the dataset to the specified time span, document type, language, and metadata completeness criteria, 357 documents were retained as the final corpus for bibliometric analysis. This final dataset was exported in BibTeX (and/or CSV, if applicable) format for processing in Bibliometrix/Biblioshiny and VOSviewer.

Regarding accessibility, the dataset used in this study can be replicated by researchers with institutional access to Scopus by applying the same search string, time span, and filtering criteria reported above. However, minor differences in document counts may occur if Scopus indexing is updated after the retrieval date. To support transparency, this study reports the search protocol, filtering criteria, and analytical parameter settings used in subsequent bibliometric procedures.

## 2.5 Data analysis

This study employed a bibliometric approach to systematically map the intellectual structure and thematic evolution of greenwashing and sustainability research. The analysis was conducted using the Bibliometrix package (Biblioshiny interface) in R Studio and VOSviewer, which are widely used in bibliometric research for performance analysis, science mapping, and thematic visualization. Bibliometrix was used for descriptive bibliometric analysis, thematic mapping, thematic evolution, and trend-topic analysis, while VOSviewer was used to construct and visualize the keyword co-occurrence network and cluster structure. This combined approach allows complementary strengths in statistical summarization and network-based visualization.

To ensure transparency and reproducibility, this study explicitly reports the analytical parameter settings used in the science-mapping procedures. The co-occurrence analysis was performed in VOSviewer using the study’s selected keyword field, with full counting and association strength normalization. A minimum occurrence threshold of 5 was

applied to retain sufficiently recurrent keywords and to reduce noise from infrequent terms. After thresholding and data cleaning through keyword standardization and synonym harmonization, the resulting keyword clusters were used for thematic interpretation.

The thematic map analysis in Bibliometrix was used to classify themes into four quadrants (motor themes, basic themes, niche themes, and emerging/declining themes) based on Callon centrality and Callon density. In this framework, Callon centrality captures the degree of interaction between a focal theme and other themes (external connectedness), whereas Callon density reflects the internal cohesion and developmental maturity of the theme (internal connectedness). This interpretation follows the established bibliometric thematic-mapping approach used in prior studies and implemented in Bibliometrix [9, 18, 19]. To improve interpretability, the thematic map was generated in Bibliometrix using the cleaned author keyword field (DE), with stemming disabled and term selection limited to the most recurrent and conceptually meaningful keywords.

For longitudinal thematic evolution, the analysis period (2005-2025) was divided into [three] time slices: 2005-2020, 2021-2022, and 2023-2024. The time slicing was determined based on [annual publication distribution / visible growth turning points / balanced document distribution across periods], rather than arbitrary equal segmentation, to ensure meaningful comparison of thematic transitions. This procedure allows the study to trace how greenwashing research evolved from early legitimacy and symbolic communication concerns toward governance-, disclosure-, and accountability-oriented themes.

Finally, trend-topic analysis was used to identify recently emerging keywords and topic trajectories. Together, these procedures provide an integrated bibliometric design to examine publication growth, source concentration, geographic contributions, conceptual clustering, and thematic maturation in greenwashing scholarship.

Table 1 summarizes the bibliometric procedures adopted in this study and groups them into three complementary components: descriptive analysis, network analysis, and trend-topic analysis. Descriptive analysis was used to provide an overview of the bibliographic dataset, including publication characteristics, core journals, productivity patterns, affiliations, corresponding countries, highly cited documents, and frequent keywords. Network analysis was employed to visualize conceptual relationships within the literature, particularly through keyword co-occurrence and thematic interconnections. Trend-topic analysis was used to identify the temporal development of research themes, including their classification into thematic quadrants and their evolution over time. Overall, the table shows that the bibliometric design was structured to capture not only the descriptive profile of the dataset, but also the intellectual structure and thematic dynamics of greenwashing and sustainability research.

Table 2 presents the descriptive profile of the bibliometric dataset used in this study. The analysis was based on the Scopus database and covered publications from 2005 to 2025, providing a 20-year temporal scope for examining the development of greenwashing-related research. The initial retrieval produced 360 records, of which 357 were retained as the final dataset after applying the study’s inclusion criteria. This small reduction indicates that most of the retrieved records were relevant to the research scope.

**Table 1.** Description of bibliometric analysis

Analysis	Description	Aspects Used in the Study
Descriptive analysis	Descriptive analysis involves examining a dataset related to scholarly publications and summarizing the important characteristics and patterns. Researchers can gain insight into the features and distribution of research findings by using this approach. It is a useful tool for understanding the basic elements of academic papers.	<ul style="list-style-type: none"> <li>Data description</li> <li>Core journal based on Bradford's law</li> <li>Production over time of core journal</li> <li>Authors, affiliations and corresponding country</li> <li>Most cited documents</li> <li>Most frequently words</li> </ul>
Network analysis	The network analysis approach examines the connections and relationships between various components of academic literature, including authors, institutions, journals, and publication. Through the visualization of these relationship as networks, researchers can get insight into the creation and spread of scientific information, including its organization, development, and pattern.	<ul style="list-style-type: none"> <li>Co-occurrence networks analysis (graphical representations of the relationship between elements in a dataset)</li> <li>Thematic research network analysis (graphical representation based on interconnection among studies in specific topics)</li> <li>Thematic research quadrant analysis (visual representation of the research themes into basic themes, motor themes, niche themes, and declining or emerging themes)</li> </ul>
Trend topic analysis	Trend topic analysis shows how the field has dynamically adapted to emerging trends and global events that influence internal control priorities and methods.	<ul style="list-style-type: none"> <li>Trend topics (visual representation of the interactive elements, as indicated by term and year frequency)</li> </ul>

**Table 2.** Data description

Description	Result
Database	Scopus
Timespan	2005:2025
Initial retrieval	360
Final dataset	357
Inclusion focus	Greenwashing-related studies
Document type	Articles
Language	English
Analysis software	Bibliometrix/Biblioshiny; VOSviewer
Core source clusters examined	Sources, authors, countries, keywords, themes, trends
Total citations in the dataset	1,707

The dataset was limited to English-language journal articles focusing on greenwashing-related studies. This restriction helped maintain document-type consistency and ensured that the analysis concentrated on peer-reviewed scholarly contributions within the targeted field. However, it also means that non-English publications and other document types were excluded from the corpus.

The bibliometric analysis was conducted using Bibliometrix/Biblioshiny and VOSviewer. These tools were used to support complementary forms of analysis, including descriptive profiling, thematic examination, and network visualization. The analytical coverage included sources, authors, countries, keywords, themes, and trends, indicating that the study was designed to map the field from publication, geographic, conceptual, and thematic perspectives.

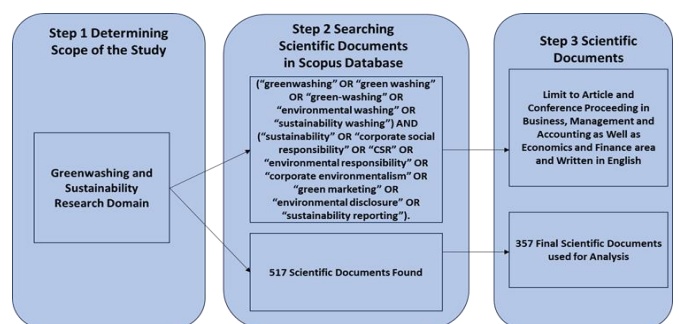
In total, the final dataset accumulated 1,707 citations. This citation volume suggests that the corpus provides a useful basis for examining patterns of influence and the development of knowledge within greenwashing research. Overall, Table 2 shows that the study relied on a focused dataset with a clearly defined scope, transparent inclusion criteria, and established bibliometric tools.

### 3. RESULT

#### 3.1 Descriptive analysis

This study examines the distribution of academic sources

contributing to greenwashing and sustainability research by applying Bradford's Law of Scattering. This analysis highlights that only a small number of journals dominate this research domain, while the majority of other journals contribute only marginally. Figure 1 and Table 3 provide a detailed overview of the journals identified as core sources in this bibliometric investigation. A total of 357 papers were published in various journals, but the majority of contributions came from only a handful of publications. The Journal of Cleaner Production emerged as the most influential source, contributing 30 publications to the field. Other core journals included Business Strategy and the Environment (23 publications), Corporate Social Responsibility and Environmental Management (21 publications), and the Journal of Business Ethics (13 publications). Other important journals included Sustainability Accounting, Management and Policy Journal, Finance Research Letters, Energy Economics, and the Journal of Sustainable Finance and Investment, each contributing between 6 and 10 publications. Together, these journals form a core area that serves as the foundation of the research field.



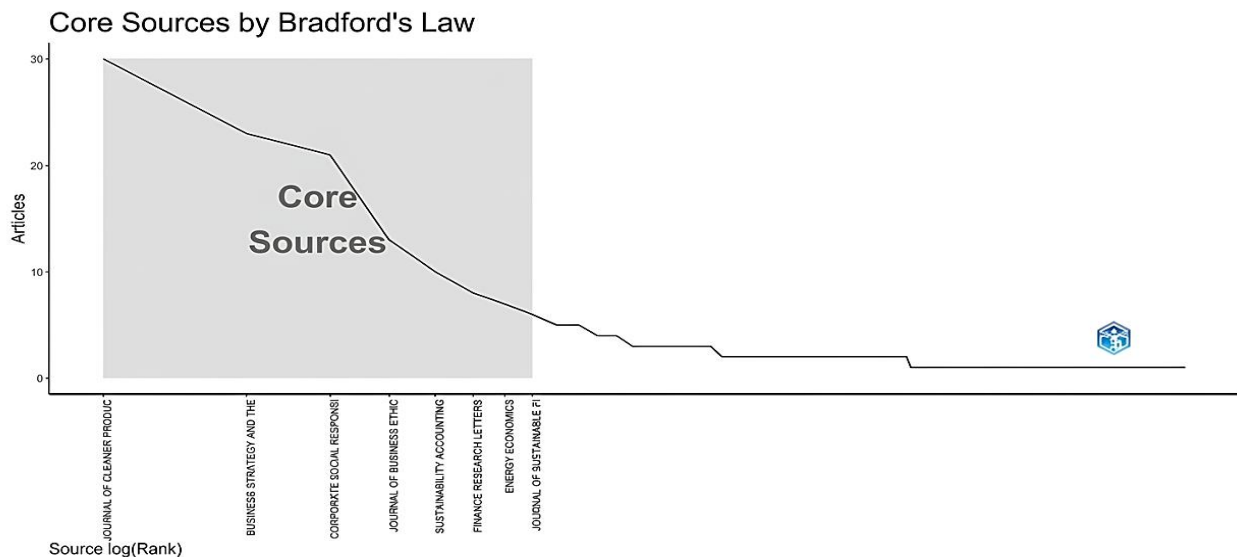
**Figure 1.** Data collection step

Figure 2 illustrates the distribution of publication sources based on Bradford's Law. The pattern shows that greenwashing research is concentrated in a relatively small group of core journals, while the remaining publications are scattered across a larger number of peripheral outlets. This distribution is consistent with Bradford's Law, which suggests that a limited number of journals typically account for a substantial share of publications in a given field.

**Table 3.** Top 10 core courses by Bradford's law

Source	h_index	g_index	m_index	TC	NP	PY_start
Journal of Cleaner Production	17	30	1.7	1707	30	2016
Business Strategy and the Environment	16	23	1.455	1343	23	2015
Corporate Social Responsibility and Environmental Management	12	21	1.091	1083	21	2015
Journal of Business Ethics	12	13	0.8	2047	13	2011
Energy Economics	5	7	1.25	213	7	2022
Journal of Sustainable Finance and Investment	5	6	1.25	111	6	2022
Sustainability Accounting, Management and Policy Journal	5	10	0.833	139	10	2020
Business and Society Review	4	5	0.364	55	5	2015
Critical Perspectives on Accounting	3	3	0.231	428	3	2013
Environment, Development and Sustainability	3	3	0.333	101	3	2017

Note: TC = Total Citations; NP = Number of Publications.



**Figure 2.** Core sources by Bradford's law

The figure indicates that the Journal of Cleaner Production is the leading source by number of publications, followed by Business Strategy and the Environment, Corporate Social Responsibility and Environmental Management, and the Journal of Business Ethics. Other relevant journals, such as Sustainability Accounting, Management and Policy Journal, Finance Research Letters, Energy Economics, and the Journal of Sustainable Finance and Investment, also appear within the core source group. This pattern suggests that the greenwashing literature has developed a recognizable publication core, particularly in journals related to sustainability, business ethics, corporate social responsibility (CSR), and environmental management. Thus, the figure helps identify the main outlets that structure the dissemination of research in this field

### 3.2 Sources description

A bibliometric principle known as Bradford's Law is used to identify fundamental journals or sources within a particular research domain. Essentially, this principle states that the majority of literature on a given topic comes from a small group of core journals (Zone 1), while additional journals are needed in subsequent zones to provide comparable coverage. Several conclusions can be drawn from the data presented in Table 3 regarding the field of greenwashing and sustainability studies. Table 3 presents the top 10 important sources contributing to the development of the greenwashing literature. These journals are characterized by strong

reputations, rigorous peer-review standards, and in-depth scholarly debate on issues of corporate social responsibility, environmental management, and sustainability. Therefore, these sources should be prioritized by researchers and practitioners, both for publication purposes and for comprehensive literature reviews in the field of greenwashing.

The most prolific source by far was the Journal of Cleaner Production, which contributed 30 publications, making it the dominant outlet for greenwashing research. The journal itself outperformed its closest competitors by a substantial margin, reflecting its central role in shaping sustainability discourse. Subsequently prominent sources included Business Strategy and the Environment (23 publications), Corporate Social Responsibility and Environmental Management (21 publications), and the Journal of Business Ethics (13 publications). Together, these four outlets accounted for the majority of Zone 1 publications, underscoring their role as the intellectual core of the field.

Bradford's distribution further shows that the first eight journals fall within Zone 1, indicating a strong concentration of literature on greenwashing within a small number of specialized publications. These journals provide the most comprehensive coverage and are therefore important for scholars seeking comprehensive insights into the topic. The following journals, such as Business and Society Review and Cogent Business and Management, fall within Zone 2, each contributing five articles. While their contributions are smaller, they nevertheless broaden the scope of perspectives by including discussions of social responsibility and broader

management themes. The concentration of publications in Zone 1 journals suggests that academics and practitioners who focus exclusively on these sources will dominate the majority of the impactful literature in the field. At the same time, the presence of Zone 2 journals highlights the spread of greenwashing discourse into related fields such as management and business studies, reflecting their increasing interdisciplinary appeal and academic maturity.

### 3.3 Author description

The bibliometric impact of primary sources in greenwashing research shows that the Journal of Cleaner Production stands out as the most influential outlet, with an h-index of 17, a g-index of 30, and a total of 1,707 citations across 30 papers since 2016, confirming its centrality in the sustainability discourse. Two other journals also demonstrated significant impact. Business Strategy and the Environment had an h-index of 16 with 1,343 citations from 23 papers. Similarly, Corporate Social Responsibility and Environmental Management held an h-index of 15 with 1,146 citations from 21 papers, reinforcing their status as core journals. Interestingly, the Journal of Business Ethics, despite publishing fewer papers (13), has garnered the highest total citations (2,047), reflecting its strong theoretical contribution to the debate on ethics and greenwashing. Meanwhile, newer journals such as Energy Economics and the Journal of Sustainable Finance and Investment have recently entered the field (2022) but are already demonstrating increasing relevance with balanced indices. Other journals, including Sustainability Accounting, Management and Policy Journal, Business and Society Review, and Critical Perspectives on Accounting, contribute focused yet impactful works that expand theoretical and methodological approaches to greenwashing. Overall, this distribution suggests that while a few core journals dominate in terms of volume and impact, both established ethics journals and newer sustainability finance journals play complementary roles in shaping the trajectory of greenwashing scholarship.

Table 4 presents the most relevant author contributions in the greenwashing literature based on publication year, frequency, total citations (TC), and total citations per year (TCpY). Overall, the table indicates that the field is shaped by a combination of highly cited earlier contributions and more recent works that are beginning to gain visibility. This suggests that the development of greenwashing research reflects both intellectual continuity and the emergence of newer contributors.

**Table 4.** Top 10 most relevant authors

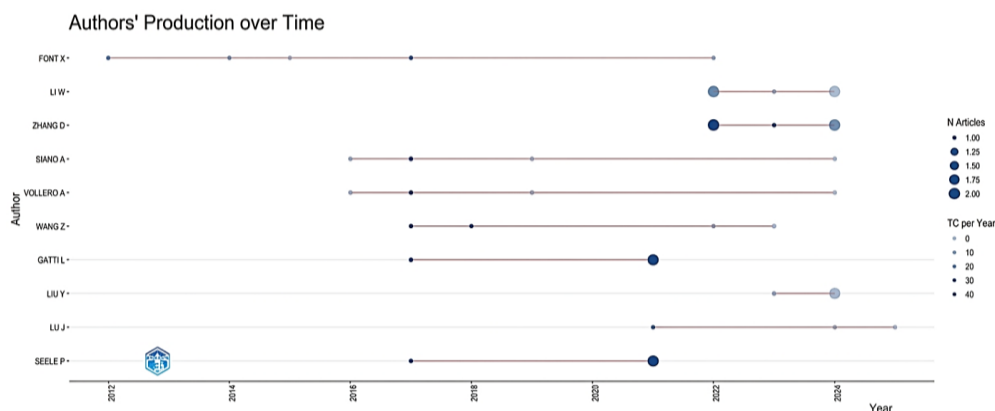
Author	Year	Freq	TC	TCpY
Xavier Font	2012	1	261	18.643
Xavier Font	2014	1	123	10.25
Xavier Font	2015	1	7	0.636
Xavier Font	2017	1	134	14.889
Xavier Font	2022	1	31	7.75
Gatti Lucia	2017	1	302	33.556
Gatti Lucia	2021	2	225	45
Li Wei	2022	2	82	20.5
Li Wei	2023	1	20	6.667
Li Wei	2024	2	8	4

Note: Freq = Frequency; TC = Total Citations.

Among the listed authors, Gatti Lucia stands out in terms of citation impact and continuity of contribution. The publications recorded in 2017 and 2021 received 302 and 225 citations, respectively, indicating that Gatti's work has played an important role in strengthening the conceptual and empirical development of greenwashing research. Likewise, Li Wei appears as a relevant recent contributor, with multiple publications between 2022 and 2024 and a comparatively strong citation rate, including 82 citations in 2022. This pattern suggests that Li Wei's work is contributing to the contemporary expansion of the field.

Earlier contributions associated with Xavier Font, also demonstrate substantial scholarly influence. Although these entries reflect single publications in different years, several of them have attracted high citation counts, such as 261 citations for the 2012 publication and 134 citations for the 2017 publication. This indicates that individual high-impact studies can remain influential over time, even when publication frequency is limited. Overall, the evidence in Table 4 shows that greenwashing research is shaped by both sustained contributions from recurring authors and influential single studies that continue to serve as key references in the field.

Figure 3 shows the publication trends of leading authors in greenwashing research from 2012 to 2024. Xavier Font contributed early (2012-2017) with a single, highly cited work. Gatti Lucia and Seele P also made influential contributions in the middle period, while Siano A, Vollero A, and Wang Z maintained a stable output between 2016 and 2020. In contrast, Li Wei and Zhang D emerged more recently (2022-2024) with higher productivity and increasing citation impact. Overall, the figure reveals two patterns: earlier authors provide the conceptual foundation, while newer researchers drive the recent growth and reshape the discourse.



**Figure 3.** Author's production over time

Table 5 highlights the authors with the strongest bibliometric impact in greenwashing research based on h-index, g-index, m-index, TC, number of publications (NP), and publication starting year. Xavier Font and Zhang Dongyang record the highest h-index (5), indicating comparatively strong and sustained visibility within the dataset. Xavier Font, active since 2012, produced five publications with 556 citations, whereas Zhang Dongyang, whose contributions began in 2022, achieved 286 citations and the highest m-index (1.25), suggesting a strong recent impact. Li Wei also shows notable recent influence, with five publications since 2022, an h-index of 4, and 110 citations.

Gatti Lucia and Seele Peter each recorded 527 citations with an h-index of 3, indicating substantial influence within the field. Siano Alfonso and Agostino Vollero also made important contributions, each with 405 citations since 2016, while Torelli Riccardo shows a meaningful recent presence with 300 citations and an m-index of 0.5. Zhihong Wang stands out by total citation count, with 653 citations from four publications, making him the most cited author in the table. By contrast, Madelyn Antoncic currently shows a more modest bibliometric presence, with two publications and 21 citations since 2020. Overall, the table suggests that greenwashing research is shaped by a combination of established contributors with sustained influence and newer authors whose recent publications are gaining visibility.

Figure 4 presents the most relevant affiliations contributing to greenwashing research. The University of Salerno emerged as the leading institution with seven publications, highlighting its central role in advancing the discourse on sustainability and corporate responsibility. This was followed by Tilburg University

University with six articles, and the Capital University of Economics and Business and Edith Cowan University with five publications each, reflecting the growing academic involvement of European and Asian institutions. Meanwhile, RMIT University also demonstrated a strong presence with five publications, demonstrating its regional leadership in sustainability studies.

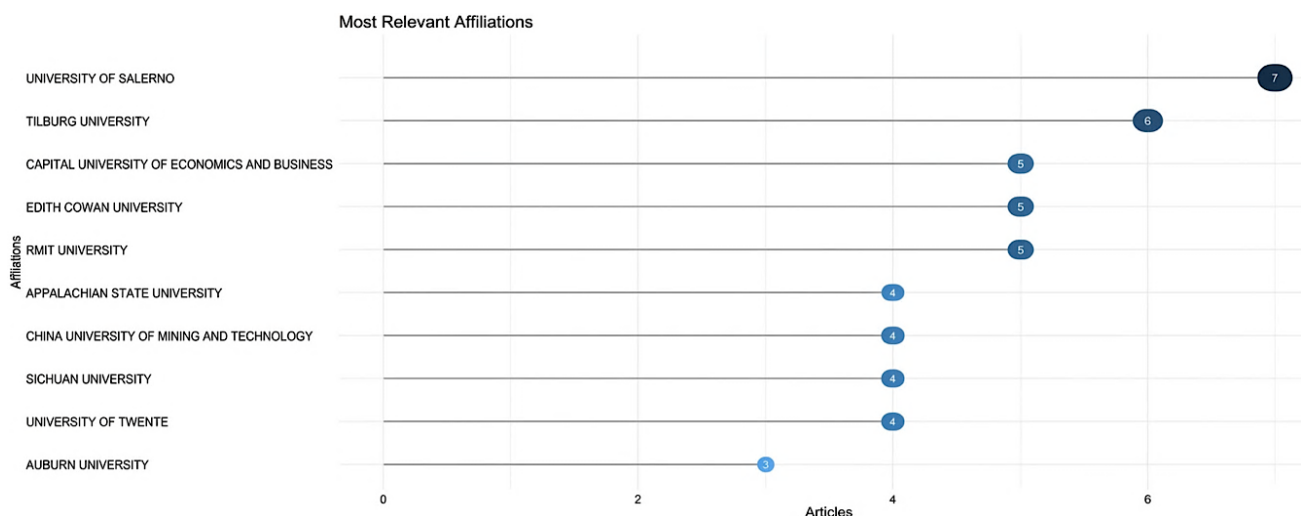
Other universities, including Appalachian State University, China University of Mining and Technology, Sichuan University, the University of Twente, and Auburn University, each contributed between three and four publications, indicating the increasingly global nature of greenwashing research. This distribution shows that while European institutions like Salerno and Tilburg dominate, there is also significant representation from Asia, North America, and Australia. Collectively, this graph illustrates how research on greenwashing is supported by a diverse range of global academic centers, underscoring the interdisciplinary and transnational nature of the field.

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**Table 5.** Top 10 author impact

Author	h_index	g_index	m_index	TC	NP	PY_start
Xavier Font	5	5	0.357	556	5	2012
Zhang Dongyang	5	5	1.25	286	5	2022
Li Wei	4	5	1	110	5	2022
Gatti Lucia	3	3	0.333	527	3	2017
Seele Peter	3	3	0.333	527	3	2017
Siano Alfonso	3	4	0.3	405	4	2016
Torelli Riccardo	3	3	0.5	300	3	2020
Agostino Vollero	3	4	0.3	405	4	2016
Zhihong Wang	3	4	0.333	653	4	2017
Madelyn Antoncic	2	2	0.333	21	2	2020

Note: TC = Total Citations; NP = Number of Publications.



**Figure 4.** Top 10 most relevant affiliations

**Table 6.** Top 10 sources impact

Source	h_index	g_index	m_index	TC	NP	PY_start
Journal of Cleaner Production	17	30	1.7	1,707	30	2016
Business Strategy and The Environment	16	23	1.455	1,343	23	2015
Corporate Social Responsibility and Environmental Management	12	21	1.091	1,083	21	2015
Journal of Business Ethics	12	13	0.8	2,047	13	2011
Energy Economics	5	7	1.25	213	7	2022
Journal of Sustainable Finance and Investment	5	6	1.25	111	6	2022
Sustainability Accounting, Management and Policy Journal	5	10	0.833	139	10	2020
Business and Society Review	4	5	0.364	55	5	2015
Critical Perspectives on Accounting	3	3	0.231	428	3	2013
Environment, Development and Sustainability	3	3	0.333	101	3	2017

Note: TC = Total Citations; NP = Number of Publications.

Table 6 presents the impact profile of the top ten sources contributing to greenwashing research. The results show that citation impact is concentrated in a relatively small set of journals. The Journal of Cleaner Production records the highest h-index (17), g-index (30), number of publications (30), and 1,707 total citations, indicating both high productivity and strong citation visibility. It is followed by Business Strategy and the Environment (h-index = 16; g-index = 23; TC = 1,343; NP = 23) and Corporate Social Responsibility and Environmental Management (h-index = 12; g-index = 21; TC = 1,083; NP = 21), which appear among the leading high-impact publication outlets in the field.

The table also shows that journals with fewer publications may still achieve substantial citation impact. For example, the Journal of Business Ethics records the highest total citations (TC = 2,047) despite publishing only 13 documents, suggesting that it contains several highly cited contributions to the greenwashing debate. In addition, newer journals such as Energy Economics and the Journal of Sustainable Finance and Investment, both starting in 2022, show relatively strong m-index values (1.25), indicating recent citation momentum. Overall, these findings suggest that greenwashing scholarship is strongly associated with sustainability, business ethics, corporate responsibility, finance, and accounting journals, pointing to the broad thematic reach of the field.

**3.4 Affiliation and country origin description**

Table 7 presents a quantitative analysis of the top 10 countries contributing to greenwashing research. China leads with 47 articles (13.2%), comprising 34 single-country publications (SCPs) and 13 multi-country publications (MCPs), resulting in an MCP ratio of 27.7%. This indicates that while domestic research dominates, China also exhibits significant levels of international collaboration. The United States follows with 43 articles (12%), with 34 SCPs and 9 MCPs, and an MCP ratio of 20.9%, indicating a stronger preference for domestic research with moderate collaborative engagement. The United Kingdom contributes 23 articles (6.4%), but has the highest MCP ratio at 39.1%, reflecting its strong orientation toward international collaboration.

Italy (22 articles; 18.2% MCP) and Germany (21 articles; 23.8% MCP) showed consistent contributions with a mix of domestic and international work. France contributed 16 articles with a high MCP ratio of 43.8%, indicating significant cross-border collaboration. Spain (14 articles; 28.6% MCP) and Canada (13 articles; 23.1% MCP) also demonstrated active participation in global research networks. In contrast, India (12 articles) reported no MCP, indicating only domestic research. Australia, with 11 articles, showed one of the higher

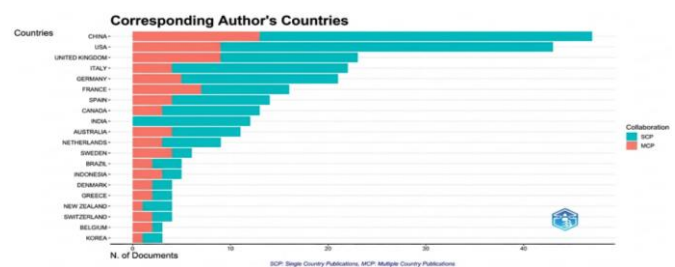
MCP ratios, at 36.4%, reflecting its integration into global sustainability research partnerships.

**Table 7.** Top 10 most relevant countries by corresponding author

Country	Article	Articles %	SCP	MCP	MCP %
China	47	13.2	34	13	27.7
USA	43	12	34	9	20.9
United Kingdom	23	6.4	14	9	39.1
Italy	22	6.2	18	4	18.2
Germany	21	5.9	16	5	23.8
France	16	4.5	9	7	43.8
Spain	14	3.9	10	4	28.6
Canada	13	3.6	10	3	23.1
India	12	3.4	12	0	0
Australia	11	3.1	7	4	36.4

Note: SCP = Single-Country Publications; MCP = Multi-Country Publications.

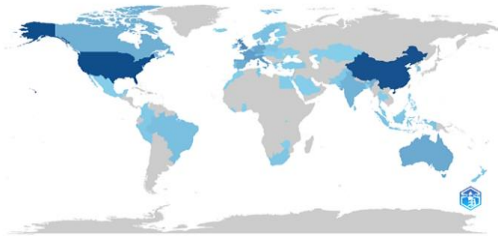
Figure 5 visualizes these findings by distinguishing between SCP (cyan) and MCP (red). China and the US dominate in absolute numbers, especially with SCP, while the UK, France, and Australia show a relatively larger MCP segment, confirming their collaborative research orientation. European countries such as Germany, Italy, and Spain contribute a balanced output, while India's position reflects a strong but exclusively local authorship. The figure shows that while China and the US lead in research volume, European countries play a significant role in fostering international collaboration in the field of greenwashing.



**Figure 5.** Corresponding author's countries

Overall, the distribution shows a dual pattern: key research output is concentrated in China and the United States, while high-level international collaboration is driven by the United Kingdom, France, and Australia. This balance underscores the global and interdisciplinary nature of greenwashing research, enriched by diverse national perspectives and collaborative approaches.

Country Scientific Production



**Figure 6.** Countries scientific production

Figure 6 shows that the dominance of China and the United States may reflect structural and institutional drivers beyond publication volume. First, both countries are central to the global low-carbon transition due to their economic scale and emission profiles, which increases regulatory attention and stakeholder scrutiny toward sustainability claims. Second, jurisdictions with more active environmental governance and disclosure enforcement tend to generate more publicly visible controversies, which can stimulate scholarly interest and data availability through documented cases and investigations. Third, research output is shaped by national research funding capacity and publication incentive systems, which may amplify bibliometric visibility in Scopus-indexed outlets. Finally, the higher MCP ratios observed in several European countries may reflect stronger cross-border research networks and collaborative funding schemes, leading to proportionally higher international co-authorship despite lower absolute counts. While these explanations are theoretically plausible, this study does not statistically test the association between country output and policy stringency, case exposure frequency, or funding mechanisms; therefore, future research could link bibliometric production to external indicators (e.g., environmental policy stringency, enforcement intensity, and greenwashing case databases) to strengthen causal interpretation.

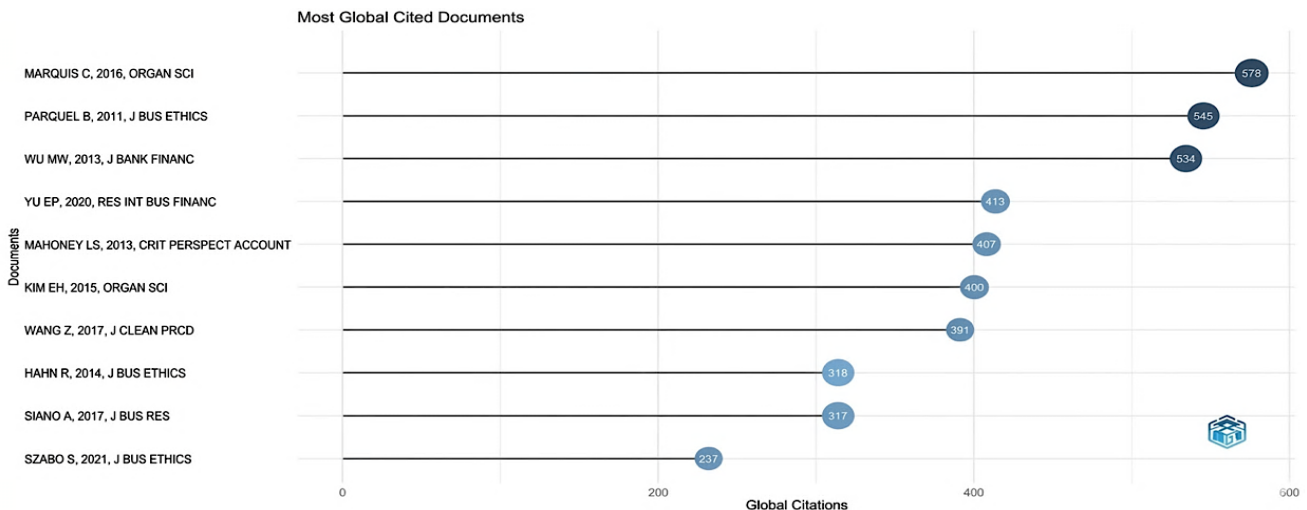
### 3.5 Most globally cited documents description

Table 8 provides the detailed bibliometric profile of the most globally cited documents in greenwashing research (Figure 7). The table shows that the intellectual foundation of this field has been shaped by a relatively limited number of highly cited studies published across journals in organization

studies, business ethics, finance, accounting, and sustainability. This pattern indicates that greenwashing has developed as a multidimensional research area rather than as a narrowly bounded topic within a single discipline. The most highly cited contribution is Marquis et al. [4], with 578 global citations, indicating the strong influence of institutional and organizational explanations in understanding corporate sustainability behavior and symbolic environmental commitment. Parguel et al. [13], with 545 citations, represented another major reference point by showing how green advertising and sustainability claims affect consumer evaluations and perceived corporate credibility. Wu and Shen [20], with 534 citations, further extended the discussion by linking greenwashing-related issues to financial and market-oriented considerations, thereby broadening the field beyond ethical communication alone.

Other highly cited documents demonstrate the growing importance of reporting quality, accountability, and disclosure. Yu et al. [16], with 413 citations, and Mahoney et al. [21], with 407 citations, showed that greenwashing research increasingly intersected with sustainability reporting and corporate accountability. Kim and Lyon [1], with 400 citations, and Wang and Sarkis [22], with 391 citations, also suggested that organizational strategy and environmental disclosure practices had become central themes in the literature. These studies collectively indicate a shift from purely conceptual concern toward empirical assessment of how environmental claims are communicated, interpreted, and evaluated.

The remaining highly cited works further reinforce the ethical and managerial dimensions of the field. Hahn and Lülfs [15], with 318 citations, and Siano et al. [14], with 317 citations, contribute to understanding the ethical tensions and strategic communication practices surrounding greenwashing, while Szabo and Webster [17], with 237 citations, show the continuing relevance of transparency and stakeholder scrutiny in more recent research. Overall, Table 9 does not merely list influential documents; it reveals the main intellectual pillars of greenwashing research, namely organizational and institutional explanations, stakeholder and consumer response, and accountability through reporting and disclosure. This structure is important for interpreting how more recent studies have emerged and why current debates increasingly connect greenwashing with ESG communication, sustainability governance, and corporate transparency.



**Figure 7.** Most globally cited documents

**Table 8.** Top 10 most globally cited documents

Ref.	Title	Journal	Total Citations	TC per Year	Normalized TC
[1]	Greenwash vs. brownwash: Exaggeration and undue modesty in corporate sustainability disclosure	Organization Science	400	40.0	6.9
[4]	Scrutiny, norms, and selective disclosure: A global study of greenwashing	Organization Science	578	64.2	10.0
[13]	How sustainability ratings might deter ‘greenwashing’: A closer look at ethical corporate communication	Journal of Business Ethics	545	39.0	9.4
[14]	"More than words": Expanding the taxonomy of greenwashing after the Volkswagen scandal	Journal of Business Research	317	39.6	5.5
[15]	Legitimizing negative aspects in GRI-oriented sustainability reporting: A qualitative analysis of corporate disclosure strategies	Journal of Business Ethics	318	26.5	5.5
[16]	Greenwashing in environmental, social and governance disclosures	Research in International Business and Finance	413	82.6	7.1
[17]	Perceived greenwashing: The effects of green marketing on environmental and product perceptions	Journal of Business Ethics	237	59.3	4.1
[20]	Corporate social responsibility in the banking industry: Motives and financial performance	Journal of Banking & Finance	534	44.5	9.2
[22]	Corporate social responsibility governance, outcomes, and financial performance	Journal of Cleaner Production	391	48.9	6.8
[21]	A research note on standalone corporate social responsibility reports: Signaling or greenwashing?	Critical Perspectives on Accounting	407	33.9	7.0

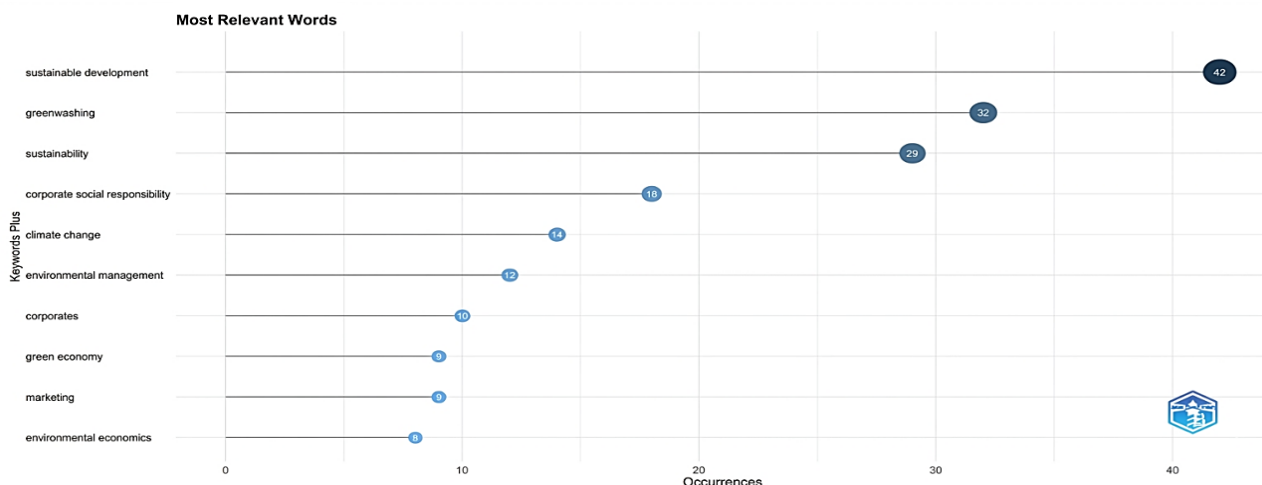
Note: TC = Total Citations.

**3.6 The most relevant word**

Figure 8 presents the most relevant Keywords Plus terms in the greenwashing literature. The most frequently occurring terms are sustainable development (42), greenwashing (32), sustainability (29), corporate social responsibility (18), climate change (14), environmental management (12), corporates (10), green economy (9), marketing (9), and environmental economics (8). This distribution indicates that greenwashing research is strongly embedded in the broader sustainability discourse and is connected with issues of corporate responsibility, environmental governance, and market-related communication.

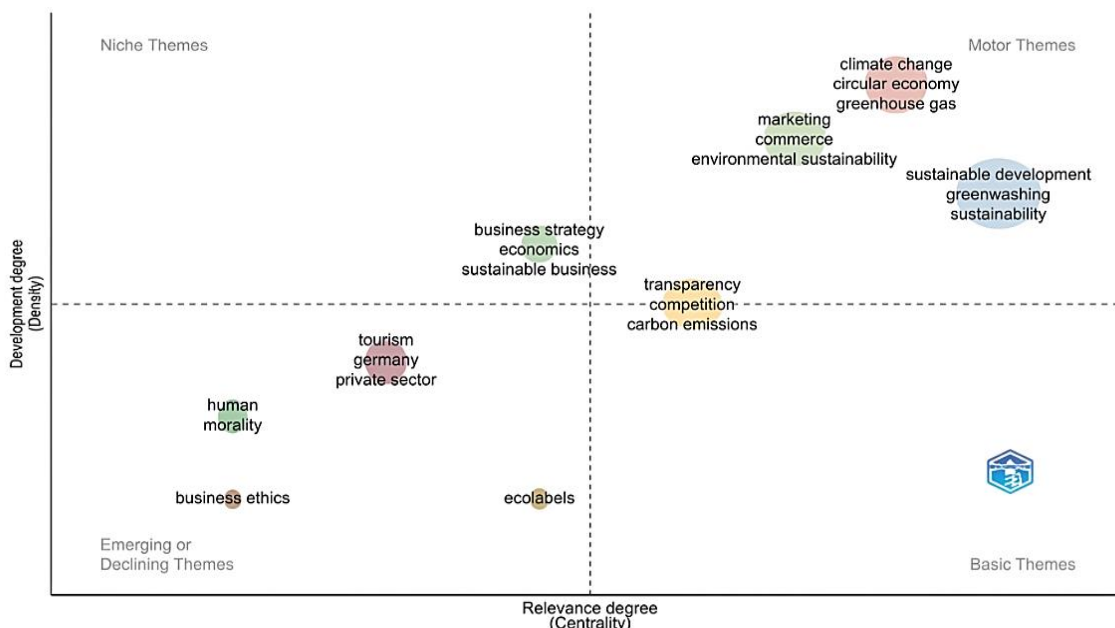
The prominence of sustainable development, sustainability, and greenwashing suggests that the field is primarily concerned with the relationship between corporate environmental claims and wider sustainability agendas. The appearance of corporate social responsibility and climate change further indicates that the literature frequently examines greenwashing in relation to ethical responsibility and contemporary environmental challenges. Meanwhile,

environmental management and corporates point to the organizational level of analysis, where firms, governance mechanisms, and internal management practices become central units of discussion. Other terms, such as green economy, marketing, and environmental economics, show that the literature also extends beyond organizational ethics into strategic communication, market positioning, and broader economic implications. Overall, the keyword pattern suggests that greenwashing research is not confined to a single disciplinary perspective, but intersects with management, marketing, sustainability, economics, and corporate responsibility. Thus, Figure 8 illustrates the thematic breadth of the field and the range of issues through which greenwashing is currently studied. However, these keyword frequencies should be interpreted as indicators of thematic prominence rather than as direct evidence of causal relationships among concepts. For this reason, a co-occurrence network analysis is needed to examine how these terms are structurally connected within the literature and to identify the main thematic clusters that organize the field.



**Figure 8.** Top 10 most relevant words





**Figure 10.** Thematic map quadrant

At the same time, the map reveals that business strategy, economics, and sustainable business remain more specialized themes, indicating that the strategic and economic dimensions of greenwashing are developing, but are still less central than the broader sustainability discourse. Meanwhile, themes such as transparency, competition, and carbon emissions appear to connect sustainability concerns with disclosure practices and market-based environmental claims, which is particularly relevant for understanding how greenwashing operates in contemporary corporate settings.

Themes such as business ethics, morality, tourism, and ecolabels occupy the emerging-or-declining quadrant, suggesting that these topics are not yet dominant in the field's current structure. However, these themes may become more important in future research, especially as regulatory scrutiny, ethical accountability, and sector-specific sustainability claims continue to expand. Overall, the map indicates that greenwashing research is increasingly moving toward a more integrated discussion of sustainability governance, accountability, and environmental communication.

### 3.8 Thematic map analysis

Table 10 provides a cluster-level thematic description using Callon centrality, Callon density, and cluster frequency (Figure 11). The results indicate that Sustainable Development is the most frequently occurring cluster (355 occurrences), confirming its role as the broad conceptual backbone of greenwashing research. It also has the highest centrality value (16.711), showing that it is strongly connected to other themes in the field. Climate Change (centrality = 8.485; density = 128.948; frequency = 73) and Marketing (centrality = 6.667; density = 99.089; frequency = 76) display high density values, indicating that these clusters are internally well developed. Their relatively high centrality values also suggest that both themes are important in shaping the intellectual structure of the field. This supports the view that greenwashing research is driven by both environmental-policy concerns and market communication dynamics. Transparency (centrality = 5.610; density = 73.016; frequency = 43) occupies an intermediate position: it is sufficiently connected to the broader network

and moderately developed internally. This is consistent with the growing emphasis on disclosure quality, accountability, and credibility assurance in sustainability reporting studies.

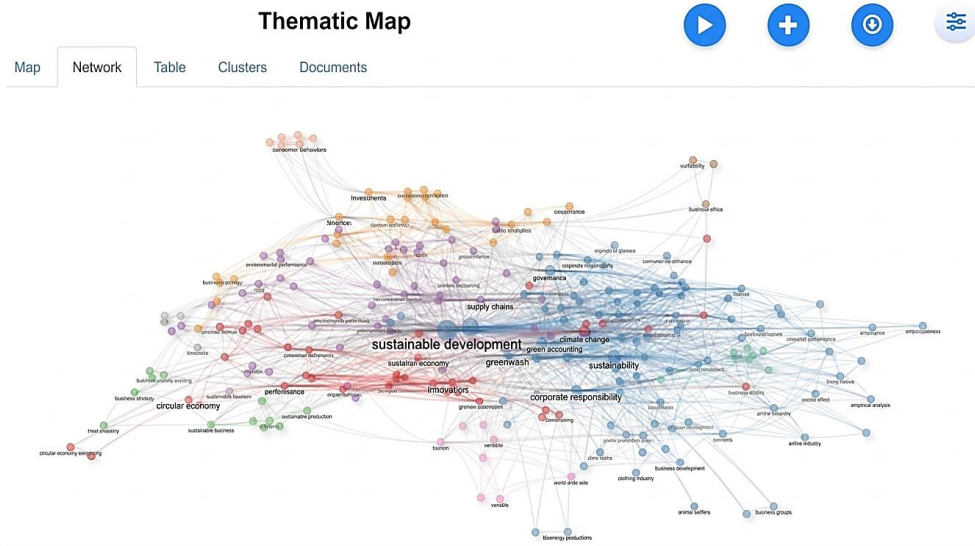
Several smaller clusters Business Strategy (frequency = 8), Tourism (13), Business Ethics (2), Ecolabels (2), and Human (4) have relatively low centrality values, suggesting weaker integration into the core thematic structure. However, these clusters should not be treated as unimportant. Instead, they represent specialized or emerging lines of inquiry. For instance, Business Ethics and Ecolabels point to normative and certification-related debates, while Tourism reflects sector-specific applications of greenwashing research. Taken together, Table 10 shows a field structured around a highly connected sustainability core, with climate and marketing as strongly developed drivers, transparency as a consolidating accountability theme, and smaller clusters as niche or emerging areas that may become more prominent in future research.

In bibliometric research, thematic analysis maps are an essential tool for identifying and visualizing the intellectual structure of a research field [26, 27]. Themes are grouped into four quadrants basic themes, driving themes, niche themes, and emerging/declining themes—based on their centrality and density [19, 28]. Figure 10 displays the thematic distribution of greenwashing research, while Table 10 provides a detailed bibliometric description for each cluster, based on Callon centrality and density, as well as rank centrality and frequency of occurrence [18].

The driving themes quadrant, representing highly developed and central topics, includes clusters such as climate change, circular economy, greenhouse gases, marketing, trade, and environmental sustainability. These themes are characterized by high density and centrality, indicating that they drive the intellectual development of the field. For example, the climate change cluster exhibits high density (128,948) and centrality (8,485), reflecting its role as a driver of policy-oriented and academic sustainability discourse. Marketing (99,089) also stands out, demonstrating the important role of corporate communications and consumer engagement in the greenwashing debate.

**Table 10.** Thematic map cluster

Cluster	Callon Centrality	Callon Density	Rank Centrality	Rank Density	Cluster Frequency
Climate Change	8.485	128.948	8	9	73
Sustainable Development	16.711	80.575	9	7	355
Business Strategy	0.5	75	4.5	6	8
Marketing	6.667	99.089	7	8	76
Transparency	5.61	73.016	6	5	43
Business Ethics	0	50	1.5	1.5	2
Tourism	0.483	70	3	4	13
Ecolabels	0.5	50	4.5	1.5	2
Human	0	62.5	1.5	3	4



**Figure 11.** Thematic map network

The basic themes, located in the bottom right quadrant, are fundamental but less developed internally. Sustainable development, greenwashing, and sustainability dominate this quadrant, serving as the conceptual backbone of the literature. With the highest frequency (355 occurrences), sustainable development anchors the field, linking corporate responsibility to the global sustainability agenda. Transparency and carbon emissions also emerge as basic yet broadly relevant themes, underscoring their role as foundational themes within accountability and disclosure frameworks.

The niche themes quadrant (top left) contains few clusters, indicating limited but specialized areas that have not yet become central to shaping the field as a whole. In contrast, the emerging or declining themes quadrant (bottom left) contains clusters such as business ethics, ecolabels, people, morality, tourism, and the private sector. These themes have low centrality and density, suggesting declining academic attention or potential areas for future exploration. For example, business ethics (CallonDensity = 50) reflects normative concerns that, while present, have not been central to recent empirical studies.

The thematic structure shows that greenwashing research is grounded in broad sustainability concepts (foundational themes), driven by climate- and market-oriented factors (driving themes), while still leaving room for underdeveloped or emerging areas such as ecolabels and ethical frameworks. This interaction demonstrates the field's multidisciplinary orientation, linking environmental science, business strategy, and ethical debates in shaping its current and future trajectory.

### 3.9 Thematic evolution analysis

The information presented in Figure 12 provides a comprehensive overview of the development and shifting focus of corporate sustainability research throughout the period 2005-2025. In the initial phase (2005-2020), CSR and sustainable development served as the primary conceptual foundations, reflecting a normative orientation emphasizing corporate social and ethical responsibility towards the environment. Entering the 2021-2022 period, there has been a shift towards issues of credibility and implementation, with increased attention paid to greenwashing, environmental performance, and SDGs. This shift indicates that the research focus is no longer limited to symbolic commitments, but is beginning to examine the gap between claims and actual sustainability performance.

Furthermore, Figure 12 shows that in the 2023-2024 period, environmental disclosure, sustainability reporting, and corporate sustainability took center stage, signaling a shift toward transparency, accountability, and credibility assurance in sustainability reporting. The convergence between greenwashing, CSR, and environmental sustainability disclosure in the current phase underscores a new research direction that emphasizes the importance of integrity assurance and stakeholder trust. Overall, this evolution reflects a transformation in the literature from a normative foundation to an empirical approach that emphasizes verification and credibility as key pillars of modern corporate sustainability practices.

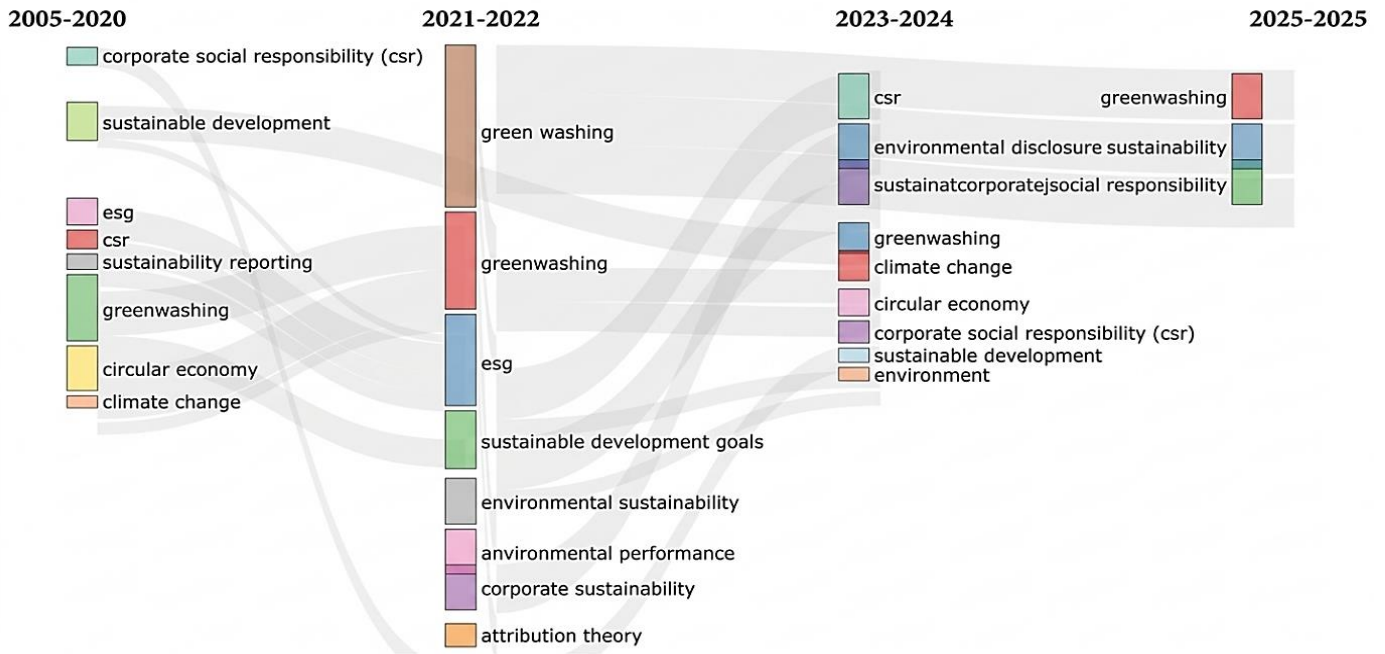


Figure 12. Thematic evolution over time

### 3.10 Trend topic analysis

The trending topics chart illustrates the temporal evolution of research themes related to greenwashing between 2016 and 2023 (Figure 13). Early studies were limited, with terms such as tourism (2016) and perception (2019) appearing sporadically, suggesting exploratory discussions within a narrower context. However, from 2020 onward, there has been a marked shift towards broader sustainability debates, with terms such as sustainable development, greenwashing, sustainability, and corporate social responsibility dominating the discourse. These keywords appear with greater frequency, reflecting their central role in framing theoretical and applied studies.

The past few years (2022-2023) have seen the field expand in new directions. The emergence of terms such as

corporations, green economy, and China demonstrates a growing interest in examining institutional contexts, economic transformations, and country-specific contributions to the greenwashing debate. At the same time, the importance of climate change and innovation highlights the integration of greenwashing studies with pressing environmental issues and technological solutions.

Overall, the figure shows that while the core literature remains grounded in sustainability and CSR, the field is progressively diversifying into themes that connect corporate practices, regional perspectives, and systemic transformations. This demonstrates the growing maturity and dynamism of greenwashing research, suggesting future opportunities for more comparative, interdisciplinary, and policy-oriented investigations.

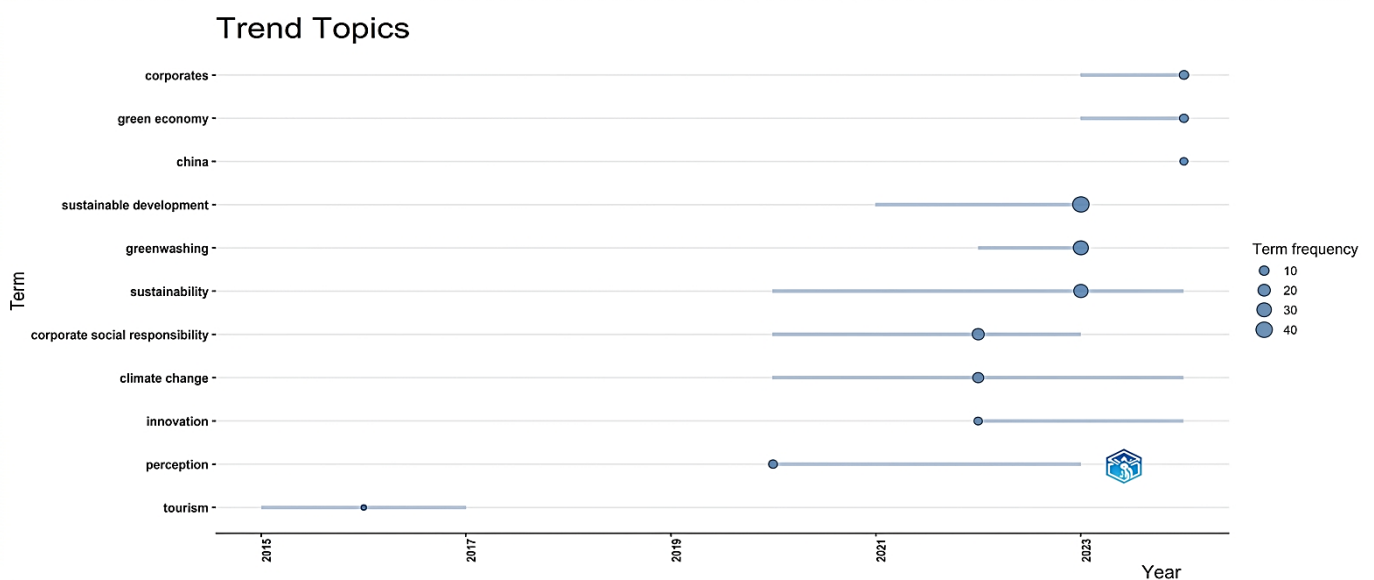


Figure 13. Trend topic over time

## 4. DISCUSSION

### 4.1 Core source concentration and field maturation

The source-level findings indicate a clear process of field maturation in greenwashing and sustainability research. As shown in Table 4, publication and citation impact are concentrated in a relatively small set of outlets, with only 8 core journals (Bradford Zone 1) accounting for a substantial share of influential contributions. In particular, the *Journal of Cleaner Production*, *Business Strategy and the Environment*, and *Corporate Social Responsibility and Environmental Management* emerge as the three leading sources in terms of productivity and impact. This concentration pattern suggests that greenwashing scholarship is no longer dispersed across isolated studies, but has developed a more stable publication structure anchored in recognized sustainability and corporate responsibility journals.

This pattern also supports the view that greenwashing is embedded in broader debates on corporate legitimacy, disclosure credibility, and stakeholder accountability rather than being confined to promotional communication alone. For example, within the sustainability-management outlets, recent highly cited studies increasingly operationalize greenwashing as an empirical governance and credibility problem linking greenwashing to stakeholder perceptions and reputational consequences [29], to financial performance under varying institutional conditions such as local environmental regulation and media coverage [30], and to firm valuation via board and governance characteristics [31]. In parallel, disclosure credibility is examined through the “signal vs. greenwashing” lens in CSR reporting settings [32], indicating a shift from purely conceptual critique toward testable mechanisms and boundary conditions that define when sustainability disclosure functions as informative signaling versus symbolic decoupling.

At the same time, the source impact results reveal an important nuance: journal influence is not determined solely by publication volume. Despite publishing fewer documents, the *Journal of Business Ethics* continues to exert disproportionate intellectual influence through highly cited work that shapes the field’s conceptual backbone. Post-2020 evidence shows that ethics-oriented scholarship remains central in defining how stakeholders detect and respond to greenwashing, such as research on perceived greenwashing effects on product and environmental perceptions [17], the locus and diffusion of responsibility across supply chains [33], and attribution-based responses to CSR positioning incongruence [34]. This indicates that the field is maturing through a dual structure: foundational theoretical development remains rooted in ethics and legitimacy debates, while contemporary empirical expansion is increasingly driven by sustainability, disclosure, and governance journals.

Finally, this dual structure helps explain the interdisciplinary character of greenwashing research identified in co-word and thematic analyses. The concentration of core sources across sustainability management and business ethics outlets is increasingly complemented by empirical streams in finance and governance that treat credibility as a market-relevant issue. Recent studies, for instance, document ESG “decoupling” and credibility gaps [35] and examine ESG-related information environments and perception dynamics [35], reinforcing the argument that greenwashing has evolved into a multidimensional phenomenon involving

communication strategy, stakeholder cognition, accountability systems, and institutional pressures. Therefore, the source concentration pattern observed in this study is not merely a bibliometric regularity; it also evidences the field’s intellectual maturation and increasing theoretical and empirical integration.

### 4.2 Thematic evolution and theoretical shift

The thematic evolution results show that greenwashing research has undergone a clear conceptual shift over time, moving from early critiques of symbolic corporate environmental communication toward more applied and governance-oriented discussions. In the earlier phase, the literature was primarily concerned with the discrepancy between sustainability claims and actual practices, reflecting a legitimacy-oriented perspective in which firms use environmental narratives to maintain social approval. This pattern is consistent with foundational work that frames greenwashing as symbolic behavior and impression management, where the central issue is the tension between reputational signaling and substantive environmental action. Contemporary empirical evidence continues to validate this legitimacy-perception channel: for instance, stakeholder-facing greenwashing communications have been shown to distort stakeholders’ beliefs and evaluations of corporate environmental practices, highlighting how narrative strategies can shape credibility judgments even when substantive performance is unclear [29].

The bibliometric evidence from this study supports that foundational perspective, but also extends it in important ways. The co-word network and thematic map confirm that core concepts such as corporate social responsibility, sustainability, and stakeholder-related communication themes remain central to the field, indicating the continuing relevance of legitimacy and stakeholder-based explanations. However, the longitudinal thematic analysis shows that the field has expanded beyond symbolic communication concerns. Recent thematic trajectories increasingly connect greenwashing to corporate accountability, sustainability reporting, climate governance, green economy, and eco-innovation, suggesting that contemporary scholarship treats greenwashing not only as a communication problem, but as a governance and disclosure problem embedded in institutional and regulatory structures. Empirical studies illustrate this shift by directly modelling the role of external governance conditions: greenwashing can be associated with corporate financial performance in information-asymmetric environments, but this effect weakens under stricter local environmental regulation and can reverse under unfavorable media coverage indicating that enforcement and information environments shape the payoffs and detectability of greenwashing [36].

This thematic shift reflects a broader theoretical transition in the field. Earlier work was dominated by legitimacy theory and consumer-response perspectives, which focused on reputation, trust, and communication effects. In contrast, more recent themes align with accountability-oriented and governance-based frameworks, where the quality of disclosure, assurance mechanisms, and institutional pressures become central analytical concerns. This is reflected in evidence showing that greenwashing is increasingly analysed as a governance-linked behavior with valuation consequences: board-related characteristics and institutional settings can shape the relationship between greenwashing behavior and

firm value, reinforcing the view that greenwashing is intertwined with internal governance architecture and external disclosure regimes [31]. In parallel, the “signal versus greenwashing” debate in CSR reporting has moved from conceptual framing toward empirical testing in sectoral contexts (e.g., logistics), clarifying when CSR reporting functions as credible signaling versus symbolic reporting [32].

The emergence of themes such as eco-innovation and green economy also suggests that the literature is increasingly linking greenwashing to sustainability transition debates. This is a notable development because it indicates that scholars are no longer only asking whether firms mislead stakeholders, but also whether such practices hinder or distort broader transition pathways toward low-carbon and responsible business models. Empirical work supports this transition perspective: greenwashing has been found to significantly reduce improvements in green innovation, implying that symbolic environmental posturing can undermine innovation-oriented transition outcomes [37]. Moreover, the ESG stream increasingly operationalizes “credibility gaps” through decoupling-type measures, showing how governance features (e.g., board composition) relate to ESG decoupling—an approach that explicitly reframes greenwashing as misalignment between ESG performance and ESG communication/reporting [38].

Thus, the thematic evolution observed in this study signals a shift from a predominantly diagnostic literature (identifying and critiquing greenwashing) toward a more solution-oriented and policy-relevant literature that examines how governance mechanisms, disclosure systems, and institutional arrangements can reduce greenwashing risks. This is consistent with a growing empirical emphasis on information environments and stakeholder cognition in ESG contexts—for example, studies using large-scale data sources (e.g., social media) to map public perceptions of ESG, which helps explain how credibility is formed, contested, and potentially repaired through governance and communication practices [39].

### 4.3 Country contribution patterns and institutional context

The country-level results show that greenwashing research is geographically concentrated, with China (47 documents; 13.2%), the United States (43; 12.0%), and the United Kingdom (23; 6.4%) emerging as the leading corresponding-author countries. This pattern suggests that knowledge production in this field is not evenly distributed, but is shaped by institutional contexts where sustainability reporting, ESG scrutiny, and public accountability pressures are relatively strong. In bibliometric terms, the dominance of these countries indicates that greenwashing has become a salient research agenda in jurisdictions with active regulatory debates, mature capital markets, and high public attention to corporate sustainability claims.

This finding supports prior studies that explain greenwashing as a response to external stakeholder pressures, including regulators, investors, NGOs, and consumers [3, 4, 12]. Earlier literature emphasizes that firms are more likely to engage in symbolic sustainability communication when they face legitimacy demands but lack equivalent substantive performance improvements [5, 12]. The present study extends that perspective by showing that the research production itself is also institutionally patterned: countries with stronger disclosure expectations and sustainability governance

infrastructures appear to generate more greenwashing scholarship. In other words, institutional pressure does not only shape corporate behavior; it also shapes where greenwashing becomes a sustained academic concern.

The prominence of China, the United States, and the United Kingdom can also be interpreted as reflecting differences and complementarities in regulatory and market environments. The United States and the United Kingdom have long-standing traditions of research in business ethics, corporate accountability, and financial disclosure, which helps explain the strong presence of greenwashing studies in these contexts [36, 40]. China’s leading contribution, meanwhile, is particularly notable because it signals the growing importance of greenwashing in emerging and transition-oriented economies, where rapid industrial transformation, environmental policy development, and ESG reporting expansion create fertile ground for research on disclosure credibility and environmental claims. This pattern suggests that the field is no longer dominated only by Western debates, but is increasingly shaped by diverse institutional settings.

At the same time, the concentration of publications in a few countries points to an important limitation and future research opportunity. The current intellectual structure may underrepresent perspectives from regions with weaker publication visibility in Scopus, different regulatory traditions, or less developed sustainability reporting ecosystems. This implies that the global greenwashing discourse, as captured in bibliometric databases, may still be skewed toward countries with stronger research infrastructure and English-language publication capacity. Future studies should therefore expand comparative analyses across underrepresented regions to examine whether the drivers, manifestations, and consequences of greenwashing differ across institutional contexts.

Overall, the country contribution pattern observed in this study supports the institutional view of greenwashing while extending it in a bibliometric direction. It demonstrates that greenwashing research develops most strongly in settings where corporate sustainability communication is highly contested, regulated, and scrutinized. This finding reinforces the argument that greenwashing is not merely a firm-level communication issue, but a phenomenon embedded in broader institutional environments that shape both corporate conduct and scholarly attention.

### 4.4 Emerging themes and future agenda

The country-level results show that greenwashing research is geographically concentrated, with China (47 documents; 13.2%), the United States (43; 12.0%), and the United Kingdom (23; 6.4%) emerging as the leading corresponding-author countries. This pattern suggests that knowledge production in this field is not evenly distributed, but is shaped by institutional contexts where sustainability reporting, ESG scrutiny, and public accountability pressures are relatively strong. In bibliometric terms, the dominance of these countries indicates that greenwashing has become a salient research agenda in jurisdictions with active regulatory debates, mature capital markets, and high public attention to corporate sustainability claims [3, 4, 12].

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Empirical evidence from recent studies helps clarify why China's output is particularly prominent. First, China provides a fertile setting for greenwashing research because its rapid sustainability transition co-exists with uneven implementation capacity across regions and sectors. For example, evidence indicates that the relationship between greenwashing and firm outcomes is contingent on the information environment: the effect of greenwashing on financial performance is moderated by local environmental regulation and media coverage, implying that regulatory stringency and public exposure mechanisms directly shape incentives and detectability [36]. Relatedly, work focusing on China explicitly examines the drivers of greenwashing within the country's evolving institutional context, reinforcing that greenwashing is increasingly framed as a governance and market-discipline issue rather than a purely communication-level phenomenon [40]. Moreover, in transition economies, greenwashing debates increasingly intersect with green investment and energy transition agendas; provincial-level evidence suggests that the coherence between "green deals," green technology, and green investment may be inconsistent, raising concerns about symbolic compliance in sustainability initiatives [41].

The prominence of the United States can be interpreted through the combination of mature capital markets, intense ESG contestation, and the rapid expansion of sustainable finance products—conditions that increase both the incentives to "sell" sustainability narratives and the scrutiny that follows. For instance, recent finance-oriented research directly investigates greenwashing in U.S. equity ETFs, reflecting growing concerns about sustainability labeling and product credibility in highly financialized [42]. Complementary evidence examines whether U.S. active mutual funds deliver on ESG promises, further indicating that greenwashing concerns are increasingly operationalized through investment-product evaluation and ESG-performance verification, not only corporate CSR narratives [43]. In addition, the intensifying political and market debate around ESG in the United States often framed as "ESG backlash" also contributes to scholarly attention because it raises the salience of legitimacy disputes and disclosure credibility [44].

For the United Kingdom, the contribution pattern can be read as consistent with the country's longstanding traditions in corporate accountability, business ethics, and sustainability communication scholarship, alongside strong civil-society and consumer-facing scrutiny. Research connected to UK contexts has examined, for example, how greenwashing relates to online consumer responses and sustainability communication mechanisms [44] and how corporate greenwashing influences organizational or stakeholder outcomes [45]. While these studies vary in scope, they reinforce that in high-scrutiny information environments, greenwashing becomes a researchable phenomenon because it leaves observable traces in stakeholder perceptions, market reactions, and disclosure practices.

At the same time, the concentration of publications in a few countries points to an important limitation and future research opportunity. The current intellectual structure may underrepresent perspectives from regions with weaker publication visibility in Scopus, different regulatory traditions, or less developed sustainability reporting ecosystems. This implies that the global greenwashing discourse, as captured in bibliometric databases, may still be skewed toward countries with stronger research infrastructure and English-language publication capacity. Future studies should therefore expand comparative analyses across underrepresented regions and explicitly link bibliometric output to institutional indicators (e.g., policy stringency, enforcement intensity, media freedom, sustainable finance market depth) to test whether the drivers, manifestations, and consequences of greenwashing systematically differ across institutional contexts.

## **5. CONCLUSIONS, IMPLICATIONS, LIMITATIONS, AND SUGGESTIONS**

### **5.1 Conclusion**

The conventional role of corporate communications in portraying sustainability has been significantly transformed by the phenomenon of greenwashing. Beyond a simple promotional strategy, greenwashing has evolved into a complex practice intersecting with accountability, corporate governance, stakeholder trust, and sustainability reporting. In the contemporary era, companies are evaluated not only on their financial results but also on their ability to disclose credible environmental and social practices. This places greenwashing at the center of academic and policy debates, demanding flexibility, strategic awareness, and ethical responsibility from companies in navigating a rapidly changing environmental and regulatory landscape. Integrating knowledge between sustainability, marketing, and accountability is therefore crucial, as it reflects the multidimensional nature of greenwashing research in assessing how corporate actions impact legitimacy, consumer perceptions, and global governance frameworks.

The scope of this field and its growing influence on theory and practice are underscored by the most cited works in greenwashing studies. Themes such as sustainable development, climate change, corporate social responsibility, marketing, and environmental sustainability form the intellectual backbone of the literature. The large number of citations highlights how these studies have enriched the discourse on reputational risk, consumer trust, and corporate legitimacy. The prominence of CSR and marketing as bridges further demonstrates their crucial role in linking symbolic communication to substantive sustainability performance. Meanwhile, the integration of climate change and innovation into the discourse reflects the field's responsiveness to global challenges and its potential to contribute to transformative solutions.

The strong thematic evolution in greenwashing research between 2016 and 2023 underscores the enduring relevance of core themes such as sustainability, CSR, and greenwashing, while also revealing the emergence of new directions such as the green economy, ecolabeling, and regional studies. This transition demonstrates how the field has matured from a normative critique of deceptive practices to a more applied and policy-oriented approach, examining the institutional,

economic, and technological dimensions of greenwashing.

Therefore, greenwashing is a dynamic and interdisciplinary field that remains grounded in the core values of accountability and transparency, yet continues to be shaped by regulatory changes, global environmental issues, and evolving market narratives. A scholarly approach enhanced by bibliometric insights is necessary to capture its complexity and trace the interactions between diverse research themes. The cluster analysis and co-word mapping conducted in this study provide detailed evidence of the interrelationships between sustainability governance, corporate communication, and consumer behavior.

In conclusion, the bibliometric analysis of greenwashing research offers valuable insights into its significant influence on corporate governance, sustainability strategies, and stakeholder relations. By synthesizing the most cited works, network structure, and thematic evolution, this study enriches the ongoing academic discourse on greenwashing and highlights the importance of addressing deceptive sustainability practices. Ultimately, an effective response to greenwashing will not only strengthen corporate accountability but also enhance the credibility of sustainability transitions, shaping stakeholder perceptions and policy decisions in the global landscape.

This study contributes to the greenwashing literature by providing an updated and integrated bibliometric synthesis of research published between 2005 and 2025. The contribution of this study does not lie in introducing a new bibliometric method, but in combining multiple established bibliometric techniques performance analysis, co-word network analysis, thematic mapping, and longitudinal thematic evolution within a single analytical framework. This integration enables a clearer empirical understanding of how greenwashing scholarship has evolved from legitimacy- and communication-centered critiques toward broader debates on sustainability reporting, corporate accountability, and governance. By clarifying the field's core sources, country contribution patterns, and thematic trajectories, this study offers a more precise basis for future theory development, comparative research, and policy-oriented inquiry.

## 5.2 Implications

By evolving greenwashing from a mere communication tactic to a central issue in sustainability and corporate governance, this study makes an important theoretical contribution to the field. The research focuses on the intersection of corporate responsibility, sustainability communication, climate change, and stakeholder engagement. This broader perspective goes beyond previous views that consider greenwashing merely a misleading advertising or public relations strategy. Instead, it reveals that greenwashing is embedded within various governance frameworks and market systems.

Bibliometric mapping identified several key clusters sustainable development, greenwashing, corporate social responsibility, climate change, marketing, trade, and environmental sustainability. Findings about how CSR and marketing operate as connecting themes within a shared network of terms reinforce their role in shaping the theoretical and empirical direction of the field. This highlights the importance of communication and legitimacy management in guiding top management strategies and corporate sustainability practices.

From a theoretical perspective, this study enriches sustainability and legitimacy theory by illustrating how symbolic actions and substantive practices are intertwined in corporate governance. It also advances stakeholder theory by demonstrating how greenwashing affects consumer trust, investor perceptions, and regulatory accountability. By integrating the themes of innovation and the green economy, this study adds to the growing literature on eco-innovation and institutional transitions, reinforcing the notion that greenwashing cannot be understood in isolation but must be examined within the context of dynamic environments and markets.

Practically, this study highlights how greenwashing has significant implications for corporate decision-making, regulatory frameworks, and stakeholder engagement. The identification of core themes and their interrelationships provide useful guidance for managers and policymakers in designing governance structures that minimize fraudulent practices and promote accountability. Just as internal control frameworks strengthen transparency in universities, robust sustainability reporting and independent assurance mechanisms are crucial in mitigating greenwashing in the corporate context.

In summary, this study makes theoretical contributions to theories of sustainability, legitimacy, and stakeholder engagement, while also offering practical insights into the governance and accountability mechanisms needed to address greenwashing practices. It positions greenwashing not only as an ethical issue but also as a strategic and regulatory challenge that impacts corporate behavior and stakeholder trust, both nationally and globally.

### 5.2.1 Implications for sustainable development planning

Although greenwashing research is often anchored in corporate communication, CSR, and marketing logics, its implications extend directly to sustainable development planning particularly urban planning, regional development planning, infrastructure planning, and policy planning. Planning systems rely on credible information flows and trust-based coordination among governments, firms, financiers, and communities. When greenwashing becomes pervasive, it does not merely distort market signals; it also contaminates planning processes by weakening evidence quality, eroding public trust, and reducing the effectiveness of policy instruments that are designed to accelerate sustainability transitions.

Greenwashing as a planning risk: information integrity and public trust. Sustainable development planning especially for green infrastructure and climate adaptation depends on transparent and verifiable claims. However, the intellectual structure mapped in this study shows how sustainability narratives frequently intersect with marketing and CSR-driven communication, while transparency and accountability emerge as critical counterweights. This configuration implies a planning-relevant risk: when sustainability claims are framed primarily through promotional discourse rather than measurable performance, planners and policymakers may face systematic "information asymmetry" in program design and project appraisal. In practice, greenwashing can inflate perceived benefits, understate lifecycle emissions or ecological impacts, and obscure trade-offs that should be made explicit in feasibility studies and environmental/social assessments.

The planning consequence is straightforward: repeated

exposure to greenwashing undermines public confidence in climate initiatives and green infrastructure projects (e.g., renewable energy facilities, low-carbon transport, nature-based solutions, and green building programs). Once trust is eroded, communities become more resistant to project siting, cost-sharing, and long-term behavioral changes, thereby increasing transaction costs, delaying implementation, and reducing policy legitimacy. In this sense, greenwashing is not only a corporate reputation problem it becomes a governance and planning problem that affects the social license to operate for sustainability programs.

### 5.2.2 Implications for urban and regional development planning

Urban and regional planners increasingly integrate climate mitigation, resilience, and biodiversity goals into spatial plans, capital investment programs, and sectoral strategies. Greenwashing can weaken these efforts in three ways. First, it biases priorities. If corporate sustainability messaging shapes public and political attention, planners may be pushed toward high-visibility “green” projects with limited substantive impact (symbolic projects), while less visible but more effective interventions (e.g., demand management, maintenance upgrades, or ecosystem restoration with measurable outcomes) receive less support.

Second, it complicates cross-sector coordination. Regional development planning often requires coordination across transport, energy, housing, water, and land-use systems. Greenwashing can create misalignment when private actors commit to sustainability rhetorically but do not align investment decisions with planning targets. The result is planning incoherence plans become aspirational documents rather than operational roadmaps.

Third, it raises evaluation challenges. Green infrastructure programs require monitoring and evaluation frameworks that track outcomes over time (emissions, air quality, biodiversity, equity, and resilience indicators). Greenwashing practices can “crowd out” rigorous evaluation by shifting attention toward narrative-based success stories rather than audited performance metrics. To mitigate this, planners need stronger verification mechanisms embedded into planning cycles, not only at the reporting stage.

Policy planning and regulatory design: from disclosure to enforceable anti-greenwashing frameworks. A key planning implication from the thematic structure of the literature is the rising importance of transparency and accountability. For policymakers, this suggests that anti-greenwashing strategies should move beyond voluntary reporting and toward enforceable architectures that are integrated into the policy cycle (formulation-implementation-evaluation). Several planning-oriented design principles follow:

(a) Standardization of claims and taxonomy alignment. Policy planning can reduce ambiguity by standardizing sustainability claims and aligning them with recognized taxonomies and sector-specific benchmarks. This prevents vague labels (e.g., “eco-friendly,” “net-zero ready”) from being used without measurable criteria.

(b) Ex ante verification in planning approvals. For projects that seek “green” labels, incentives, or preferential treatment (permits, subsidies, green bonds, public procurement scoring), planning authorities can require ex ante verification: lifecycle assessments, third-party audits, and disclosure of assumptions used in impact projections. This is especially relevant for green infrastructure where planning approvals and funding

decisions occur before outcomes materialize.

(c) Continuous monitoring and adaptive regulation. Planning is iterative. Anti-greenwashing policy should therefore incorporate post-implementation audits and adaptive enforcement. Where claims fail to match performance, consequences should include corrective disclosures, penalties, or withdrawal of incentives. This aligns anti-greenwashing enforcement with performance-based planning.

(d) Credibility infrastructure: assurance, data systems, and public transparency. Effective planning requires credible data systems. Policymakers can strengthen “credibility infrastructure” by supporting independent assurance markets, digital reporting registries, open datasets for environmental performance, and transparent procurement records for green projects. Public transparency is not merely an accountability mechanism; it is a planning instrument that enables learning, benchmarking, and course correction.

Practical guidance for planners and policymakers. Based on the synthesis offered in this study, planners and policymakers can operationalize anti-greenwashing measures through concrete interventions:

- 1) Embed anti-greenwashing checks in planning instruments (strategic environmental assessment, project appraisal frameworks, public procurement guidelines, and green financing eligibility criteria).
- 2) Prioritize measurable outcomes over narrative commitments by requiring outcome-linked KPIs and independent verification for “green” project branding.
- 3) Design communication governance for public programs: ensure that government-endorsed “green” labels and claims are supported by evidence, with clear disclaimers and public access to methodologies.
- 4) Strengthen trust-building mechanisms through participatory planning and transparent risk communication, particularly for contested green infrastructure projects.

Directions for future research bridging greenwashing and planning. Future work can deepen the planning dimension by examining: (i) how greenwashing influences public acceptance and the political feasibility of green infrastructure, (ii) how anti-greenwashing regulations affect investment allocation across regions and sectors, and (iii) which governance designs best protect the integrity of planning systems in sustainability transitions. Linking bibliometric trends to policy outcomes and planning performance indicators would be especially valuable to move from mapping the literature to informing planning practice.

### 5.3 Limitations of the study

This study provides a comprehensive bibliometric review of the evolution and significance of greenwashing research within the broader sustainability discourse. One major obstacle lies in the inherent limitations of the data collection process. The reliance on the Scopus database and the limited availability of English-language publications are significant limitations of this analysis. While Scopus offers extensive coverage across disciplines, the exclusion of non-English studies or studies indexed in other repositories, such as Web of Science or regional databases, may limit the comprehensiveness of the findings globally. Given that greenwashing is a highly international phenomenon with diverse regional contexts, this limitation is particularly

significant, as research in languages other than English can capture nuanced local perspectives and regulatory responses.

Another limitation arises from the screening process, which prioritizes academic journal articles, conference proceedings, and book chapters primarily in the fields of business, management, and environmental studies. While this ensures academic rigor, it may underrepresent insights from interdisciplinary domains such as law, political science, or sociology, which also engage critically with greenwashing. Furthermore, the bibliometric method itself has an inherent weakness: it relies heavily on citation metrics, which may not always reflect a study's true quality or impact, but rather its visibility within the academic community. Therefore, emerging or innovative works that have not yet garnered citations may be underappreciated.

Acknowledging these limitations is crucial for interpreting the findings in their proper context. While this study provides compelling evidence about the intellectual structure and thematic evolution of greenwashing research, it does so within the constraints of its methodological choices. Future studies could expand the scope by incorporating multiple databases, multilingual sources, and interdisciplinary perspectives, thus offering a more inclusive and globally representative understanding of greenwashing, both as a corporate practice and as an academic field.

#### 5.4 Suggestions for future research

Future research on greenwashing should expand its scope beyond English-language publications indexed by Scopus to include multilingual sources and cross-databases such as Web of Science or regional repositories. This will provide a more globally representative view of how greenwashing is understood and challenged across different cultural and regulatory contexts.

Furthermore, adopting an interdisciplinary perspective drawing on law, political science, sociology, psychology, and communication studies will enrich our understanding of how misleading sustainability claims shape consumer behavior, stakeholder trust, and policy development. Technological advances such as artificial intelligence, big data, and social media also merit further scrutiny, as they create new opportunities for the spread and detection of greenwashing.

Finally, comparative and longitudinal approaches can reveal how greenwashing evolves across industries, countries, and time periods. Examining sectors such as fashion, energy, and tourism will highlight its drivers and impacts, while longitudinal studies can explore how corporate practices adapt to regulatory pressures and shifting stakeholder expectations. Together, these approaches will deepen theoretical development and inform practical strategies for enhancing accountability, transparency, and sustainability in corporate governance.

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