



Greenwashing, ESG Fraud, and the Forensic Gap: A Bibliometric Mapping

Article	Abstract
<p>Author Dien Ajeng Fauziah^{1*}, Syafri², Khoirul Abidin³, Bambang Agoes Hermanto⁴</p> <p>Affiliation ^{1,2} Universitas Bhayangkara Surabaya ³ Universitas Wijaya Kusuma Surabaya ⁴ Universitas Bengkulu</p> <p>Corresponding Author: dien.ajeng.fauziah@ubhara.ac.id</p> <p>Date: Received: 3 Maret 2026; Accepted: 17 Mei, 2026; Published: 31 Mei 2026</p> <p>DOI: 10.32764/margineco.v10i1.7319</p>	<p>The proliferation of ESG disclosures has been accompanied by rising concerns over greenwashing and sustainability-related fraud, yet the intellectual convergence of greenwashing, ESG fraud, and forensic accounting remains systematically unmapped. This study aims to map the intellectual structure, thematic evolution, and research frontiers at the intersection of sustainability misconduct and forensic accountability. Employing a Bibliometric, 1,285 Scopus-indexed journal articles published between 2007 and 2026 were analyzed using Biblioshiny. Techniques included performance analysis, keyword co-occurrence mapping, thematic mapping, and thematic evolution analysis. The co-occurrence network reveals four keyword clusters greenwashing and corporate legitimacy, corporate greenwashing in the green economy, ESG greenwashing and financing constraints, and governance and performance with the field demonstrating a 35.22% annual growth rate and projected peak output by 2032. Critically, forensic accounting remains conspicuously absent as a distinct thematic cluster, with the literature treating greenwashing primarily as a communication failure rather than a domain requiring investigative methodology. These findings empirically validate calls for integrative theoretical frameworks and define a future research agenda organized around five interconnected gaps: forensic integration, causal mechanisms, generalizability, forward-looking assurance, and detection methodology. The study provides the first data-grounded mapping of this interdisciplinary convergence, charting a pathway from the conceptual recognition of greenwashing toward actionable forensic investigation.</p> <p>Keywords: Greenwashing; ESG Fraud; Forensic Accounting; Bibliometrics Analysis; Sustainability.</p> <p>Abstrak Meningkatnya pengungkapan ESG telah diiringi oleh kekhawatiran terhadap greenwashing dan kecurangan keberlanjutan, namun konvergensi intelektual antara greenwashing, ESG fraud, dan akuntansi forensik belum dipetakan secara sistematis. Studi ini bertujuan memetakan struktur intelektual, evolusi tematik, dan batas-batas riset pada persimpangan sustainability misconduct dan akuntabilitas forensik. Dengan menggunakan Bibliometrik, sebanyak 1.285 artikel jurnal terindeks Scopus yang diterbitkan antara tahun 2007 hingga 2026 dianalisis menggunakan Biblioshiny. Teknik analisis meliputi performance analysis, keyword co-occurrence mapping, thematic mapping, dan thematic evolution analysis. Temuan mengungkap empat jaringan kemunculan; greenwashing dan legitimasi korporat, corporate greenwashing dalam ekonomi hijau, ESG greenwashing dan kendala pembiayaan, serta tata kelola dan kinerja dengan tingkat pertumbuhan tahunan 35,22% dan proyeksi puncak publikasi</p>

pada tahun 2032. Secara kritis, akuntansi forensik tetap absen sebagai kluster tematik yang terlihat, dengan literatur yang memperlakukan greenwashing terutama sebagai kegagalan komunikasi alih-alih sebagai domain yang memerlukan metodologi investigatif. Temuan ini memvalidasi secara empiris seruan akan kerangka teoretis integratif dan mendefinisikan agenda riset masa depan yang terorganisir dalam lima kesenjangan yang saling terkait: integrasi forensik, mekanisme kausal, generalisabilitas, asuransi berorientasi masa depan, dan metodologi deteksi. Studi ini menyediakan pemetaan berbasis data pertama atas konvergensi interdisipliner ini, merintis jalur dari pengakuan konseptual greenwashing menuju investigasi forensik yang dapat ditindaklanjuti.

Kata kunci: Greenwashing; Penipuan ESG; Akuntansi Forensik; Analisis Bibliometrik; Keberlanjutan.

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INTRODUCTION

The global push for corporate sustainability has made Environmental, Social, and Governance (ESG) disclosures a cornerstone of stakeholder communication. Paradoxically, this surge in sustainability reporting has been accompanied by a rise in "greenwashing" and ESG-related fraud, where firms misrepresent their environmental and social performance to gain legitimacy without substantive action. This duality places a critical question at the forefront of accounting research: how can we effectively understand, detect, and deter sustainability misconduct? Extant literature links high-quality ESG disclosures to lower fraud risk and greater credibility, while vague or forward-looking claims are increasingly identified as vehicles for misrepresentation (Carè & Fatima, 2024; Ellili & Seow, 2025; Peng, 2025). This tension underscores the need for robust accountability mechanisms, with forensic accounting and sustainability assurance emerging as critical governance responses.

Scholarly attention to this domain has grown rapidly, resulting in a fragmented landscape of knowledge. Numerous bibliometric and systematic reviews have mapped distinct but separate segments of this field. One cluster of research focuses on the relationship between ESG disclosure quality, firm value, and fraud risk, often grounded in legitimacy and signaling theories (Jain & Tripathi, 2023; Cao et al., 2024). Another stream specifically conceptualizes greenwashing as a misrepresentation phenomenon, exploring its drivers, regulatory implications, and detection via media and whistleblowers (Pendse et al., 2022; Moodaley & Telukdarie, 2023; Cinceoglu & Strauß, 2024). A third, more nascent area investigates ESG fraud through the lens of fraud triangle dynamics, data manipulation, and governance failures (Tarjo et al., 2024; Zheng, 2025). Separately, the literature consistently prescribes forensic accounting and expanded assurance as defenses, yet critiques the current audit focus on historical data and the significant gap in assuring forward-looking sustainability commitments (Wu, 2025; Peng, 2025).

Despite this wealth of parallel literature, a significant gap remains. To the best of our knowledge, no study has systematically mapped the intellectual convergence of these three critical domains: greenwashing, ESG fraud, and forensic accounting. Existing reviews treat them in silos, failing to reveal the intellectual structure at their intersection. Consequently, the research landscape lacks a holistic, integrated framework that shows how theoretical foundations, thematic clusters, and methodological approaches cohere to address sustainability misconduct as a unified challenge. We do not know which theories bridge these areas, what the dominant and emerging thematic convergences are, or where the most critical gaps for future research lie.

This study addresses this gap by conducting a comprehensive bibliometric analysis to map the intellectual structure of sustainability misconduct research. Our novelty lies in moving beyond a single-focus review to systematically investigate the convergence of greenwashing (the act), ESG fraud (the legal and ethical violation), and forensic accounting (the investigative and assurance response). The objectives of this research are threefold: (1) to identify the conceptual, thematic, and intellectual foundations linking these domains; (2) to map the collaborative networks, influential outlets, and emerging trends shaping this

interdisciplinary nexus; and (3) to develop a structured agenda that integrates multi-dimensional models for future research, incorporating the interplay of disclosure quality, governance mechanisms, and forensic assurance practices.

The findings of this study will provide a much-needed cartography of this fragmented field, offering a coherent theoretical and conceptual framework. This integrated map will not only advance academic understanding but also guide practitioners, regulators, and auditors in developing more robust, holistic strategies to combat the evolving challenge of sustainability misconduct.

Research Question

This study does not test causal hypotheses in the traditional inferential sense but instead formulates a set of structured research questions grounded in established theory and prior empirical findings. These questions are designed to systematically map the intellectual structure at the convergence of greenwashing, ESG fraud, and forensic accounting—an intersection that remains theoretically and empirically underdeveloped (Zheng, 2025; Ellili & Seow, 2025; Peng, 2025). We integrate relevant concepts from agency theory, legitimacy and signaling theory, governance and assurance literature, and the forensic accounting framework to anchor each inquiry.

Agency theory posits that information asymmetry between managers and stakeholders creates opportunities for misrepresentation. When ESG disclosures are used to signal legitimacy without corresponding substantive action—a practice conceptualized as greenwashing—the resulting misalignment can erode stakeholder trust and elevate misconduct risk (Carè & Fatima, 2024; Zheng, 2025). This theoretical tension, between the signaling function of ESG disclosures and the opportunistic behaviors they may mask, provides the conceptual foundation for mapping how sustainability misconduct research has evolved as an intellectual domain. The main research question guiding this study is:

Main RQ: How has the intellectual structure of sustainability misconduct research evolved across periods, particularly at the intersection of greenwashing, ESG fraud, and forensic accounting?

This main question is operationalized through three sub-questions, each addressing a distinct dimension of intellectual structure.

Sub-RQ1: Publication Growth and Temporal Evolution

How has publication growth on greenwashing, ESG fraud, and forensic accounting developed across different periods?

The temporal dimension of a research field reflects its maturity, relevance, and responsiveness to external events. Prior studies note that regulatory shifts and corporate scandals intensify scholarly attention to ESG fraud and greenwashing (Tarjo et al., 2024; Zheng, 2025). Mapping the publication trajectory allows us to identify inflection points where the intersection of these three domains gained traction, revealing how the intellectual structure has expanded and differentiated over time. This question is grounded in the understanding that bibliometric growth patterns serve as indicators of a field's theoretical and practical urgency (Jain & Tripathi, 2023; Phore, 2025).

Sub-RQ2: Intellectual Foundations and Influential Actors

What authors, journals, countries, institutions, and documents have shaped the intellectual foundation of sustainability misconduct research?

From a sociology of science perspective, identifying influential contributors and outlets is essential to understanding how knowledge is produced, validated, and disseminated. Legitimacy theory suggests that certain voices and platforms come to dominate discourse, shaping what is considered credible and central (Ellili & Seow, 2025). Prior bibliometric studies on ESG and sustainability have mapped these foundational structures separately (Cao et al., 2024; Thomas et al., 2024), but no study has systematically examined the network of intellectual influences that bridge greenwashing, ESG fraud, and forensic accounting. This question seeks to reveal the collaborative and citational architecture underpinning this interdisciplinary nexus.

Sub-RQ3: Thematic Clusters and Emerging Research Directions

What thematic clusters and emerging research directions appear in the literature on sustainability misconduct, especially in relation to forensic accounting?

Thematic mapping uncovers the conceptual structure of a field, identifying dominant, niche, and emerging topics. The forensic accounting and assurance literature emphasizes the critical role of detection methods, governance mechanisms, and audit scope in addressing greenwashing and ESG fraud (Peng, 2025; Wu, 2025; Ozili, 2020). However, existing reviews have examined these themes in isolation, leaving the convergence with greenwashing and ESG fraud literature unmapped (Moodaley & Telukdarie, 2023; Pendse et al., 2022). This question is designed to identify how thematic clusters—such as disclosure quality, forward-looking commitments, assurance coverage, governance quality, and forensic capability—intersect, and to surface emerging directions that warrant future investigation. By answering this question, the study contributes to closing the identified gap in forward-looking assurance and cross-contextual understanding of sustainability misconduct.

In summary, these research questions collectively guide a systematic mapping of the intellectual convergence among greenwashing, ESG fraud, and forensic accounting—a configuration that remains theoretically fragmented and empirically uncharted. The subsequent section details the bibliometric methodology employed to answer these questions.

RESEARCH METHODS

This study employs a Bibliometric Systematic Literature Review (B-SLR) to map the intellectual structure of sustainability misconduct research at the intersection of greenwashing, ESG fraud, and forensic accounting. Bibliometric analysis was selected because it enables the quantitative mapping of large volumes of scholarly literature, revealing publication trends, influential contributors, thematic clusters, and emerging research directions through statistical and network-based techniques (Zupic & Čater, 2015; Donthu et al., 2021). This approach is particularly suited to addressing the identified research gap: the absence of a systematic mapping of the intellectual convergence among three previously fragmented domains.

The methodological design is anchored in an integrated theoretical lens. Signaling and legitimacy theories explain how ESG disclosures shape stakeholder perceptions, while misaligned signals (greenwashing) undermine legitimacy and elevate misconduct risk (Zheng, 2025; Phore, 2025). Agency theory illuminates how governance structures and information asymmetry create conditions conducive to ESG fraud, particularly when disclosure quality is weak (Ellili & Seow, 2025; Peng, 2025). Forensic accounting theory provides the investigative framework, emphasizing the role of data analytics, professional judgment, and assurance mechanisms in detecting sustainability-related misconduct (Ozili, 2020; Odukoya & Samsudin, 2021). The bibliometric design is structured to capture the interactions among these theoretical dimensions: disclosure quality, forward-looking commitments, governance mechanisms, forensic capability, and assurance scope (Peng, 2025; Wu, 2025).

The data for this study were retrieved exclusively from Scopus (Elsevier), accessed on 17 May 2026. Scopus was chosen as the sole database for several reasons. First, Scopus offers broader journal coverage in the social sciences, including accounting, finance, and sustainability research, compared to Web of Science (WoS), which has historically been stronger in the natural sciences (Mongeon & Paul-Hus, 2016). Second, Scopus provides comprehensive bibliographic metadata—including abstracts, keywords, author affiliations, citation counts, and reference lists—that are essential for co-word analysis, co-citation analysis, bibliographic coupling, and thematic mapping. Third, recent bibliometric syntheses in ESG and sustainability research have demonstrated Scopus's adequacy as a standalone database for rigorous bibliometric reviews (Carè & Fatima, 2024; Ellili & Seow, 2025; Phore, 2025).

However, the exclusive reliance on Scopus presents a limitation. Web of Science indexes a partially different set of journals and may capture additional relevant studies. This decision was made to maintain data consistency and avoid the complexities of merging metadata from two databases with different indexing formats, which can introduce deduplication errors and distort network metrics (Donthu et al., 2021). The potential exclusion of WoS-indexed studies is acknowledged as a limitation. Additionally, only publications written in English were included, which may exclude relevant non-English scholarship.

The study applies a systematic set of inclusion and exclusion criteria to filter the initial search results and construct a bibliometrically valid corpus. Table 1 and Table 2 present these criteria along with their methodological rationale.

Table 1. Inclusion Criteria

No.	Inclusion Criteria	Methodological Rationale
1	The publication must be indexed in the Scopus database.	Scopus provides high-quality bibliographic metadata, citation records, and exportable data formats compatible with Biblioshiny.
2	The document type must be a journal article.	Journal articles represent peer-reviewed scholarly contributions with reliable and complete bibliometric metadata.
3	The study must address at least one core concept: greenwashing, ESG fraud, sustainability misconduct, forensic accounting, fraud detection, or fraud investigation.	This criterion ensures direct relevance to the main and sub-research questions.
4	The study must relate to accounting, auditing, assurance, governance, fraud, corporate misconduct, ESG disclosure, or sustainability reporting.	This prevents the review from including studies that mention keywords peripherally without substantive relevance to the accounting and forensic investigation context.
5	The publication must be written in English.	English is the dominant language in international bibliometric databases and supports keyword standardization for analysis.
6	The publication must provide complete bibliographic information: title, abstract, keywords, authors, affiliations, year, source title, citations, and references.	Complete metadata are required for co-word analysis, co-citation analysis, bibliographic coupling, and thematic evolution mapping.
7	The publication must fall within the review period of 2007 to 2026.	This range captures the evolution from early CSR and environmental disclosure research through the emergence of ESG fraud and forensic sustainability accountability. The year 2007 marks the initial rise of structured ESG reporting frameworks.

Source: Researcher Data (2026)

Table 2. Exclusion Criteria

No.	Exclusion Criteria	Methodological Rationale
1	Studies discussing sustainability in general without addressing misconduct, fraud, greenwashing, ESG manipulation, audit, assurance, or forensic accounting will be excluded.	Such studies do not directly address the research questions.
2	Editorials, book reviews, letters, short notes, errata, news articles, and non-academic documents will be excluded.	These documents generally lack sufficient scholarly contribution and complete bibliometric metadata.
3	Publications without abstracts, keywords, citation information, or sufficient bibliographic metadata will be excluded.	Incomplete metadata limit the validity and reliability of bibliometric mapping.
4	Duplicate records retrieved during the database search and screening process will be removed.	Duplicate documents may distort publication counts, citation analysis, and network visualization.
5	Studies discussing only traditional financial fraud without any link to ESG, sustainability reporting, greenwashing, corporate responsibility, or environmental disclosure will be excluded.	The focus of this review is sustainability-related misconduct, not general financial fraud.
6	Non-verifiable sources such as blogs, corporate white papers, media reports, and opinion pieces will be excluded.	This maintains the academic quality and credibility of the review corpus.

Source: Researcher Data (2026)

Database Scopus with Search String:

TITLE-ABS-KEY ((greenwash* OR "green washing" OR "ESG fraud" OR "ESG misconduct" OR "ESG manipulation" OR "sustainability fraud" OR "sustainability misconduct" OR "sustainability reporting manipulation" OR "sustainability disclosure manipulation" OR "environmental deception") AND ("forensic accounting" OR "forensic audit*" OR "fraud investigation" OR "fraud detection" OR "accounting fraud" OR "corporate fraud" OR "financial crime" OR "sustainability assurance" OR "ESG assurance" OR (audit* AND sustainability) OR (audit* AND ESG) OR governance)).

The bibliometric analysis was performed using RStudio 4.5.2 with the Bibliometrix package and its web-based interface Biblioshiny (Aria & Cuccurullo, 2017). Bibliometrix was selected for its comprehensive suite of bibliometric functions, its capacity for science mapping, and its reproducibility through script-based workflows. The following analyses were conducted:

1. Performance Analysis

Publication trends: Annual scientific production was plotted to visualize growth trajectories and identify inflection points, addressing Sub-RQ1. Most relevant sources, authors, affiliations, and countries: Descriptive statistics identified the most productive journals, influential authors, leading institutions, and contributing countries, addressing Sub-RQ2. Citation analysis: Total citations and average citations per year were computed to identify highly influential documents.

2. Science Mapping and Network Analysis

Co-authorship analysis: Collaboration networks were constructed at the author, institution, and country levels to reveal the social structure of the field. The analysis identifies clusters of researchers who frequently publish together, indicating collaborative research fronts. Co-citation analysis: Cited references were analyzed to identify the intellectual foundations of the field. Documents frequently cited together form clusters representing foundational theories, methods, or seminal works. This analysis reveals the intellectual structure that underpins sustainability misconduct research. Bibliographic coupling: Citing documents sharing common references were clustered to identify current research fronts and thematic schools of thought. Keyword co-occurrence analysis (co-word analysis): Author keywords and Keywords Plus were extracted to construct a co-occurrence network. Keywords that frequently appear together form thematic clusters. The analysis used a minimum threshold of [sebutkan, misal: 3] co-occurrences for a keyword to be included in the network, balancing granularity with interpretability.

3. Thematic Mapping and Evolution

Thematic map: A strategic diagram was constructed by plotting clusters based on Callon's centrality and density measures. This yields four quadrants: Motor Themes (high centrality, high density), Niche Themes (low centrality, high density), Emerging or Declining Themes (low centrality, low density), and Basic Themes (high centrality, low density). This analysis addresses Sub-RQ3 by identifying dominant, niche, and emerging research directions. Thematic evolution: A Sankey diagram or thematic evolution map was generated to trace how research themes have shifted across predefined time periods (e.g., 2007–2013, 2014–2019, 2020–2026). This temporal breakdown was designed to capture the pre-ESG, ESG emergence, and post-pandemic regulatory tightening phases. Factorial analysis: Multiple Correspondence Analysis (MCA) or Correspondence Analysis (CA) was conducted on the keyword co-occurrence matrix to visualize the conceptual structure of the field in a two-dimensional space, identifying clusters of closely related concepts.

4. Network Parameters and Visualization

Network normalization was performed using the association strength method (or alternatively, the Louvain clustering algorithm) to detect community structures within co-citation and co-word networks. Visualization of networks was rendered using Biblioshiny's built-in plotting functions, with node sizes proportional to occurrence/frequency and edge thickness representing the strength of co-occurrence or co-citation links. Clustering algorithms were applied to identify thematic groupings, with cluster labels generated from the most frequent or central terms within each cluster.

RESULT AND DISCUSSION

The comprehensive synthesis of the Greenwashing, ESG fraud, and forensic accounting literatures in the sustainability misconduct domain yields four core findings that organize the evidence base: (i) the central role of disclosure quality and forward-looking promises as signals of misconduct risk; (ii) the evolving but uneven effectiveness of governance and assurance in limiting greenwashing and ESG fraud; (iii) the critical contribution of forensic accounting and audit technology to detection, investigation, and deterrence; and (iv) substantial methodological and contextual gaps that shape how results should be interpreted and replicated. Across, multiple sources consistently emphasize that signals of misrepresentation (greenwashing) arise not simply from low ESG scores but from misalignment between rhetoric and verifiable performance, particularly for forward-looking commitments. These conclusions are supported by the integrated references cited in this response and reflect areas where recent bibliometric and systematic reviews converge or diverge.

Descriptive Bibliometric Overview

The bibliometric dataset comprises 1,285 documents published between 2007 and 2026, drawn from 396 unique sources. This indicates that research on greenwashing, ESG fraud, forensic accounting, and sustainability misconduct has developed into a broad and increasingly diversified scholarly domain. The annual growth rate of 35.22% suggests a strong upward trajectory, especially in recent years, which reflects the growing academic and regulatory concern over ESG-related misconduct, misleading sustainability claims, and the need for more rigorous accountability mechanisms. The relatively low document average age of 2.25 years further confirms that this is a highly contemporary research area, with much of the literature emerging in the most recent publication period. In terms of authorship structure, the corpus includes 2,823 authors, with an average of 3.06 co-authors per document. This pattern suggests that sustainability misconduct research is largely collaborative and interdisciplinary. Only 105 authors contributed single-authored documents, indicating that most studies in this field require engagement across accounting, auditing, governance, sustainability, finance, and ethics. The level of international co-authorship, recorded at 30.04%, also shows that this topic has gained cross-border scholarly relevance. Such collaboration is unsurprising because greenwashing and ESG fraud are not confined to specific national contexts, but are closely linked to global capital markets, sustainability disclosure standards, and transnational corporate accountability. The analysis also shows that the documents received an average of 37.52 citations per article, suggesting that the field has a relatively strong citation impact despite its recent expansion. The presence of 3,268 author keywords reflects conceptual diversity within the literature. Key themes are likely to include greenwashing, ESG disclosure, sustainability reporting, assurance, fraud detection, corporate governance, and forensic accounting. Therefore, co-citation and reference-based analyses should be interpreted carefully unless the dataset is re-exported with complete reference information.

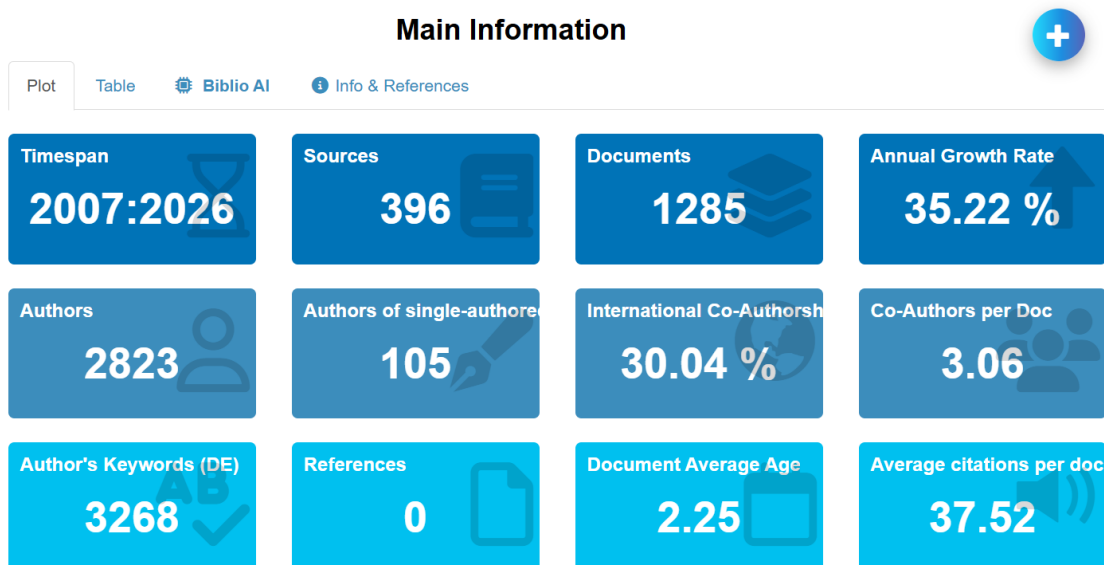


Figure 1. Main Information

Source: Rstudio (2026)

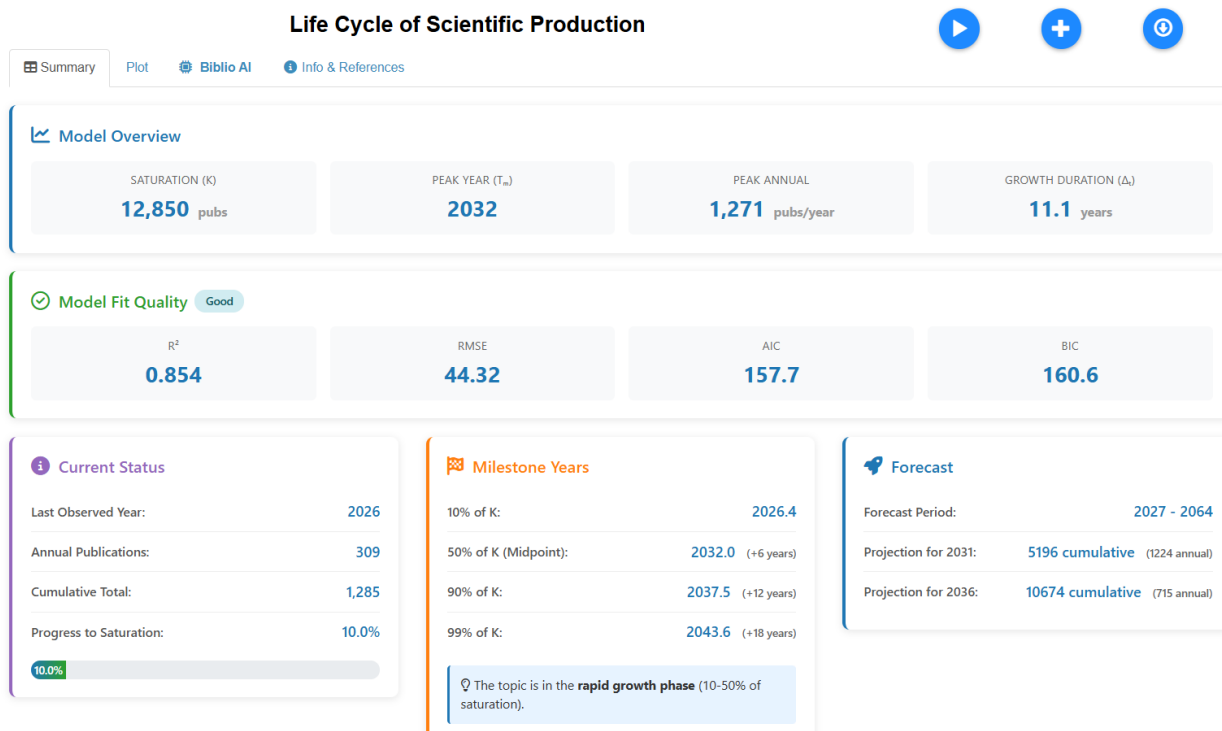


Figure 2. Life Cycle of Scientific Production
Source: Rstudio (2026)

Life cycle analysis confirms that research on greenwashing, ESG fraud, forensic accounting, and sustainability misconduct remains in a vigorous expansion phase, having reached only 10% of its projected saturation level of 12,850 publications, with cumulative output attaining 1,285 documents and annual production rising to 309 publications by 2026. The model, demonstrating acceptable fit ($R^2 = 0.854$, $RMSE = 44.32$, $AIC = 157.7$, $BIC = 160.6$), projects peak annual output of 1,271 publications in 2032, with an estimated growth duration of 11.1 years, indicating a concentrated period of accelerated scholarly production spanning the late 2020s through the mid-2030s. Milestone projections place the 50% saturation point at 2032, 90% saturation by 2037.5, and near-complete saturation (99%) by 2043.6, with cumulative output forecasted to reach 5,196 publications by 2031 and 10,674 by 2036. While these projections signal robust field maturation, they warrant cautious interpretation given the susceptibility of bibliometric trajectories to exogenous factors such as regulatory shifts, evolving ESG disclosure mandates, and changes in indexing practices. Collectively, the findings underscore that sustainability misconduct research has transitioned beyond an emergent niche into a rapidly consolidating research stream, propelled by intensifying scholarly and regulatory attention to ESG accountability, greenwashing detection, and the forensic investigation of non-financial reporting misconduct.

Publication Growth (Sub-RQ1)

The final bibliometric corpus comprised 1,285 journal articles published between 2007 and 2026 across 396 sources. The field demonstrates an annual growth rate of 35.22%, with a low document average age of 2.25 years, confirming its status as a rapidly expanding and highly contemporary research domain. The life cycle analysis corroborates this trajectory: with a saturation level projected at 12,850 publications, the current output represents only 10% of the estimated maturity point, indicating the literature remains in a strong expansion phase. The model projects peak annual output around 2032 (estimated 1,271 publications), suggesting the most intensive period of knowledge production lies in the immediate future.

Authorship patterns reveal a collaborative and interdisciplinary field. Among 2,823 authors, only 105 contributed single-authored documents (average co-authors per document: 3.06), and international co-authorship reached 30.04%. Author production over time shows concentration among recurring

contributors—notably Zhang Y, Li W, Wang X, and Li Y—with publication density intensifying markedly between 2024 and 2026.

Geographically, China dominates production (1,024 publications), followed by the USA (223), the UK (171), Italy (155), and India (130). This distribution reflects both the global reach of sustainability misconduct research and the centrality of specific national contexts, particularly China's green economy transition.

Analysis of authors' production over time reveals that sustainability misconduct research has evolved from a dispersed, early-stage literature toward a more structured scholarly domain characterized by both authorial continuity and renewal, with production increasingly concentrated among a recognizable core of recurring contributors between 2020 and 2026. The most visible authors—including Zhang Y, Li W, Li Y, Wang X, Wang Y, Zhang D, Liu Y, Zhang Z, Chen L, and Wang S—exhibit sustained publication trajectories, with Zhang Y emerging as the most persistent intellectual actor through continuous contributions spanning 2020 to 2026, while Li W, Li Y, Zhang D, Wang Y, Liu Y, Chen L, and Wang S demonstrate repeated engagement particularly from 2022 onward, signifying long-term research commitment rather than isolated contributions. A marked intensification of author activity is evident between 2024 and 2026, with larger production nodes concentrated in 2025 and 2026 for Zhang Y, Wang X, Wang Y, Zhang Z, and Liu Y, while the emergence of Wang X predominantly during this period signals the entry of new contributors during the field's rapid growth phase. This dual pattern of sustained contribution by established authors and the influx of newer scholars indicates that the field is consolidating into a more coherent intellectual community, driven by heightened regulatory scrutiny of sustainability disclosures, growing concern over greenwashing and ESG fraud, and the increasing centrality of forensic accounting within sustainability accountability research.

Intellectual Foundations (Sub-RQ2)

The intellectual foundation of the field rests on two principal document clusters revealed through bibliographic coupling. The first cluster (confidence: greenwashing 58.5%, sustainability 68.2%, CSR 76.9%) reflects a CSR-based, legitimacy-oriented research stream with lower centrality to the field's core. The second cluster (confidence: greenwashing 41.5%, ESG 50%, sustainability 31.8%) demonstrates higher centrality and indicates a thematic transition toward an ESG-centered research agenda. Author collaboration networks similarly exhibit a semi-fragmented structure: Zhang Y anchors the largest collaborative cluster (linked to Li W, Chen L, Zhang Z, and others), while Wang X and Li Y lead separate, active research communities. The country collaboration map further shows that despite high international co-authorship rates, collaboration remains regionally concentrated, with China serving as the primary hub connected to Western and Asia-Pacific research networks.

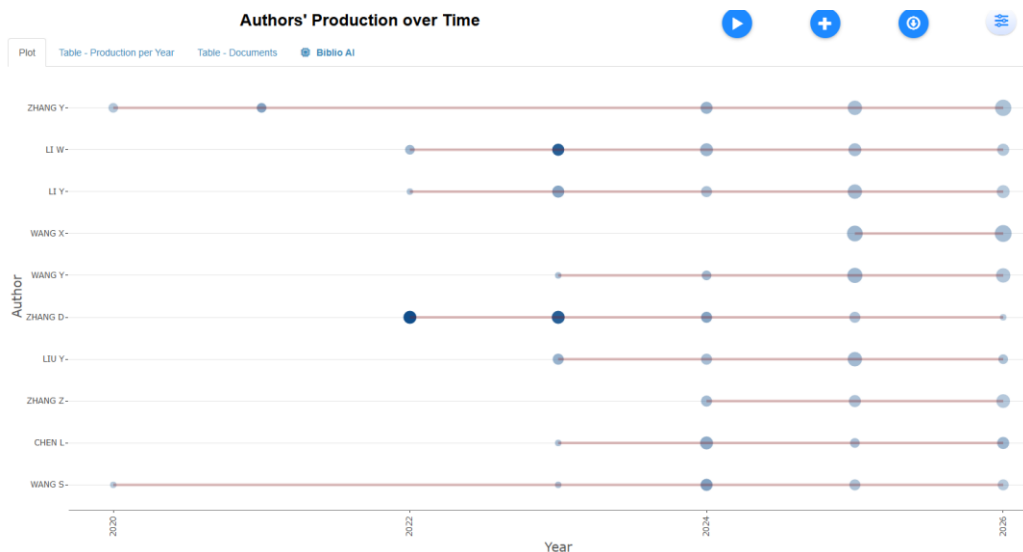


Figure 3. Authors' Production over Time

Source: Rstudio (2026)

Table 3. Country Production

Country	Freq
China	1024
Usa	223
Uk	171
Italy	155
India	130
Australia	124
France	94
Spain	85
Germany	79
Canada	70
Indonesia	55
Denmark	53
Malaysia	42
Brazil	39
Tunisia	39
Netherlands	36
South Korea	31
Greece	29
Switzerland	28
South Africa	27
Turkey	26
Portugal	25
Saudi Arabia	25
United Arab Emirates	24
Poland	22
Norway	20
Pakistan	20
New Zealand	17
Czech Republic	16
Egypt, Finland	14
Cyprus, Lithuania, Romania, Sweden	11
Belgium, Hungary, Ireland, Lebanon, Singapore	10
Ghana	9
Iran, Japan, Peru, Thailand	8
Bangladesh, Kuwait, Morocco, Qatar	7
Algeria	5
Azerbaijan, Colombia, Ukraine	4
Chile, Israel, Jordan, Kazakhstan, Oman, Slovakia, Uzbekistan	3
Albania, Austria, Estonia, Iraq, Latvia, Luxembourg, Mexico, Sri Lanka, Tanzania, Zimbabwe	2
Armenia, Bahrain, Georgia, Kyrgyzstan, Liberia, Liechtenstein, Philippines, Rwanda, Slovenia, Zambia	1

Source: Rstudio (2026)

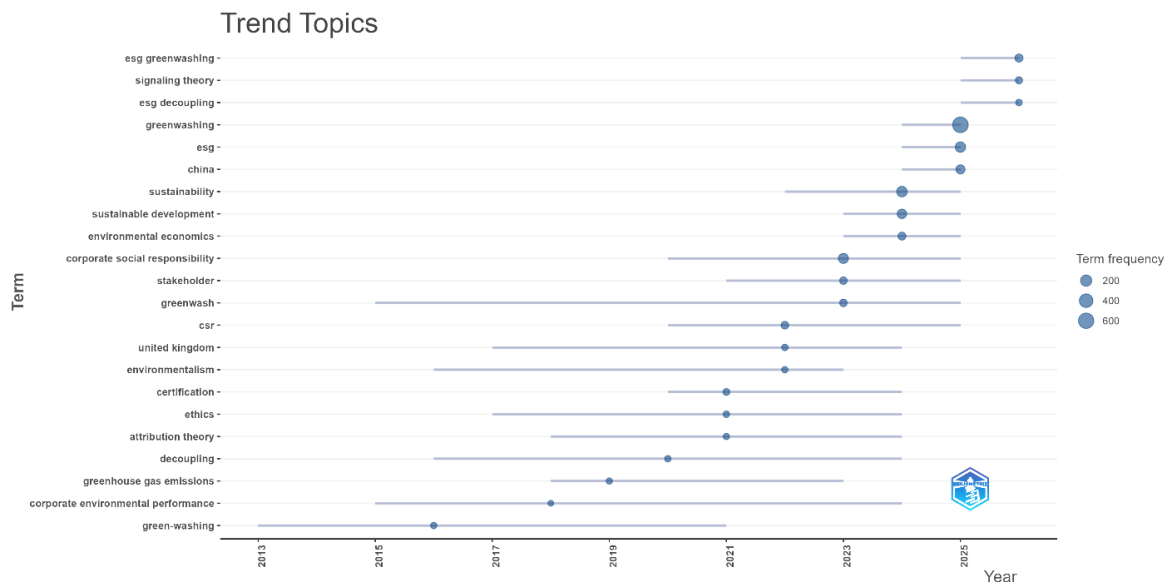


Figure 4. Trend Topics

Source: Rstudio (2026)

Trend topic analysis reveals a clear temporal evolution in sustainability misconduct research, transitioning from broad environmental and corporate responsibility concepts toward increasingly specialized ESG-related misconduct themes. The earliest phase (approximately 2013–2019), dominated by terms such as green-washing, corporate environmental performance, and greenhouse gas emissions, framed greenwashing primarily as a problem of environmental communication and symbolic corporate behavior. The intermediate period (2020–2022) witnessed theoretical deepening, marked by the emergence of decoupling, attribution theory, ethics, certification, and CSR, reflecting growing scholarly attention to the gap between sustainability claims and actual performance, as well as to legitimacy, verification, and accountability mechanisms. The most recent phase (2023–2026) demonstrates a decisive shift toward ESG-centered terminology including ESG, ESG greenwashing, signaling theory, ESG decoupling, and China—with greenwashing maintaining the largest topical presence through 2025, indicating sustained centrality. This progression confirms the field's transformation from general environmental disclosure discourse into a specialized research stream focused on ESG credibility, strategic disclosure, and the misalignment between ESG signals and corporate substance. Critically, however, the persistent absence of terms such as forensic accounting, fraud investigation, and fraud detection across all temporal phases reveals a significant gap: while the literature has increasingly recognized and conceptualized ESG misconduct, it has yet to integrate the forensic mechanisms necessary for its systematic detection and investigation.

The word cloud analysis indicates that greenwashing is the most dominant term in the corpus, appearing substantially larger than all other keywords. This confirms that greenwashing constitutes the central conceptual anchor of the literature on sustainability misconduct. The prominence of sustainability and ESG further shows that the field is increasingly shaped by debates on non-financial disclosure, corporate accountability, and environmental, social, and governance performance. Other visible terms, such as corporate social responsibility, sustainable development, China, green economy, and climate change, suggest that the literature is not limited to accounting or fraud studies alone, but also intersects with environmental management, policy, corporate legitimacy, and sustainability transitions. The presence of CSR indicates that earlier discussions on corporate responsibility remain relevant, although they now appear to be increasingly reframed within ESG and greenwashing debates. Meanwhile, terms related to corporate greenwashing, certification, green innovation, and environmental economics point to more specific subthemes concerned with credibility, verification, and the gap between corporate claims and actual sustainability performance. Overall, the word cloud shows that the intellectual structure of this research area is strongly centered on greenwashing, while ESG-related misconduct and forensic accountability remain emerging areas that require deeper investigation.

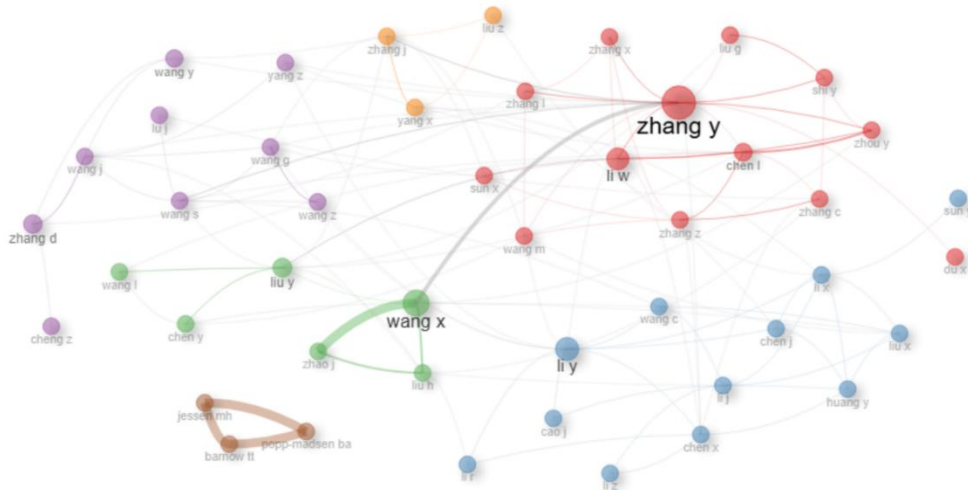


Figure 7. Collaboration Network

Source: Rstudio (2026)

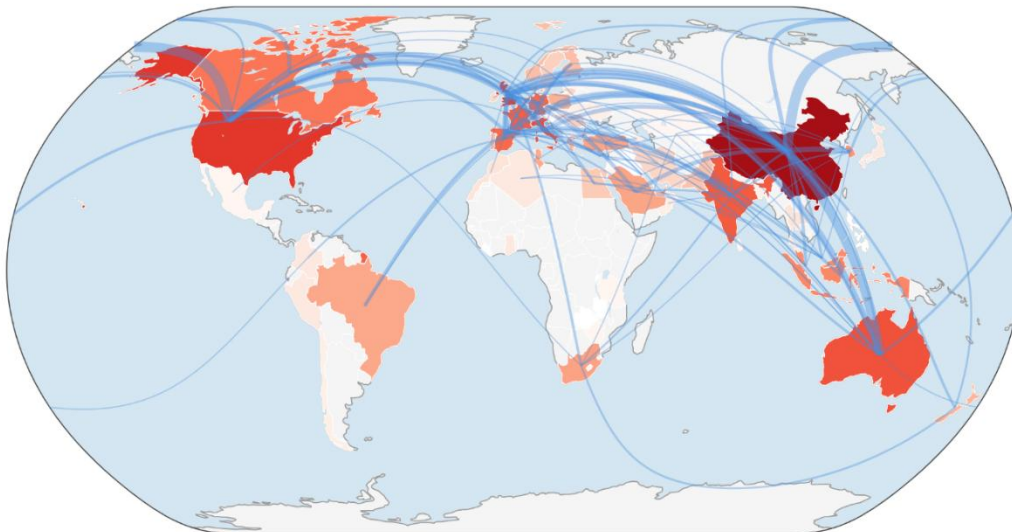


Figure 8. Country Collaboration Map

Source: Rstudio (2026)

The author collaboration network shows that research on greenwashing, ESG fraud, forensic accounting, and sustainability misconduct is organized around several distinct scholarly communities. Zhang Y appears as the most prominent author in the network, indicated by the largest node size and dense collaborative ties with authors such as Li W, Chen L, Zhang Z, Zhang C, Liu G, Shi Y, Zhou Y, and Du X. This suggests that Zhang Y functions as a key contributor and collaboration hub within one of the most active research clusters. Another important node is Wang X, who is strongly connected to authors including Zhao J, Liu H, Liu Y, and Wang F, indicating a second influential collaboration group. The presence of multiple color-coded clusters reflects the fragmented but expanding structure of the field, where different author groups contribute to related but partially separated research streams. The blue cluster centered around Li Y and connected to authors such as Chen J, Huang Y, Liu X, and Chen X suggests another active scholarly community. Meanwhile, smaller clusters, such as the brown group involving Jessen MH, Barrow T, and Popp-Madsen BA, indicate more specialized or peripheral collaborations. Overall, the network demonstrates that the literature is increasingly collaborative, yet still structured around several semi-independent author groups rather than a fully integrated global research community.

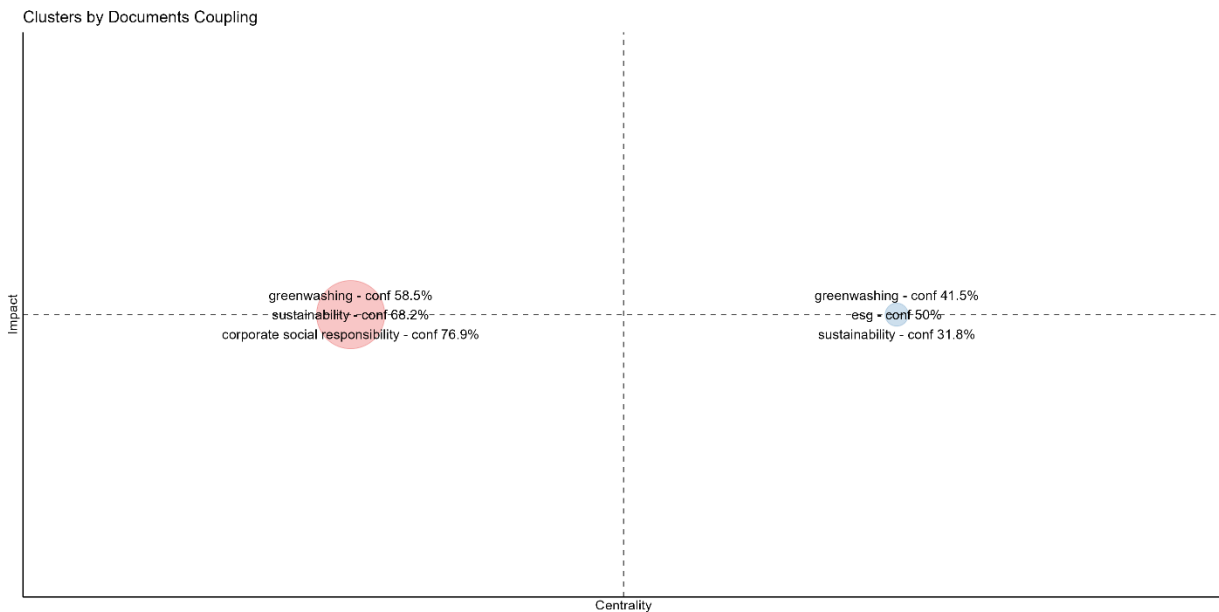


Figure 9. Coupling Map

Source: Rstudio (2026)

The document coupling analysis identifies two principal clusters within the literature on greenwashing, ESG fraud, forensic accounting, and sustainability misconduct. The first cluster, located on the left side of the centrality axis, is characterized by the terms greenwashing with a confidence level of 58.5%, sustainability with 68.2%, and corporate social responsibility with 76.9%. This cluster reflects a research stream rooted in CSR, sustainability discourse, and corporate legitimacy. Its relatively lower centrality suggests that, although this stream is conceptually coherent, it is less strongly connected to the broader intellectual core of the field. The second cluster, positioned on the right side of the map, contains greenwashing with a confidence level of 41.5%, ESG with 50%, and sustainability with 31.8%. Its higher centrality indicates stronger integration with the main body of sustainability misconduct research. This pattern suggests a thematic transition from traditional CSR-based greenwashing studies toward a more contemporary ESG-centered research agenda. Overall, the coupling structure shows that greenwashing remains the dominant linking concept across clusters, while ESG has emerged as a central organizing theme. However, forensic accounting does not appear as a visible coupling term, indicating that investigative and fraud-detection perspectives remain underdeveloped within the current document structure.

Thematic Clusters and Emerging Directions (Sub-RQ3)

The thematic map (Figure 10) reveals a differentiated conceptual structure comprising four quadrants. Motor Themes (upper-right: high centrality, high density) are dominated by corporate greenwashing, China, and green economy a mature, well-integrated cluster. Niche Themes (upper-left: high density, low centrality) include climate change, circular economy, and carbon emission, representing specialized environmental discourses weakly connected to misconduct research. Emerging/Declining Themes (lower-left: low centrality, low density) contain environmental, social, and green innovation, indicating peripheral or transitional status. Basic Themes (lower-right: high centrality, low density) comprise greenwashing, sustainability, ESG, ESG greenwashing, and environmental management—central to the field yet conceptually underdeveloped. Keyword co-occurrence analysis confirms greenwashing as the dominant conceptual hub. The largest cluster (red) links greenwashing with sustainability, ESG, CSR, sustainable reporting, sustainable finance, and artificial intelligence. A second cluster (blue) connects corporate greenwashing, China, and green economy. A third (purple) associates ESG greenwashing with green innovation, information asymmetry, and financing constraints. A governance-related cluster (green) links governance, environmental, social, and performance.

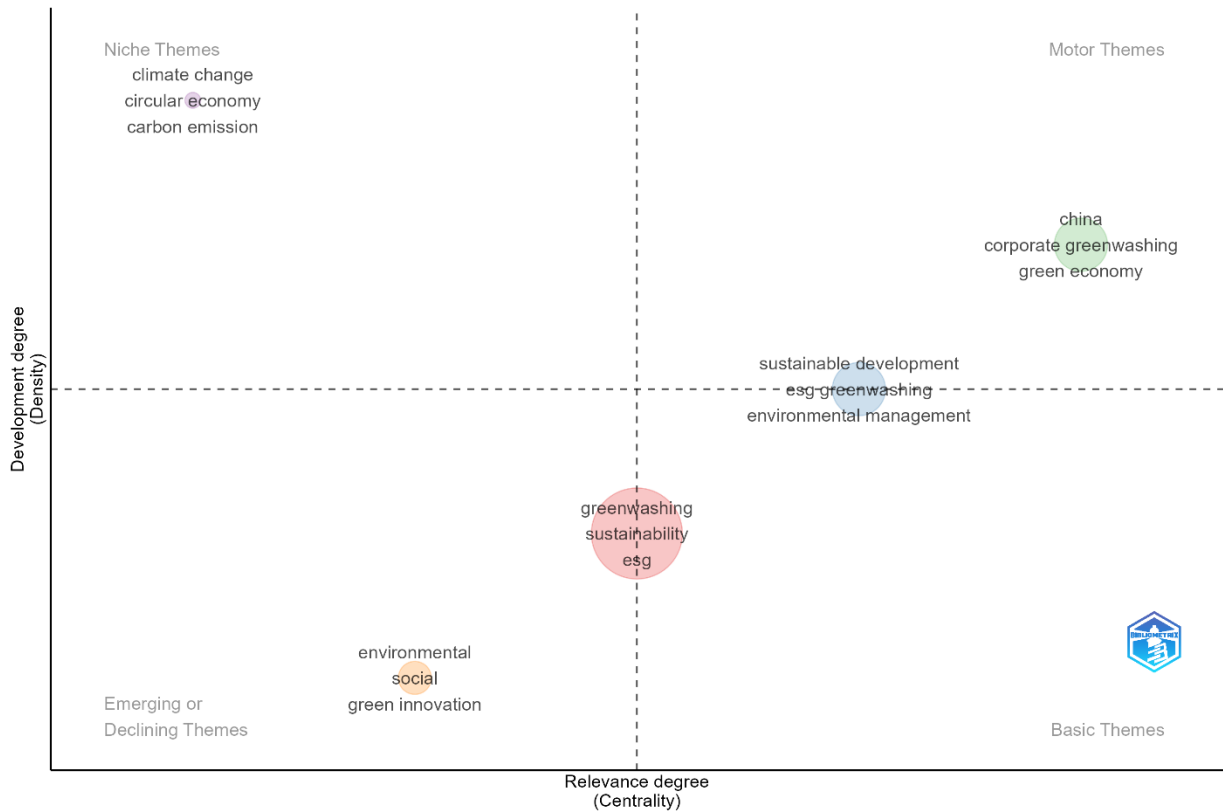


Figure 10. Thematic Map

Source: Rstudio (2026)

Thematic evolution mapping (Figure 11) reveals a clear temporal shift: 2007–2012 focused on greenwash, corporate environmentalism, and CSR; 2013–2023 diversified toward environmental performance, circular economy, and country-specific studies; 2024–2025 introduced ESG performance, board gender diversity, signaling theory, and sustainable finance; by 2026, themes narrowed to corporate governance, ESG governance, information asymmetry, and environmental governance.

The thematic map reveals a differentiated intellectual structure comprising four quadrants: Motor Themes (upper-right), where the cluster of China, corporate greenwashing, and green economy exhibits high centrality and density, signifying a mature and influential research stream well-integrated with the broader literature; Niche Themes (upper-left), encompassing climate change, circular economy, and carbon emission, which demonstrate high internal development but low centrality, indicating specialized, environmentally focused discourses weakly connected to the core misconduct literature; Emerging or Declining Themes (lower-left), where environmental, social, and green innovation occupy a peripheral position with low centrality and density, suggesting either nascent emergence or declining relevance; and Basic Themes (lower-right), comprising greenwashing, sustainability, ESG, ESG greenwashing, sustainable development, and environmental management, which function as foundational concepts central to the field yet remain conceptually underdeveloped, lacking sufficient theoretical refinement and methodological rigor. The most promising research gap resides within these Basic Themes: despite their centrality and broad scholarly attention, the literature has not yet consolidated their conceptual, methodological, and investigative foundations. Critically, forensic accounting remains conspicuously absent as a visible thematic cluster across all quadrants, revealing that sustainability misconduct research continues to prioritize disclosure practices, environmental management, and greenwashing narratives over structured fraud detection, forensic audit methodologies, evidence gathering, and investigative accountability. This persistent invisibility of forensic accounting underscores a fundamental gap, highlighting the urgent need for stronger investigative frameworks capable of detecting, verifying, and evaluating ESG fraud and sustainability reporting manipulation.

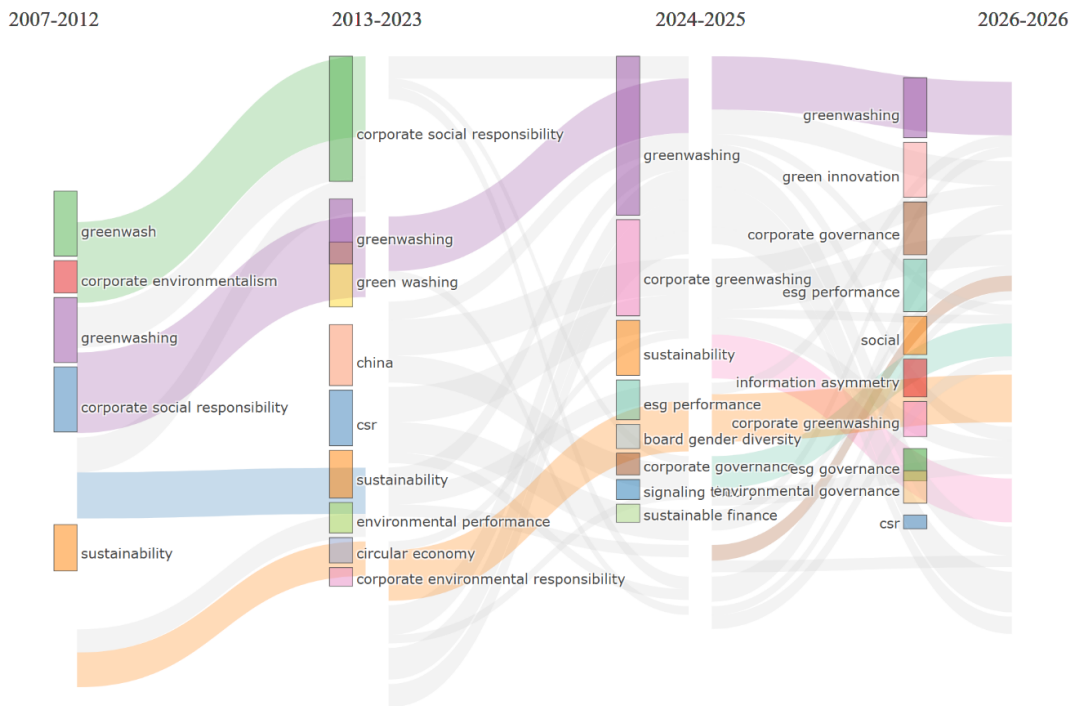


Figure 11. Thematic Evolution

Source: Rstudio (2026)

The thematic evolution map shows a clear transition in sustainability misconduct research from broad corporate responsibility discourse toward more specific ESG-related greenwashing and governance themes. During 2007–2012, the literature was mainly organized around greenwash, corporate environmentalism, greenwashing, corporate social responsibility, and sustainability, indicating that early studies framed misconduct primarily as a problem of environmental claims, corporate legitimacy, and CSR communication. In 2013–2023, the field became more diversified, with themes such as corporate social responsibility, greenwashing, green washing, China, CSR, sustainability, environmental performance, circular economy, and corporate environmental responsibility. This period reflects the expansion of the literature from conceptual CSR debates toward empirical and contextual studies, particularly in relation to environmental performance and country-specific corporate behavior. In 2024–2025, the thematic structure became more specialized, with greenwashing, corporate greenwashing, sustainability, ESG performance, board gender diversity, corporate governance, signaling theory, and sustainable finance emerging as important topics. By 2026, the field had further shifted toward greenwashing, green innovation, corporate governance, ESG performance, social, information asymmetry, corporate greenwashing, ESG governance, environmental governance, and CSR. Overall, the evolution suggests a movement from CSR-based greenwashing studies toward ESG governance, financial information asymmetry, and accountability-oriented sustainability misconduct research.

DISCUSSION

Why Greenwashing Dominates: Regulatory, Market, and Theoretical Explanations

The overwhelming dominance of greenwashing as the central conceptual hub across all bibliometric analyses reflects a confluence of regulatory pressure, investor preferences, and theoretical accessibility rather than indicating it is the most empirically prevalent form of sustainability misconduct. Regulatory developments including the EU CSRD, ISSB standards, and escalating enforcement by the SEC and ESMA have transformed greenwashing from a reputational concern into a legally actionable form of misconduct, creating a feedback loop whereby heightened enforcement generates scholarly interest that in turn informs regulatory refinement (Peng, 2025; Zheng, 2025). Simultaneously, the rapid expansion of ESG-integrated assets and sustainability-linked financial instruments has created material incentives for firms to overstate sustainability credentials. Signaling theory explains this dynamic: firms in information-asymmetric

environments use ESG disclosures as quality signals, but when verification mechanisms are weak as our results confirm for forward-looking disclosures the signalling equilibrium degrades, enabling opportunistic greenwashing (Zheng, 2025; Carè & Fatima, 2024). Furthermore, greenwashing is more readily operationalizable than ESG fraud, which requires establishing intent, materiality thresholds, and forensic evidence standards that are methodologically demanding and data-constrained (Ozili, 2020). This accessibility bias partially explains why forensic accounting and fraud investigation remain underrepresented, as they demand specialized expertise and access to non-public investigative data rarely available for large-scale bibliometric studies. Beyond explaining greenwashing's dominance, the most significant finding is not what the maps show but what they conspicuously omit: across all analyses, forensic accounting, fraud detection, and fraud investigation remain absent as distinct thematic clusters a paradox given the field's core concern with greenwashing and ESG fraud. The literature has successfully conceptualized greenwashing as a legitimacy and signalling problem (Zheng, 2025; Phore, 2025) and linked it to governance mechanisms and disclosure quality (Peng, 2025; Wu, 2025), yet has not developed the investigative dimension of how such misconduct should be systematically detected, evidenced, and investigated, directly supporting earlier arguments that forensic accounting frameworks remain underutilized in non-financial misconduct contexts (Ozili, 2020; Odukoya & Samsudin, 2021).

The thematic structure further reveals a field in transition but not yet integrated, carrying significant implications for the theoretical architecture of sustainability misconduct research. The positioning of greenwashing, ESG, and sustainability as Basic Themes central yet underdeveloped empirically validates long-standing calls for integrative frameworks bridging signalling/legitimacy theory, agency/governance theory, and forensic accounting perspectives (Ellili & Seow, 2025; In et al., 2023; Zheng, 2025). The Motor Theme cluster (China, corporate greenwashing, green economy) exemplifies both strengths and limitations: its high centrality and density indicate that context-specific theorizing around state-led green transitions has achieved considerable maturity, yet the concentration of theoretical development within a single geographic context raises concerns about generalizability. Agency theory may operate differently in state-coordinated economies where the principal-agent relationship involves government actors with non-financial objectives compared to market-driven economies where shareholder primacy shapes governance incentives (Ellili & Seow, 2025; Singhanian et al., 2022). The Niche Theme cluster (climate change, circular economy, carbon emission) presents a theoretical paradox: these topics are substantively central to greenwashing through net-zero pledges and carbon offset claims, yet remain disconnected from the accountability and fraud detection frameworks dominant in accounting research, suggesting that environmental science and policy perspectives have developed conceptual vocabularies not yet adequately translated into accounting scholarship. The thematic evolution from CSR-based greenwashing toward ESG-centered misconduct research is consistent with prior bibliometric syntheses (Carè & Fatima, 2024; Jain & Tripathi, 2023; Phore, 2025), but the present study adds crucial nuance: while prior reviews noted growing attention to ESG disclosure quality and governance as moderators of misconduct risk, they did not systematically map the absence of forensic accounting in the intellectual structure.

Our finding that governance and assurance themes appear primarily in the context of prevention (board independence, audit committees, disclosure verification) rather than investigation (fraud detection methodologies, evidentiary standards, digital forensics) represents a departure from the assumption in earlier work that assurance practices adequately address misconduct risks (Moodaley & Telukdarie, 2023; Peng, 2025). Furthermore, the thematic map reveals a disconnect between the environmental and governance dimensions of ESG fraud: climate change and carbon emissions occupy a Niche Theme quadrant internally developed but disconnected from the central misconduct discourse despite being prime domains for greenwashing through net-zero pledges and carbon offset claims. This fragmentation explains why forward-looking disclosures remain persistently identified as high-risk yet under-assured areas (Peng, 2025; Wu, 2025). Bridging the theoretical divide between niche environmental discourses and core misconduct research, while extending theorizing beyond single-context studies through explicit comparative work testing whether existing frameworks travel across institutional boundaries, represents both a significant opportunity for

interdisciplinary contribution and a necessary step toward the integrated investigative infrastructure the field currently lacks.

Unaddressed Gaps and a Call for Integration

This study set out to address the absence of a systematic mapping of the intellectual convergence among greenwashing, ESG fraud, and forensic accounting a gap it has partially addressed by transforming the previously anecdotal observation of forensic accounting's absence into a data-grounded finding supported by multiple bibliometric techniques. However, five interconnected gaps remain unaddressed and constitute a substantive agenda for future research: the forensic accounting integration gap, concerning the adaptation of forensic methodologies from financial statement fraud to non-financial, forward-looking ESG claims and the evidentiary standards applicable to greenwashing allegations; the causal mechanism gap, as bibliometric mapping cannot establish whether improved governance reduces greenwashing or whether firms self-select into stronger governance, nor whether assurance deters misconduct or merely detects its visible manifestations questions requiring longitudinal, quasi-experimental, and case-based designs; the generalizability gap, arising from the heavy concentration of research in the Chinese context and unresolved concerns about whether governance mechanisms function similarly across state-coordinated, market-driven, and hybrid regulatory environments; the forward-looking assurance gap, as we have not identified the specific standards or methodologies that would constitute adequate assurance for net-zero pledges, product lifecycle claims, or scenario-based sustainability projections; and the detection methodology gap, emerging from the nascent but undertheorized appearance of artificial intelligence within the greenwashing cluster, signaling emerging interest in technology-enabled detection while the literature lacks rigorous studies on AI, natural language processing, or machine learning tools specifically designed for greenwashing detection (Alhumoudi & Alhumoudi, 2023; Gangwani, 2020).

These gaps reveal that the current literature treats greenwashing predominantly as a communication failure rather than as a potential fraud requiring investigative methodology, thereby limiting the field's practical utility for auditors, regulators, and enforcement bodies. We argue that future research must integrate three dimensions currently operating in silos: Detection, through developing forensic data analytics, AI-enabled auditing tools, and digital evidence-gathering techniques specifically designed for ESG data, including non-financial metrics, carbon accounting, and supply chain disclosures (Ozili, 2020; Gangwani, 2020; Alhumoudi & Alhumoudi, 2023); Assurance Expansion, by extending assurance scope beyond historical, quantitative disclosures to cover forward-looking commitments, scenario analyses, and systemic sustainability strategies areas our results show remain critically under-assured (Peng, 2025; Wu, 2025); and Theoretical Integration, through building a unified framework that bridges signaling/legitimacy theory (explaining why greenwashing occurs), agency/governance theory (explaining structural conditions enabling misconduct), and forensic accounting theory (providing the investigative methodology) a synthesis repeatedly called for but not yet achieved (Ellili & Seow, 2025; Zheng, 2025; In et al., 2023).

The implications of these findings extend beyond general recommendations. For regulators, the absence of forensic integration suggests that current enforcement frameworks may be conceptually sophisticated in identifying greenwashing but operationally weak in investigating it, necessitating mandatory forensic readiness for ESG disclosures and explicit standards from the ISSB and EFRAG for assurance coverage of net-zero commitments and product lifecycle claims. For audit and assurance providers, the thematic gap signals an opportunity to develop specialized forensic sustainability practices that extend beyond historical data to cover predictive ESG claims, scenario testing, and green bond verification (Peng, 2025; Anwar, 2022). For researchers, the most impactful contributions will come from studies that bridge the forensic accounting gap through testing detection methodologies, developing ESG-specific fraud risk indicators, and conducting cross-contextual investigations accounting for the sectoral and jurisdictional heterogeneity our results highlight (Ellili & Seow, 2025; Thomas et al., 2024). Ultimately, the challenge for the next phase of sustainability misconduct research is not merely to continue mapping the intellectual structure but to build the missing investigative infrastructure the forensic frameworks, assurance standards, and detection methodologies that will enable the field to move from conceptual recognition of greenwashing to

actionable forensic verification, from cross-sectional association to causal explanation, and from disclosure analysis to fraud investigation.

CONCLUSION

This bibliometric systematic review provides the first data-grounded mapping of the intellectual structure at the intersection of greenwashing, ESG fraud, and forensic accounting a convergence that, despite its growing practical urgency, has remained conceptually and empirically fragmented. The study's principal contribution lies not merely in cataloguing thematic patterns, but in transforming the long-standing but anecdotal observation of forensic accounting's absence into an empirically validated finding substantiated across multiple bibliometric techniques. By systematically revealing what the literature has developed sophisticated conceptualizations of greenwashing as a legitimacy and signaling problem and what it has conspicuously neglected the investigative methodologies required to detect, evidence, and investigate sustainability misconduct this review exposes the foundational asymmetry that defines the field's current intellectual architecture. In direct response to the main research question guiding this inquiry how has the intellectual structure of sustainability misconduct research evolved at the intersection of greenwashing, ESG fraud, and forensic accounting? the evidence demonstrates that the field has undergone a marked evolution from broad CSR and environmental communication discourse toward a specialized ESG-centered research agenda, yet this evolution remains incomplete. The intellectual structure is organized around four thematic clusters with greenwashing functioning as the dominant conceptual hub, but forensic accounting, fraud detection, and fraud investigation remain absent as visible thematic dimensions. The temporal trajectory, spanning 2007 to 2026 with a 35.22% annual growth rate, confirms accelerated scholarly production driven substantially by regulatory developments, but this growth has not been accompanied by the theoretical integration or methodological diversification necessary for a mature research domain. The field has succeeded in establishing that greenwashing matters; it has not yet equipped itself with the forensic tools to address how it should be systematically investigated.

The theoretical implications are threefold. First, the positioning of foundational concepts as Basic Themes central yet underdeveloped empirically validates persistent calls for integrative frameworks bridging signaling/legitimacy theory, agency/governance theory, and forensic accounting perspectives. Second, the concentration of Motor Themes within a single geographic context challenges assumptions of theoretical generalizability and necessitates explicit comparative work across institutional environments. Third, the thematic disconnection between niche environmental discourses and core misconduct research reveals a translation gap between environmental science vocabularies and accounting's accountability frameworks. Practically, the findings signal to regulators that current enforcement architectures may be conceptually equipped to identify greenwashing but operationally ill-prepared to investigate it, underscoring the urgency of developing assurance standards for forward-looking sustainability commitments. For the auditing profession, the identified thematic void represents not merely a research gap but a market opportunity to develop specialized forensic sustainability practices.

Several limitations warrant acknowledgment. The reliance on Scopus-indexed English-language publications, while methodologically justified for data consistency, inevitably underrepresents non-Western scholarship and may not fully capture regionally specific governance dynamics. The absence of complete reference data constrained co-citation analyses, limiting the depth of intellectual ancestry mapping. Bibliometric methods, by design, measure scholarly impact through citation and co-occurrence metrics that reflect but do not fully capture the qualitative significance of individual contributions. The rapid growth trajectory means that recent publications have not yet accumulated their full citation impact, potentially underestimating emerging influences. The challenge confronting the next phase of sustainability misconduct research is not incremental but architectural. Moving forward demands building the investigative infrastructure the field currently lacks: forensic frameworks adapted from financial fraud detection to non-financial, forward-looking ESG claims; assurance methodologies capable of verifying net-zero pledges and product lifecycle assertions; and detection tools harnessing artificial intelligence for systematic greenwashing identification. This review charts a pathway from the conceptual recognition of sustainability misconduct

toward actionable forensic accountability a transition that, if realized, will determine whether the field becomes practically relevant to the regulatory, professional, and societal demands that have propelled its remarkable growth.

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