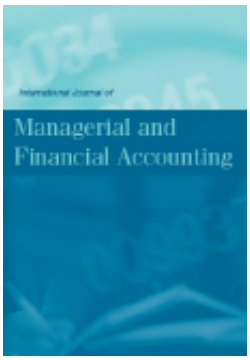
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Greenwashing practices in carbon management accounting within the financial services sector: a systematic review using PRISMA and bibliometric analysis

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Abstract: This study aims to examine the issue of greenwashing in carbon management accounting (CMA) within the financial services sector (FSS) explaining the importance of the gap between the sustainability information

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provided by financial institutions and their environmental performance. We performed a systematic review of 22 peer-reviewed publications from Scopus and Web of Science databases (2014–2024) employing the PRISMA framework, and performed bibliometric analysis along VOS viewer. We found that financial intermediaries routinely use greenwashing techniques, such as selective environmental reporting and misleading disclosure, to align with investors and regulators while continuing to finance high-carbon projects. The bibliometric analysis reveals two major thematic clusters: 1) regulatory pressures and governance mechanisms; 2) carbon performance metrics and ESG integration. Consequently, this paper contributes to the body of knowledge by offering a detailed methodology for aligning greenwashing assessment with environmental accountability in the context of CMA, and is among the first systematic reviews to synthesise greenwashing in this context. We identified critical research gaps and proposed a future research agenda on standardised metrics, verification mechanisms, and regulatory frameworks.

Keywords: greenwashing; carbon management accounting; CMA; financial institutions; ESG disclosures; preferred reporting items for systematic reviews and meta-analyses; PRISMA; bibliometric analysis; sustainable finance.

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1 Introduction

Consumers increasingly seek environmental products because of the growing awareness of human activities' impact on the environment. Consequently, some organisations have already introduced ecological practices into their marketing strategies. At the same time, other companies are resorting to greenwashing, i.e., misleading consumers into thinking their products are eco-friendly (Assidi et al., 2026). Greenwashing refers to a situation where consumers believe that they are purchasing environmentally friendly products when they are not, resulting in misguided purchasing decisions. This can lead to negative effects. If customers continue to consume products that contribute to environmental degradation, it can lead to additional environmental damage (Chouaibi et al., 2022b; Dey et al., 2023). Once customers find out that a company is engaging in greenwashing activities, they are likely to feel deceived about the company's environmental commitments. Companies that engage in greenwashing use different methods, including selective dissemination of information, making use of green labelling, or simply making claims that lack clarity (Batelli et al., 2025).

Greenwashing in financial services sectors (FSS) poses a credibility risk as institutions increasingly adopt sustainable finance practices, undermining investor trust and the integrity of green markets (Dempere et al., 2024). Financial institutions engage in

greenwashing are recorded to be greenwashing, pretending to be ecologically conscious while still funding high-carbon emission projects and other activities that damage the environment. Hence, the FIs will be playing a critical role in the shift from a high-carbon to a low-carbon economy (Lee and Raschke, 2023). Therefore, investment in environmental, social, and governance (ESG) aspects and carbon management accounting (CMA) has become prevalent. This is consistent with similar findings supported by the United Nations Principles for responsible investment, which emphasise the role of fund managers' commitment to ESG principles (Rossi et al., 2025). Recent studies have highlighted the relationship between ESG practices and financial performance, underscoring the importance of understanding greenwashing as a phenomenon that distorts the signaling value of ESG disclosures (Chouaibi et al., 2022b). Greenwashing has recently affected the FSS, which finances substantial funds for the operation of high-carbon emission projects.

While prior systematic reviews have examined greenwashing at the corporate or product level, limited attention has been paid to the intersection of greenwashing and CMA within financial institutions (Batelli et al., 2025). The study addresses this gap by providing a systematic review that explicitly integrates CMA, greenwashing, and FSS. It examines greenwashing practices and its impact on consumer confidence through a comprehensive literature review (Efenyumi et al., 2025). Furthermore, it evaluates the role of the financial institutions' CMA and carbon disclosure (CD) in regaining the public trust, and promoting a low-carbon economy (Silaban and Sitorus, 2025).

1.1 Research questions and objectives

1.1.1 Research questions

Based on the identified research gap, this study addresses the following research questions:

RQ1 What are the key greenwashing practices employed by financial institutions in the context of CMA?

RQ2 What mechanisms drive greenwashing in the FFS, and what are their market consequences?

RQ3 What regulatory, operational, and disclosure mechanisms can mitigate greenwashing and enhance transparency in CMA practices?

RQ4 What are the dominant thematic clusters and research trends in the greenwashing-CMA-FSS literature?

1.1.2 Research objectives

To answer these research questions, the following objectives have been formulated:

RO1 To identify and categorise key greenwashing practices employed by financial institutions in the context of CMA, such as selective disclosures and vague sustainability claims

RO2 To explore the mechanisms through which greenwashing harms market dynamics, including capital misallocation and stakeholder misinformation

RO3 To propose regulatory pathway and operational framework to reduce greenwashing and enhance sustainable financial practices

RO4 To map the intellectual structure in the literature on greenwashing in the context of CMA and Financial Institutions through bibliometric analysis.

2 Theoretical framework

This research is based on four complementary theoretical perspectives that together explain the drivers, mechanisms, and consequences of greenwashing in CMA in financial institutions.

2.1 Legitimacy theory and CMA

Legitimacy theory posits that organisations function within the limits of society's expectations and values to preserve their legitimacy (Suchman, 1995). For financial institutions, the disclosures on sustainability are a way of communicating their commitment to environmental standards and of being accepted by society. But it poses a dilemma between substantive environmental action and symbolic disclosure. Financial institutions can greenwash by taking advantage of the information asymmetries between themselves and their stakeholders, by issuing CMA disclosures pretending to be environmentally responsible while still funding high-carbon activities. One of the key concepts for understanding greenwashing in finance is the gap between symbolic actions and real actions (Boiral, 2013).

2.2 Stakeholder theory and greenwashing

Stakeholder theory emphasises that an organisation's operations must take into account the conflicting interests of a variety of stakeholders, such as investors, regulators, employees, and society (Freeman, 1984). The FFS has the most complex demands of the stakeholders. Financial institutions are more under investor pressure to implement ESG actions and regulatory bodies to report on sustainability. Meanwhile, banks are being put under pressure frequently for their capital to be used in funding lucrative carbon-intensive projects. The stakeholder conflict is that financial institutions will be incentivised to engage in greenwashing to meet the various and conflicting expectations of the stakeholders involved (Christensen et al., 2013).

2.3 Signaling theory and ESG disclosures

Signaling theory explains how organisations signal others about unobservable, using credible signals (Spence, 1973). ESG disclosures are indicators of financial institutions' commitment and performance in the environment. But in the presence of greenwashing, these signals may get confused and stakeholders may end up being misled between those institutions that are truly sustainable and those that are symbolically decoupling. However, the lack of a standardised verification process results in the credibility of ESG signals being compromised, allowing opportunistic financial institutions to profit from misleading sustainability claims (Abay, 2022).

2.4 Institutional theory and regulatory pressures

Institutional theory focuses on how organisations adapt to the external influences of regulatory agencies, professional norms and cultural expectations (DiMaggio and Powell, 1983). The coercive pressures come from environmental laws that are being enforced on financial institutions; the mimetic pressures as other institutions in the financial industry are pushing to adopt ESG; and the normative pressures from the professional bodies that are pushing financial institutions toward sustainability. But institutional pressures can also result in ceremonial compliance, whereby institutions implement a pretend solution by pretending to be sustainable but without substantive change. Due to this institutional decoupling, financial institutions might meet the regulations' requirements by 'symbolic' rather than 'real' environmental work, and this is what is known as greenwashing (Luo and Tang, 2014).

3 Research design and methods

3.1 Overview of systematic literature review

A systematic review synthesises all pertinent data that meets the predetermined eligibility criteria to address aforementioned research questions, and it is a scientific approach that helps the researcher to synthesise the body of literature using the methodical, explicit, and transparent iterative process. Therefore, the preferred reporting items for systematic reviews and meta-analyses (PRISMA) model was used to systematically identify all relevant studies that meets the pre-determined eligibility criteria to the study (Page et al., 2021; Uddin et al., 2026; Rasheed et al., 2023). The PRISMA flowchart is grounded in a sequential four-step process (identification, screening, eligibility, and inclusion), serving as the foundational framework or conducting this systematic literature review (Page et al., 2021).

3.2 Search strategy and keywords

A systematic search strategy was designed to explore relevant resources that defined inclusion and exclusion criteria (Page et al., 2021). The keywords used for the development of the search string are: carbon accounting, CMA, CD, Financial Institution, FI, Green wash, and Greenwash. The terms were linked together by Boolean operators (e.g., OR for synonyms: 'CA' OR 'CMA'; AND for concept combination: 'greenwashing' AND 'financial institution'), and the relevant studies were retrieved from the electronic databases i.e., Scopus and Web of Science. The search targeted peer-reviewed journal articles in English published from 2014 to 2024 and relevant to the following topics: CMA, greenwashing, and financial institutions.

3.3 Eligibility criteria

To ensure both precision in study selection and replicability of the review process, the eligibility criteria were established prior to the review process. The criteria, which guided the screening and selection of articles, are summarised in Table 1. This structured approach aligns with the PRISMA guidelines (Page et al., 2021) (Table 1).

Table 1 Eligibility criteria for study selection

Criterion	*Inclusion*	*Exclusion*
Source type	Peer-reviewed journal articles	Conference proceedings, book chapters, editorials, opinion pieces, and non-academic sources
Language	Articles published in English	Articles in languages other than English
Publication period	Articles published between 2014 and 2024	Articles published before 2014 or after 2024
Database	Articles indexed in Scopus or Web of Science	Articles not indexed in these core databases
Relevance to topic	Studies explicitly addressing Carbon Management Accounting (CMA), greenwashing, and/or Financial Institutions (FIs)	Studies lacking a direct focus on CMA, greenwashing practices, or their application within the financial sector
Study focus and methodology	Empirical studies, case studies with generalisable findings, and conceptual papers with robust frameworks	Case-specific reports without generalisable findings, and theoretical or conceptual papers lacking empirical data or a clear, rigorous methodology

Source: Adapted from Page et al. (2021)

3.4 PRISMA screening process

The PRISMA approach was applied during the literature screening and selection procedure (Page et al., 2021). The four-step process adopted under PRISMA are as follows and have been presented in pictorial form in figure:

Step 1 Identification: literature search were conducted in Scopus and Web of Science databases using predefined keywords e.g., 'CMA', 'greenwashing', and 'financial institutions'. The search were limited to peer-reviewed journal articles published between 2014 and 2024, written in English, and relevant to CMA, greenwashing, and financial institutions.

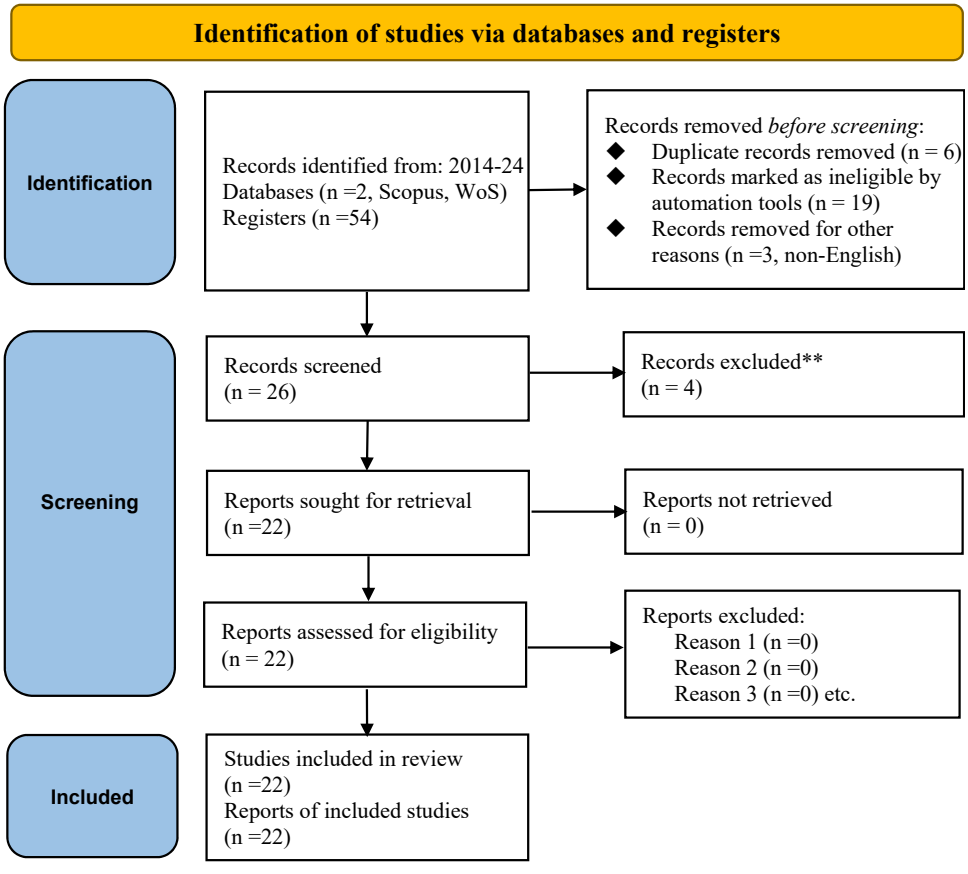
Step 2 Screening: researchers evaluated the papers identified in the initial phase based on their applicability to the study theme and the exclusion and inclusion criteria. The studies' titles and abstracts were usually screened in this stage, and those that satisfy the inclusion criteria were then subjected to full-text research (FTR).

Step 3 Eligibility: the full-text articles were retrieved for detailed assessment against the inclusion criteria. Excluded studies included those lacking CMA or greenwashing practices in the FSS including financial institutions, case-specific reports without generalisable findings, and theoretical or conceptual papers lacking empirical data or robust methodologies.

Step 4 Inclusion: based on the review protocol, a final set of 22 articles were included based on their relevance and alignment with the research objectives. The exclusion criteria were applied to provide accuracy and repeatability in the systematic literature review process, thus affirming the credibility and trustworthiness of the research through its emphasis on high-quality, pertinent,

and promising work while at the same time removing non-related publications. The modified methodology enhances understanding and compliance with systematic review procedures as new information has been provided regarding each exclusion criterion.

Figure 1 PRISMA flow diagram showing identification, screening, and inclusion of studies (see online version for colours)



3.5 Criteria for selecting key papers

3.5.1 Citation impact

The studies with a high number of citations during the period under review were considered as they have been influential in determining the discourse on greenwashing, CMA, and financial institutions. To reduce discrepancies in the indexing of citations, the citation metrics were verified from various databases, including Web of Science, Scopus, and Google Scholar. This cross-validation ensured that highly cited publications were consistently identified and captured across the databases.

3.5.2 Thematic relevance

Articles closely connected to the key research questions (e.g., the relationship between CMA and greenwashing, ESG compliance, and the role of financial institutions in sustainable finance) were included. We ensured that the prioritised studies were published in peer-reviewed journals with at least a minimum impact factor, thereby giving more scholarly credibility to the selected corpus.

3.5.3 Methodological rigor

Papers based on empirical research, systematic literature review, or conceptual frameworks were selected since they followed a clear structure. We verified the methodological soundness of each included paper against established quality criteria to ensure consistency and reduce bias.

3.5.4 Novel contributions

Papers presenting new ideas or under-discussed aspects of CMA and greenwashing (e.g., links to CDs or green bonds) were accepted to capture emerging trends and innovative perspectives. This ensured that the review reflects contemporary developments in the field.

3.6 Final sample

The study finally included 22 papers meeting the above criteria, extensively discussed in the following section. These papers were chosen to illustrate the most significant findings and trends related to objectives of the study from the analysis of particular forms of greenwashing in financial institutions to the role of CMA in supporting ESG initiatives, as well as the overall implications for policy and regulation in this area (Assidi et al., 2026; Chouaibi et al., 2022b; Rossi et al., 2021).

4 Results and discussions

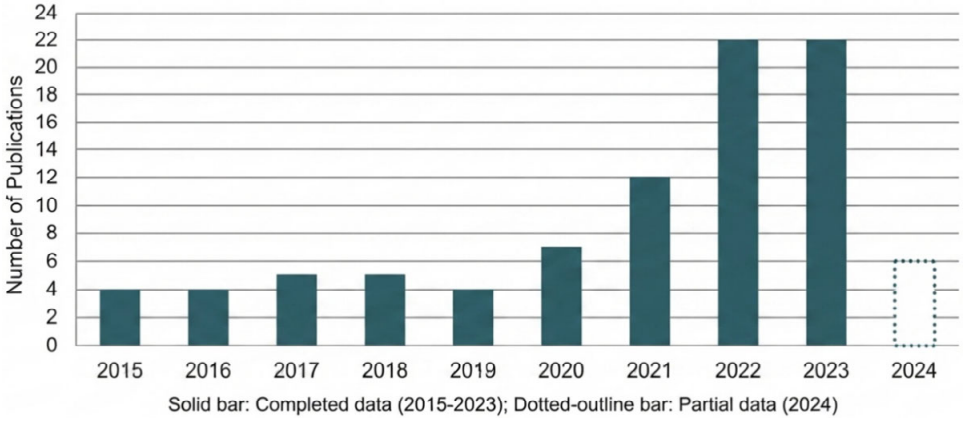
4.1 Bibliometric analysis: co-word analysis

This study conducts a comprehensive bibliometric analysis adapted from Raza et al. (2025a, 2025b), Uddin et al. (2025), and Sanyal and Uddin (2023). A co-word analysis was conducted for the bibliometric network analysis employing VOS viewer software, at the eligibility phase. Co-word analysis is a bibliometric technique that examines the relationship between various phrases or ideas based on how frequently they appear together in scientific literature (Raza et al., 2023). This technique requires creating a co-occurrence matrix, which shows how frequently terms occur together in a collection of publications which can be used to find the most common clusters, co-occurring terms, or groups of similar terms and identify their associations. This approach, which has been increasingly popular in recent years, clarifies the literature. The study of sustainable CMA and low-carbon economy enables trend analysis by identifying relevant trends.

4.2 General observation

Over the past ten years, greenwashing in financial institutions has drawn increasing attention. The highest number of research articles were published in 2022 and 2023 (Figure 2).

Figure 2 Trends in publications on greenwashing in financial services (2014–2024) (see online version for colours)



Source: VOSviewer version 1.6.20

Due to several factors, including the heightened examination of many industries particularly the financial sector, to ensure that their operations support low-carbon economy principles and the aims of sustainable development, this topic area has recently attracted attention. ESG investment criteria are gaining popularity as financial institutions encourage practicing CMA and support a low-carbon economy.

4.3 Most impactful journals

The study identifies the most impactful journals in greenwashing, CA, and financial institutions. Table 2 presents a comprehensive overview of these selected journals, encompassing the number of publications, citations, and AJG 21 ranking. notably, our findings revealed strong academic rankings for almost two-thirds of these journals, affirming the robustness of our research.

On a scale from one star to four stars (*), the Academic Journal Guide, 2021 of CABS (Chartered Association of Business Schools) rates two journals (*Journal of Accounting Research and Organisation Science*) with four stars and seven other journals with three stars. Further analysis observed that scholars' preferences in sustainable finance are multidisciplinary and distributed across two main categories (Table 2).

The first category includes journals highly specialised in *Accounting and Finance*, such as: *Sustainability Accounting*, *Management and Policy Journal*, *Energy Economics*, *Finance Research Letters*, *Journal of International Financial Management and Accounting*, *Journal of Management and Governance*, *Journal of Accounting Research*, *Journal of Financial Reporting and Accounting*, *Journal of Accounting in Emerging Economies*, and *Abacus*.

Table 2 List of source journals, publications, citation, AJS ranking, category

Name	*Citations*	*AJG 21 ranking*	*Category*
Sustainability Accounting, Management and Policy Journal	183	2	A & F
Business Strategy and the Environment	268	3	B & M
Energy Economics	155	3	A & F
Finance Research Letters	27	2	A & F
Corporate Social Responsibility and Environmental Management	39	1	B & M
Asia Pacific Journal of Marketing and Logistics	22	1	B & M
Journal of International Financial Management and Accounting	95	2	A & F
IEEE Transactions on Engineering Management	4	3	B & M
Journal of Business Research	79	3	B & M
International Journal of Hospitality Management	111	3	B & M
Tourism Management	2	4	B & M
Journal of Management and Governance	4	1	B & M
Journal of Accounting Research	112	4*	A & F
Organisation Science	335	4*	B & M
Business Strategy Review	1	1	B & M
Journal of Consumer Behaviour	3	2	B & M
Journal of Financial Reporting and Accounting	35	1	A & F
Journal of Accounting in Emerging Economies	37	2	A & F
Problems and Perspectives in Management	13	1	B & M
Abacus	13	3	A & F
Journal of Environmental Management	14	3	B & M
Journal of Management Studies	182	4	B & M

Note: Accounting and finance (A & F), business management (BM).

Source: https://charteredabs.org/academic-journal-guide/academic-journal-guide-2021

The second category includes journals of management, such as: Business Strategy and the Environment, Corporate Social Responsibility and Environmental Management, Asia Pacific Journal of Marketing and Logistics, IEEE Transactions on Engineering Management, Journal of Business Research, International Journal of Hospitality Management, Tourism Management, Organisation Science, Business Strategy Review, Journal of Consumer Behaviour, Problems and Perspectives in Management, Journal of Environmental Management, and Journal of Management Studies.

4.4 Key-word co-occurrence cluster analysis

The next objective was to find phrases often used in various papers using network analysis of keyword co-occurrence. This analysis can help researchers learn more about

subjects that have attracted considerable scholarly attention. The text-mining technique in VOSviewer was used to create a visual map in which the distance between terms indicates how similar or associated they are. When closely related, the distances of two or more keywords from the map decrease (Wang et al., 2024).

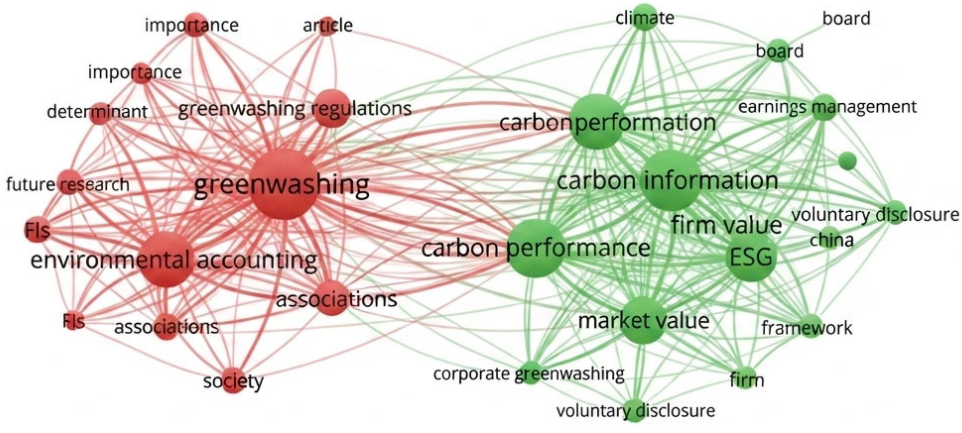
In this study, the keyword co-occurrence in publications establishes the relationship of these terminologies, which are interconnected in intricate ways. This is very clearly illustrated in the keyword co-occurrence cluster network map (Figure 3). The map shows some keywords linked through connecting lines indicating that they frequently appear together in the dataset publications. The use of these terms is relatively common, indicating substantial research in these areas. The two main clusters are indicated by the two distinct colours on the keyword co-occurrence cluster network map: red and green.

However, both clusters – greenwashing and regulations from a management perspective (red) and greenwashing and carbon performance from a financial perspective (green) – are closely interconnected and share overlapping themes, reflecting the complexity of our research.

Overall, we found that the words; 'greenwashing,' 'greenwashing regulations,' 'environmental accounting,' 'financial institutions,' 'associations,' and 'society' were the most commonly occurring in the red cluster (i.e., the words with the most significant node).

These terms relate to environmental effects, climate change and wider economic implications, and sustainable CA (Silaban and Sitorus, 2025). They exhibit the growing significance of integrating environmental, accounting, and social factors into financial institutions' core business practices (Silaban and Sitorus, 2025).

Figure 3 Keyword co-occurrence network visualised using VOSviewer (see online version for colours)



Source: VOSviewer version 1.6.20

The papers that assess the greenwashing in financial institutions from a managerial standpoint are included in the green cluster. 'Carbon information,' 'carbon performance,' 'market value,' 'firm value,' 'ESG,' and 'carbon act' were the terms that emerged most frequently in the green cluster in Figure 3 (Birindelli et al., 2024).

All these terms are interrelated and explain the relationship between financial institution and carbon, ESG, low-carbon economy, and social impact. They highlight the

advantages that financial institutions can gain thanks to the use of CA objectives to enhance their reputation and encourage innovations and supporting proper management of financial institutions' risks and opportunities (Birindelli et al., 2024).

Thus, this demonstrates the relationship between finance, economy, society, and the environment, and shows that the financial industry is beginning to better understand the environmental challenges and implications for accounting systems and decision-making.

These results answering RQ4 as the two major thematic clusters were identified (i.e., regulatory pressures and governance – red cluster, and carbon performance and ESG integration – green cluster).

4.5 Various aspects of greenwashing

4.5.1 Foundational drivers and ethical context of greenwashing

4.5.1.1 Ethical foundations and post-crisis context

The main themes introduced are greenwashing efforts, and low-carbon economy policies, including how environmental regulations affect green finance, ethical dilemmas of the finance industry, and prospects for the low-carbon economy. Past studies have examined the ethical problems in the finance industry in the aftermath of the 2008 subprime mortgage crisis-2008 (Kofke, 2015).

The findings have provided useful information regarding different strategic choices and organisational changes made by the financial institutions. The researcher discussed the moral dilemmas that the encountered both during and after the financial crisis and the moral standards that should guide it (Kofke, 2015).

4.5.1.2 Institutional characteristics and national variations

Financial institutions are not only subjected to the negative impact of climate change but are also expected to play an active role in its mitigation and in demonstrating ethical standards. In this regard, Gong et al. (2026) examined 117 financial institutions from developing and developed nations, exploring the motivations for voluntary CD and the quality of the disclosures (Gong et al., 2026). The findings demonstrated that an FI's voluntary disclosure of low-carbon programs and low-carbon performance can be strongly predicted by characteristics at the national and institutional levels (Guo and Yang, 2024). Financial institutions tend to portray themselves as responsible organisations, especially when they are prosperous, have low levels of risk, operate in industrialised nations that prioritise the environment, and are subject to many listing criteria. However, when the CD is considered, the scenario weakens by country (Prihandini, 2026). New criteria that concentrate on climate risk and sustainable finance or social effects, generally need to be implemented to give an external evaluation of FI's participation that is more objective. Thus, reporting on sustainability can incorporate environmental indicators.

4.5.1.3 Symbolic versus authentic sustainability efforts

Kaspereit and Lopatta (2016) provided an extensive review of financial institutions' sustainability reporting practices. The authors made a distinction between 'authentic efforts' to meet the sustainable goals in CA disclosures and 'greenwashing,' or

superficial sustainability measures (Kaspereit and Lopatta, 2016). This study used quantitative and qualitative methods to examine the quality of sustainable accounting for observations of 315 FIs in Europe from 2002 to 2014. Financial institutions' annual reports provided information on the quality of sustainable reporting (Kaspereit and Lopatta, 2016). European financial institutions have started giving funds to address contextual issues, including education and climate change, and highlighting stakeholder preferences. Business associations, policymakers, and lawmakers in developing economies have been actively advocating for sustainable development lately with schemes like corporate social responsibility (CSR), financial inclusion, climate mitigation actions, green banking, and corporate philanthropy (Ilesanmi, 2024). Furthermore, the integration of sustainability reporting standards in financial institutions' practices within Europe has been described as symbolic (Donkor et al., 2021). These discrepancies indicate that in an organisation, accountability shortcomings are overlooked; instead, managerial self-interest prevails. Based on the results of the previous research, there can be an overall sense of guarded optimism about sustainable accounting performance in emerging economies, which can grow significantly and become more visible and recognised in the future (Sahu et al., 2024; Zhu et al., 2024).

4.5.1.4 Definitional ambiguities and consensus gaps

Tang et al. (2025) investigated the probable advantages of the low-carbon loan loss provisioning CA system for the financial institutions in line with this study. The authors made the postulation that the conventional mode of loan loss provisioning emphasises risk management and profitability, and ignores lending operations' effects on society and the environment (Tang et al., 2025).

However, a challenge exists i.e., there is subjectivity when it comes to evaluating a company's operations. There may be varying interpretations of sustainable performance among evaluators. There is no consensus among financial institutions and regulators around definitions of low carbon/eco-friendly behaviour. However, a solution to this issue might be to have a law establishing definitions of terms such as 'low carbon' and 'eco-friendly'.

This addresses RQ1 by identifying selective disclosures, vague sustainability claims, symbolic sustainability reporting, voluntary CD, and definitional ambiguities as key greenwashing practices employed by financial institutions in the context of CMA.

4.5.2 Green investment instruments: bonds, Sukuk, and subsidies

4.5.2.1 Green bonds: frameworks, potential, and challenges

The analysis of the green bond market analysis indicates potential to boost environmentally friendly investing. The requirement for a specified reference framework in green bonds can help lower the risk of greenwashing and channel funds towards environmentally sustainable initiatives (Shi et al., 2023). The authors also mentioned the challenges faced by investors, issuers, and intermediaries due to the green bond market expansion. Various findings, such as a costly process, a lack of defined criteria for what qualifies as a 'green investment,' and the requirement for increased transparency, are associated with these significant challenges (Ge et al., 2025). However, these challenges can be addressed, and the possible benefits of green finance, such as reduced environmental impact and enhanced financial stability, are worth the investment (Shi

et al., 2023). Thus, transparency and disclosure are indispensable to issuing and disclosing green bonds. Hence, industry regulations and standards must be established.

4.5.2.2 Green Sukuk and market integration

García and Agostini (2023) provided a thorough overview of the background, regulations, and current market conditions of green sukuk performance in Europe and their relationship to the international green bond market (García and Agostini, 2023). The researchers also examined how green sukuk (Islamic climate finance), a Shariah-compliant financial instrument for renewable energy, the emergence and proliferation of green sukuk, and the institutional and legal factors that influence its adoption (Hoque et al., 2026). Most of the literature on green finance discussed the challenges of introducing green bonds and environmentally friendly banking solutions.

4.5.2.3 Environmental performance and access to finance

Orazalin et al. (2024) examined the relationship between environmental performance and financial institutions funding access using data analysis of 3915 unlisted entities in seven developing nations by World Bank Enterprise Surveys (2018–2019). Based on the environmental effect reduction index, the authors' findings imply that a firm's ability to obtain loans may be enhanced by participation in environmental activities. Specifically, the results show that companies that perform better in terms of environmental performance would obtain more financing at a reduced cost. A company's environmental performance benefits from the loans it receives (Qin et al., 2026). Moreover, enterprises operating in controversial industries face challenges securing funding while exhibiting superior environmental performance. Since greenwashing damages reputations and misleads environmentally conscious consumers, it is doubtful that these stakeholders in these sectors can succeed. Policymakers can make a case for stricter environmental laws by emphasising the advantages for both the environment and business financial stability using such data.

4.5.2.4 Political, practical, and subsidy-driven obstacles

García and Agostini (2023) argued that green bonds offer an essential solution for the crisis of funding environmental degradation (García and Agostini, 2023). This study examined the political and practical concerns in green bonds. It provided adequate substantiation to support the claim that, due to several practical and political issues, green bonds do not offer the ideal solution to environmental degradation (García and Agostini, 2023). Several practical challenges include the lack of well-defined criteria and directives for issuing green bonds, along with the transparency issues in the green project verification process. Such problems cast doubt on the effectiveness of green bonds to compensate for ecological losses (Apergis et al., 2025). The political constraints mostly pertain to bond issuers' political commitments to environmentally sustainable projects that support efforts for ecological debt reduction. This investigation highlighted the mismatch in the interests of bond issuers and environmental objectives. Another central element in executing the environmental programs is regulation. Ling et al. (2024) used data from Chinese polluting companies to evaluate how environmental laws have impacted the growth of green finance (Ling et al., 2024). The adoption of these laws

enhances sustainable development; however, it also costs polluting companies' money. These costs are a required step towards a more sustainable future. Polluting companies increase their green investments to meet environmental standards (Ling et al., 2024). The relevance of such regulatory compliance should be considered as a critical component in gaining access to green finance, as evidence suggests that businesses with higher implementation of such regulations have higher likelihood to obtaining more green funding from the financial sector, which underscores the power and responsibility of policymakers in shaping the future of green finance (Luo et al., 2024).

4.5.2.5 Subsidy-driven greenwashing and regulatory responses

Zhang and Zhang (2024) assessed the relationship between greenwashing disclosure practices and subsidy changes for Chinese-listed firms in the energy industry for the period between 2011 and 2021 (Zhang and Zhang, 2024). The results provide crucial insights into the complex decision-making procedures to address the relationship between greenwashing and subsidies related to energy sector companies. Interestingly, it was found that companies whose subsidies were about to expire were more likely to engage in greenwashing than those whose subsidies were still active (Zhang and Zhang, 2024). Highly polluting industries are more motivated to engage in greenwashing compared to Cleaner-producing enterprises. Additionally, the authors discovered data indicating a firm's bankruptcy risk level had a significant role in the firm's decision-making process (Wang et al., 2026).

To avoid the inappropriate allocation of financial resources, regulators should continue supporting businesses to progress their sustainability performance, monitoring how rules are being executed, and discouraging weak ESG practices. Although corporate strategy is essential, it carries the risk of misleading or deceiving stakeholders (Ge et al., 2025).

This addresses RQ2 by identifying inadequate definitions, lack of transparency, weak regulatory enforcement, and absence of independent verification as key mechanisms driving greenwashing, while highlighting capital misallocation and stakeholder deception as its primary market consequences.

4.5.3 Corporate social responsibility, internet reporting, and symbolic actions

4.5.3.1 CSR and financial performance

Enhanced understanding of firms' ethical practices and social responsibilities among the public has led to a noteworthy increase in the focus on CSR in academics and the business world. Researchers have been examining the relationship between CSR investments and financial impacts in the banking and finance industry (Chouaibi et al., 2022a; Rossi et al., 2021; Uddin, 2020). CSR in the financial institutions provides crucial information on such areas and highlights the increasing significance of CSR in this sector, and the possible effect these initiatives may have on stakeholders and society (Ellemers and Chopova, 2021).

Prior studies have examined how CSR and financial performance in the financial institution are interconnected and the factors that encourage financial institutions to engage in CSR activities (Chouaibi et al., 2022b, 2021). Kurpierz and Smith (2020) used a sample of more than 120 financial institutions between 2004 and 2010. Their results held up well after considering the subprime crisis, different CSR dummy provisions, and

more CSR classes demonstrated that the financial performance and CSR have a positive relationship (Kurpierz and Smith, 2020). The authors argued that governments should offer less support to financial institutions that engage in CSR projects for strategic motives. The relationship between financial performance and CSR has been examined by several scholars provided a comprehensive analysis in this area. They proposed that, Governments can support financial institutions' CSR efforts by sanctioning loans to organisations that demonstrate significant CSR activities (Chouaibi et al., 2022b, 2021).

4.5.3.2 Internet social and environmental reporting

Financial institutions' internet social and environmental reporting (ISER), and CSR significantly contribute to greenwashing studies, that provided notable insights into Middle Eastern countries by focusing on Lebanese financial institutions and greenwashing techniques (Khalil and O'sullivan, 2017). Additionally, it ascertained the scope, quality, and correlations of ISER using few variables, such as size, profitability, and religion, along with how they related to one another by investigating a combination of techniques (Khalil and O'sullivan, 2017). A survey on CSR was conducted among financial institution employees. The scope, quality, and relationships between ISER and financial institutions were examined through a content analysis of different financial institutions' websites (Poliakova et al., 2024). The researchers discovered that financial institutions are more strategic, involved, and report-driven than other industries. They hold differing views about the motivations behind financial institutions' CSR involvement (Ben Fatma and Chouaibi, 2021). Most Financial institutions assert that CSR benefits both the public and the financial institutions towards brand image and distinctiveness; as a result, it is seen as a win-win situation. A few institutions assert that this is voluntary and has no ulterior motive (Hatane and Soewarno, 2024). Concerning ISER's impact on financial institutions' profitability, stakeholders agreed with a positive long-term effect. However, the lack of ISER assessment tools by financial institutions may have minimal impact on their short-term profitability (Khalil and O'sullivan, 2017).

4.5.3.3 Equator principles, regional disparities, and symbolic actions

Kim and Yoon (2023) examined the effects of financial institutions and CSR outcomes on social development and ecological risk management (Chouaibi et al., 2021). Their attention was focused on the equator principles (EP), a set of best practice guidelines for financial institutions involved in project financing (Romdhane, 2025). Romdhane (2025) conducted a similar analysis for data ranging between 2015 and 2025, from 78 financial institutions. There were 26 institutions from developing nations and 52 institutions from developed nations (Romdhane, 2025).

This analysis showed that developing and developed nations differ significantly in the features of countries and financial institutions adopting this principle. The authors' investigation of the immediate and long-term effects of its implementation in financial institutions revealed that before 2003, i.e., the pre – equator principle era – financial institutions in developed countries were large, risky, and under-performing compared to developing countries without EP implementations (Chen et al., 2018). It supports the theory of greenwashing.

4.5.3.4 Equator principles adoption, regional disparities, and the risk of greenwashing

The research identified a short-term rise in fundraising activities and less convincing proof of increased profitability, which could relate to EP adoptions by financial institutions and its immediate reputational advantages (Power and Tandja-M, 2025). Furthermore, environmental issues are generally acknowledged in developed nations and addressed by well-established institutional capacities, corporate governance, and legal frameworks to safeguard society and the environment (Siregar and Utomo, 2019). Considering the comprehensive strategy used by financial institutions, EP activities may be seen as little more than superficial measures or greenwashing tactics to address environmental issues. On the other hand, developing countries trail behind developed economies in terms of environmental regulation and awareness. The authors argue that adopting these principles is a strategic choice that requires significant financial investments and adopting institutions' performance and operations (Siregar and Utomo, 2019). Similarly, Wedari et al. (2021) emphasised the necessity of accuracy and transparency in reporting financial institutions' participation in CSR initiatives (Wedari et al., 2021). Furthermore, Ge et al. (2025) discussed how the green economy is frequently promoted to advance environmental preservation and sustainability. They did, however, issue a warning about the risk of 'greenwashing,' which occurs when governments or businesses make exaggerated or fraudulent claims regarding environmental credentials to mislead investors or consumers (Ge et al., 2025). National environmental policy has to be seen as a deliberate, long-term policy that is aimed towards concrete environmental and economic goals. Its role goes beyond symbolism that involves structural shifts that need to be systemically implemented and assessed (Umemiya et al., 2017).

This addresses RQ2 by identifying inadequate definitions, lack of transparency, weak regulatory enforcement, and absence of independent verification as key mechanisms driving greenwashing, while highlighting capital misallocation, stakeholder deception, and reputational damage as its primary market consequences.

4.5.4 Carbon disclosure, lending practices, and mitigation mechanisms

4.5.4.1 Carbon disclosure and corporate borrowing constraints

He et al. (2013) analysed the panel data on 1,100 publicly listed manufacturing firms in China from 2001 to 2011. As a result, the study examined whether under the cover of green credit policies, financial institutions provide more credit to firms that have more green innovation and had more transparency in the environment (He et al., 2013). The results indicated that green innovation has a considerable impact on access to corporate funding. Better disclosure of the environment, however, did not lead to more loans available. The authors continued that the greenwashing phenomenon deserves more discussion because of the lack of a significant effect of CD. The quality of complex disclosures slightly increased loan size, but soft disclosures were determined to be an obstacle to loan funding. The most likely reason for this difference is that creditors do not like companies that are involved in corporate greenwashing (Siddique et al., 2021).

4.5.4.2 Lending practices in agriculture and biodiversity

Parker and Sheedy-Reinhard's (2022) aimed to examine the planet's biodiversity from brown lending by examining the contribution of financial institutions in creating a green economy. They looked at Australian Financial institutions' due diligence practices regarding lending to the agricultural industry, which is a significant cause of climate change and issues related to animal welfare (Parker and Sheedy-Reinhard, 2022). The authors made the case that financial institutions should consider animal welfare and the environment when making lending choices. They argued that ESG animal husbandry issues should be included in regulatory and quasi-regulatory standards for responsible banking, as this is both rational and desirable (Parker and Sheedy-Reinhard, 2022).

The authors asserted that financial institutions exploit rather than address the issues of food scarcity, water instability, climate disruption, and animal sufferings. Meanwhile, animal agriculture regulations seek to legitimise and garner support from the public for the industry's continuous growth and investment (Niinimäki, 2021). It illustrates the broader issue of symbolic acts that uphold the status quo, greenwashing, and self-regulation. Financial institutions need to address the interconnected cycle where animal agriculture is both caused and impacted by climate disruption. Their attempts at self-regulation remain inadequate.

4.5.4.3 Operational strategies and regulatory pathways for mitigation

Schwertner and Sohn (2024) proposed several approaches for sustainable finance activities in Luxembourg to respond to these issues. Initially, they suggested strategies for execution that bolster efforts to promote environmental sustainability in the financial institutions. Secondly, they proposed evaluating how existing global climate finance initiatives and techniques promote the development of innovative business models, products, or services align with degrowth and sustainability goals in regional and local economies.

This addresses RQ3 by proposing operational, regulatory, and disclosure mechanisms to mitigate greenwashing and enhance transparency in CMA practices, including the need for defined reference frameworks, transparency in green bond issuance, inclusion of ESG criteria in lending decisions, regulatory standards for responsible banking, and independent verification procedures.

5 Future research directions

The current systematic review has led to the identification of various research gaps and emerging themes that require further exploration. These gaps relate to different aspects, such as metrics standardisation, risk and performance, business models, disclosure and transparency, verification procedures, regulatory frameworks, stakeholder involvement, and collaborative efforts. The details of these research streams have been organised in Table 3 with future research questions and main literature basis.

Table 3 Research streams and future research questions

Research streams	*Future research questions*	*Sources*
Metrics standardisation	Would investors be able to verify financial institutions' sustainability promises with the use of standardised sustainability metrics?	Charmahali et al. (2021)
Risk and performance	Do environmental reports affect financial institutions' reputations and performance?	Wang and Wang (2023)
	Could lending that is not compatible with environmental regulations cause financial institutions that may be experiencing a credit constraint to absorb more capital?	
	Does the size of a financial institution have an impact on the danger of greenwashing?	
	What connection exists between a nation's environmental laws and the operations of its financial institutions?	
	What does this mean for financial institutions that are globally systemically important (G-SIBs)?	
New business model	Can the present financial institution business models sustainably ensure environmental compliance? In light of complete environmental compliance, what business model ought financial institutions to use? How can the costs of banking green compliance be quantified?	Bailis and Arabshahi (2011)
Disclosure and transparency	How can financial institutions apply procedures for creditworthiness assessments that take environmental compliance of businesses into account? What will SMEs without environmental scores have to pay in terms of borrowing costs?	Siddique et al. (2021)
Verification and standardisation	Do enhanced verification procedures guarantee that businesses are held responsible for the sustainability claims? How can the veracity of environmental data and information be confirmed? In what ways might promoting independent certification and verification of a financial institution's sustainability initiatives improve openness and credibility?	Garrido et al. (2020), Li et al. (2025)
Regulations	What measures should financial institutions take to prevent the funding of companies that cause pollution from being associated with greenwashing? How can authorities stop greenwashing techniques and dissuade financial institutions from using them?	Thomson (2013)
Engagement	How might taxonomy be modified to account for the greenwashing phenomenon? Does the way stakeholders respond to greenwashing affect a company's reputation?	Sensharma et al. (2022)
Collaboration	How can industry groups and financial institutions work together to promote innovation, knowledge exchange, and best practices in sustainable financing?	Sensharma et al. (2022)

Source: Compiled from several sources

The findings of this systematic review reveal several critical issues regarding greenwashing in the FFS. These issues offer directions for future research.

5.1 Inadequate definitions and standards

There are inadequate standards or definitions, such as the environmental and social management system (ESMS), of what constitutes ‘green’ or ‘sustainable’ in the banking industry. Such ambiguity further allows for manipulation and misunderstanding the stakeholders, they can be easily misled when it comes to distinguishing real sustainability versus greenwashing practices. Clients find it difficult to assess the actual environment-related effects of financial institutions’ operations. Because they are often free to use vague, ambiguous, and unverifiable language. It enables them to show a misleading portrayal of sustainability as well as misleading statements to invest in greenwashing practices (Rehman et al., 2020).

5.2 Lack of transparency

Greenwashing can thrive when financial institutions lack transparency regarding their sustainability measures, practices, and policies. This makes it difficult for customers to assess the actual environmental performance of any institution operating in their country and hold institutions accountable. A lack of transparency and clarity in sustainability disclosures leaves stakeholders without clarity on whether financial institutions’ green promises are actually being met in their practices (Li et al., 2020).

5.3 Misallocation of funding

Funding and financial investments carry the potential cause environmental harm. Greenwashing is when financial institutions support specific projects and sectors, ignoring its environmental other harmful impacts, like financing enterprises or projects that have a negative impact on the planet. Because of these issues, consumers face difficulties when it comes to understanding whether a financial institution’s operations comply with sustainability requirements (Apergis et al., 2025).

5.4 Weak regulatory enforcement

Regulatory processes and rules related to the banking sector should be effective enough to prevent and monitor greenwashing. Weak enforcement and supervision can make it possible for financial institutions to make unwarranted or false statements without being punished. Effective regulation and sanctions for the transgression of the rules would be a strong signal to those seeking to indulge in misleading environmental marketing (Qin et al., 2026).

5.5 Absence of independent verification

Independent certification and third-party verification processes are needed to substantiate the claims of financial institutions on sustainability. This would boost credibility, build stakeholder trust and eliminate the informational imbalance that currently allows for greenwashing practices. Furthermore, the adoption of standardised verification systems

would allow for consistent verification across institutions, allowing investors and consumers to better assess and make informed decisions based on verified environmental performance information (Vera-Muñoz, 2024).

Overall, this systematic review highlights the complexity of greenwashing in the financial services industry. Together, the problems identified (including definitions, lack of transparency, funding misallocation, regulatory shortcomings, and lack of independent verification) proposes the need for more stringent standards, more effective enforcement, and more accountability (Wu et al., 2020).

Future research should focus on the development of harmonised sustainability definitions, empirical analyses of the effectiveness of regulations and the design of robust verification frameworks. Closing these gaps will play a crucial role in moving towards true sustainability in finance and safeguarding investors from misleading greenwashing (Yildirim, 2023).

However, stakeholders need help distinguishing between true sustainable practices and greenwashing campaigns due to the necessity of particular verification procedures and trustworthy third-party certifications. These issues will necessitate the cooperation of various elements such as regulators, financial institutions, consumers, and advocacy organisations (Nishitani et al., 2021).

Standardised guidelines, reporting formats, and verification methods may be introduced in order to create transparency and reduce the risk of greenwashing. Additionally, informing consumers about sustainable financing practices can help them demand accountability from financial institutions regarding their environmental statements and making informed choices (Abay, 2022).

6 Implications

6.1 Practical implications

Gunawan et al. (2022) have proposed that financial institutions must improve transparency by revealing their sustainability standard, environmental policies, and procedures for measuring, assessing, and reporting their environmental impact. This can mean publishing comprehensive sustainability reports and providing public access to them. Effective and precise communication enhances the ability of stakeholders and consumers to evaluate a financial institution's sustainability performance. To promote environmental awareness, financial institutions could support educational programs aimed at raising awareness of the impact of their activities and supporting sustainable processes (Chouaibi et al., 2022b). In addition to providing useful theoretical insights regarding greenwashing practices in the banking sector, this research has practical implications as well. The paper investigates the rationale behind the phenomenon of greenwashing in banking, highlighting such factors as regulatory constraints, the necessity to attract customers and investors, and the desire to meet environmental and sustainability objectives. The theoretical investigation deepens our understanding of important factors affecting greenwashing practices. This paper analysed the negative consequences of greenwashing, which is the term used to define false and misleading claims regarding products that are environmentally sound. Companies that are involved in greenwashing risk losing money and reputation as consumers increasingly recognise the importance of sustainability issues. Another aim of this paper is to educate consumers

and investors about the deceptive marketing practices of financial institutions related to greenwashing. Understanding the problem will encourage demands regarding sustainability practices from companies in the future. Greater understanding of the issue can enable stakeholders to demand actual sustainability initiatives and make better-informed decisions.

6.2 Theoretical contributions

In terms of theoretical contributions, the paper underlines the development of legitimacy theory as it shows how the financial organisations apply carbon management disclosures to seek legitimacy and how 'decoupling' between normative policies and actual practices occurs in this regard. This builds upon the previous studies examining the signalling effect of ESG disclosures (Orazayeva and Arslan, 2024; Rossi et al., 2021), and the mediating effect of social and ethical practices between environmental and financial performance (Chouaibi et al., 2022b). Contributing to stakeholder theory, the paper illustrates the conflicting stakeholder demands from investors, government, and society, providing incentives for greenwashing behaviour.

7 Conclusions

This research examined the causes and consequences of the phenomenon of greenwashing in finance, with its implications for CMA and sustainability. The study identifies a number of major issues and challenges related to how greenwashing is understood by financial organisations through systematic literature review and bibliometric analysis (Rana et al., 2025). The results of the study indicate that the main motivation for greenwashing actions pertaining to the financial system is a desire for compliance with countries' ESG requirements and for drawing sustainable investments allowing meeting regulatory requirements (Zhao et al., 2026). This finding confirms the work that shows how ESG performance is increasingly connected to financial results (Rossi et al., 2025) and how CSR and ethical actions are relevant to corporate conduct (Chouaibi et al., 2021). Nevertheless, such motives often lead to discrepancy between the sustainability claims of financial organisations and their practices. This discrepancy undermines stakeholder trust, distorts market processes and threatens the reputation of CMA as one of the sustainability tools.

This study highlights several gaps in the literature: although many studies have been conducted on the applicability of CMA at the corporate and product level, fewer studies have investigated the intersection between CMA and greenwashing in the financial sector; furthermore, few studies exist on the role of independent assurance and standardised metrics in the fight against greenwashing (Batelli et al., 2025). The available integrated framework lacks the element of financial institutions as financiers of both environmentally friendly and carbon-intensive activities.

To address these problems, the research proposes the most influential determinants driving greenwashing in financial institutions and regulatory and operational solutions to improve transparency and accountability related to the CMA process, as well as recommendations for future research, such as the implementation of metrics for evaluation of environmental performance of financial operations and the impact of

greenwashing on long-term stakeholder trust. The bibliometric analysis identified two dominant thematic clusters:

1 regulatory pressures and governance (red cluster)

2 carbon performance and ESG integration (green cluster).

These clusters reflect the dual forces shaping financial institutions' environmental behaviour – external institutional pressures and internal operational mechanisms.

Future research should focus on the following areas:

1 development of standardised sustainability metrics for verifying financial institutions' environmental claims

2 examination of the effectiveness of enhanced verification procedures and third-party assurance in reducing greenwashing

3 evaluation of the impact of different regulatory approaches on deterring greenwashing, building on studies of voluntary ESG assurance mechanisms and integrated reporting adoption (Thawani and Bhatia, 2024)

4 investigation of the relationship between environmental reporting and financial institutions' reputational risk and financial performance

5 exploration of how stakeholder responses to greenwashing affect financial institutions' reputation and performance.

In conclusion, this research paper provides a comprehensive synthesis of greenwashing activities in CMA adopted by the financial services industry, highlighting the necessity of robust regulations, clear disclosures, and third-party verification systems. Without addressing these items, a transparent and reliable environment cannot be achieved, and actions must align with a genuine sustainability plan. Today, the need to combat climate change and pursue sustainable finance makes accountability and transparency measures in environmental actions conducted by financial institutions important. Greenwashing decreases the legitimacy of sustainable finance contributing to the difficulties of attracting investments for combating climate change. To guarantee credibility, transparency, and verifiability of sustainability claims, various stakeholders such as regulators, financial institutions, and society have to work closely together.

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Writing – review and editing, MS., FU., and MBH..; Visualisation, MS., FU., and MBH.; Project administration, MS., and FU.; Supervision, MBH.; Funding acquisition, MBH. All authors have read and agreed to the published version of the manuscript.

Declarations

Availability of data and materials: data will be available on request.

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