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THE RELATIONSHIP BETWEEN CORPORATE DECARBONIZATION AND FINANCIAL PERFORMANCE – BIBLIOMETRIC ANALYSIS

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Purpose: The aim of the study is to identify relationship between corporate decarbonization and financial performance in the light of extant literature.
Design/methodology/approach: The process entails conducting a bibliometric study with the Scopus database and VOSviewer software to identify major research trends, themes, and gaps. The bibliometric analysis covers 2 650 papers published and recorded in Scopus database in years 2010-2024
Findings: The main conclusions indicate that although decarbonization is a topic of much discussion, few studies specifically look at how it affects company financial performance or the factors that influence it. The paper thus points out a research gap and urges more research to delve deeper into the strategic and financial performance-related ramifications of business decarbonization.
Research limitations/implications: The sample under analysis is derived from a single database. Further limitations are linked to the VOSviewer software features. Moreover, expanding the regions or years of examined publications may also be crucial. Additionally, this is a theoretical study that merely illustrates one avenue for further investigation. In order to further clarify the topics under study, it is crucial to carry out thorough literature reviews.
Originality/value: The paper identifies a research gap and proposes additional, in-depth research on the strategic and financial performance implications of corporate decarbonization. This opens up new areas of research that could be explored in the future. Empirical research is required to explore causality, sector-specific impacts, and long-term performance metrics.
Keywords: Decarbonization, ESG, financial performance, VOSviewer.
Category of the paper: Research paper.

1. Introduction

In the last few years, the increasing impact of non-financial factors which influence on the activities of enterprises can be observed. Issues such as Corporate Social Responsibility or Sustainability appear more and more often in the environment, and companies more and more often introduce them to their strategies (Michalczuk, Konarzewska, 2018). It is worth focusing here on issues related to ESG, the reporting of which for all large companies and all companies

listed on the stock exchange has become an obligation through the Directive (EU) 2022/2464 "The Green Deal" of the European Parliament and of the Council of 14 December 2022 of the European Parliament (Directive (EU) 2022/2464). This is part of the European Union's The European Green Deal policy, which aims to become the first climate-neutral continent by 2050.

Therefore, special attention should be paid to environmental aspects, and above all to decarbonization, which is the main objective of European Union policy. Decarbonization consists in reducing and, in the future, cessation of CO2 emissions into the atmosphere (A European Green Deal). Companies are already adopting decarbonization strategies in their business models and sustainability reports. The "environmental" pillar of ESG focuses primarily on companies' management of their ecological footprint, including emissions, resource use, and energy efficiency. Recent research has highlighted that companies committed to ESG tend to adopt more aggressive decarbonization strategies, with a focus on low-carbon technologies and transparent emissions reporting (Amel-Zadeh, Serafeim, 2018).

Nevertheless, this is a fairly new and unexplored topic, and companies are just starting to implement decarbonization as part of a sustainability/ESG strategy. The main objective of this paper is to find out links/relationships between decarbonization and financial performance of the company X and Y based on the literature review and network visualization map using VOSviewer analysis. The bibliometric analysis covers 2 650 papers published and recorded in Scopus database in years 2010-2024. The main research questions are formulated as follows:

1. What are the main trends in decarbonization and corporate financial performance?
2. What are the key thematic areas and research trends in the literature on corporate decarbonization and financial performance, as identified through bibliometric analysis using VOSviewer?
3. How do the most frequently cited studies in this field conceptualize and empirically measure the relationship between corporate decarbonization initiatives and financial outcomes?

This study contributes originality to the research on the relationship between financial performance and corporate decarbonization. Although corporate strategies increasingly include environmental issues, knowledge on how exactly decarbonization activities affect financial performance is underexplored. The study offers a structured summary of the main topic areas, current research directions, and frequently mentioned conceptual frameworks. A new methodological approach to understanding the intellectual structure of this research area is introduced by incorporating network visualization mapping. The results aim to influence future research on the financial impact of corporate decarbonization programs and identify important research gaps. The next section of paper presents literature review connecting with the carbon emission reduction and corporate performance.

2. Literature review

A key idea in the discussion of sustainability is Corporate Social Responsibility. It alludes to businesses' voluntarily undertaken attempts to conduct their operations in a manner that benefits society as a whole (Carroll, 1991). CSR, which has historically been based on ethics, has expanded to cover a wide range of topics, from labor conditions and human rights to environmental sustainability and open government. Because of that in last few years the CSR was more and more replaced by ESG concept which integrates Environmental, Social, Governance aspects with the business strategy.

These are key frameworks for evaluating the ethical effect and sustainability of a business:

- Energy consumption, waste management, and carbon emissions are examples of environmental pillar.
- Diversity, human rights, and labor practices are examples of social pillar.
- Business structure, board diversity, and transparency are examples of governance pillar.

Changes in corporate reporting and investment strategies are being driven by the perception that ESG performance serves as a stand-in for long-term financial performance and risk management (Clark et al., 2015).

A rising understanding that sustainability-related issues, such inequality, climate change, and governance shortcomings, can have significant financial repercussions is reflected in the incorporation of ESG into company strategy. ESG is therefore more than simply a reporting tool; it is a strategic necessity that fits with fiduciary duties and stakeholder expectations. More and more recent research has focused on risk reduction, stakeholder involvement, and the strategic advantages of sustainability, framing it as a source of competitive advantage as opposed to a legal need (Eccles et al., 2014).

Additionally, multidisciplinary approaches that integrate knowledge from organizational behavior, economics, and environmental science are becoming more and more popular. This illustrates how complexed sustainability issues are and how cross-sectoral, systemic solutions are required (Bansal, DesJardine, 2014).

How businesses incorporate Environmental, Social, and Governance (ESG) considerations into their fundamental strategy is the subject of a large amount of research. Strong ESG performance has been linked to better financial results, better risk management, and greater stakeholder relationships, according to many studies, e.g. (Clark, Feiner, Viehs, 2015; Friede et al., 2015). As institutional investors use ESG screening when making portfolio selections, ESG integration is also becoming more and more associated with capital availability (Sullivan, Mackenzie, 2017).

Corporate decarbonization is private sector initiatives and actions that contribute to reducing greenhouse gas emissions. Environmental laws and regulations that motivate companies to reduce CO2 emissions (Leffel et al., 2024; Ng et al., 2023; Johnson et al., 2023).

Beyond conventional corporate responses to climate change towards deep decarbonization: a systematic literature review (Johnson, Rötzel, Frank, 2023, pp. 921-954).

The process by which businesses lower carbon dioxide and other greenhouse gas (GHG) emissions throughout their value chains, operations, and product life cycles is known as corporate decarbonization. In order to match company operations with global climate goals like those outlined in the Paris Agreement, it is a crucial component of larger corporate sustainability and climate plans (UNFCCC, 2015). Changes in energy sourcing, supply chain optimization, investments in low-carbon technologies, and improvements in the design of goods and services are all examples of decarbonization.

The Science Based Targets Initiative (SBTi), which assists businesses in establishing GHG reduction goals in accordance with the most recent climate science, is a crucial strategic component of corporate decarbonization. According to the Science Based Targets Initiative (2021), the SBTi defines science-based targets as those that are "in line with what the most recent climate science indicates is required to accomplish the objectives of the Paris Agreement—limiting global warming to well below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C".

In response to these targets and growing pressure from regulators and stakeholders, companies are taking a variety of actions to decarbonize. These include, for example, switching to renewable energy sources, increasing energy efficiency, implementing internal carbon pricing, engaging in sustainable supply chain practices, investing in carbon offsetting and removal technologies, and redesigning products for lower life-cycle emissions (CDP, 2022; Bocken et al., 2014).

The connection between decarbonization initiatives and financial performance has been the subject of numerous empirical research. According to research, proactive climate policies can result in long-term profitability, enhanced reputation, and a competitive edge. Busch and Lewandowski (2018), for instance, discovered that businesses with robust carbon management procedures frequently see positive anomalous stock returns. Matsumura, Prakash, and Vera-Muñoz (2014) discovered that, particularly in carbon-intensive industries, businesses that reveal fewer emissions typically have a higher firm value.

According to other research, implementing ESG (environmental, social, and governance) initiatives associated with decarbonization or aligning with science-based goals can boost investor confidence and reduce the cost of capital (Clark, Feiner, Viehs 2015; Khan, Serafeim, Yoon, 2016). In conclusion, business decarbonization is becoming more and more strategic and financially necessary in addition to being an environmental need. Businesses can achieve sustainability and financial gains by aligning their actions with science-based climate goals.

Therefore, this literature review and network visualization map using VOSviewer analysis can help to identify themes in which research should be conducted and to provide information in which areas issues related to ESG, and particularly carbon emission reduction, can help companies improve their financial performance.

3. Methods

The main research method is literature review of papers recorded in the Scopus database with the application of VOSviewer software functionality. Bibliometric analysis is commonly used to explore a given topic and helps in further research paths. For example Tafuro and Piccaluga (2023) analyzed when and where corporate purpose is discussed in academic literature, as well as what key topics it focuses on. Di Vaio, Zaffar and Chhabra (2024) aim to identify the connection between human dynamic capabilities, carbon accounting and integrated reporting in the transition processes. Xiao, Pan and Lai (2025) thoroughly examined the application of digital technology in the decarbonization of shipping. Its status, challenges and prospects.

The first step of the research process was to create a code which would be useful to find appropriate results.

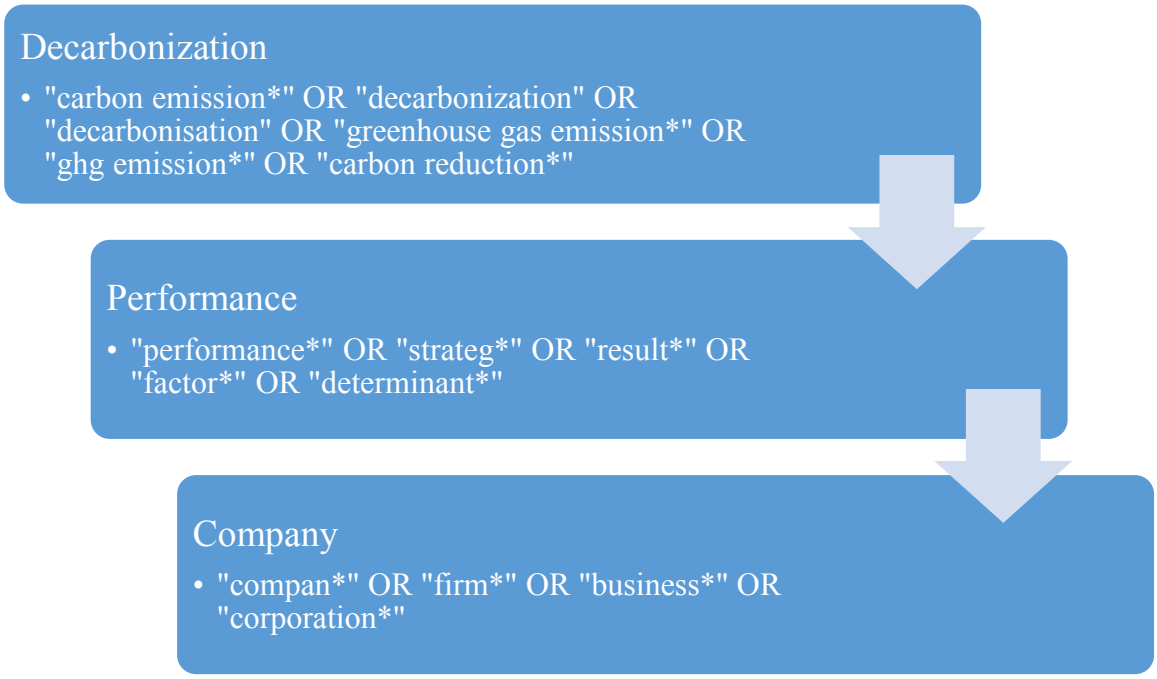

Figure 1. Main keywords chose to analysis.

Source: Own elaboration.

The keywords were divided into three areas. First area was connected to “decarbonization”. To prepare better research there were also take into account synonym as “carbon reduction”. Also, to precise the topic and find more papers words as “carbon emission” and “greenhouse gas emissions” were chosen. These words are also used in analysis of the company’s performance in terms of lowering carbon emissions.

The second element of the study is to determine the key findings on the impact of decarbonization on businesses. On the one hand, the keywords that were selected focused on the impact of the firms' performance, results, and strategy. However, they were also relating to causes, for example factors, and determinants.

Finally, the third area was connected with influence of carbon emissions on the company/firm/business.

To provide more detailed outcomes additional filters have been applied as presented in figure 2.

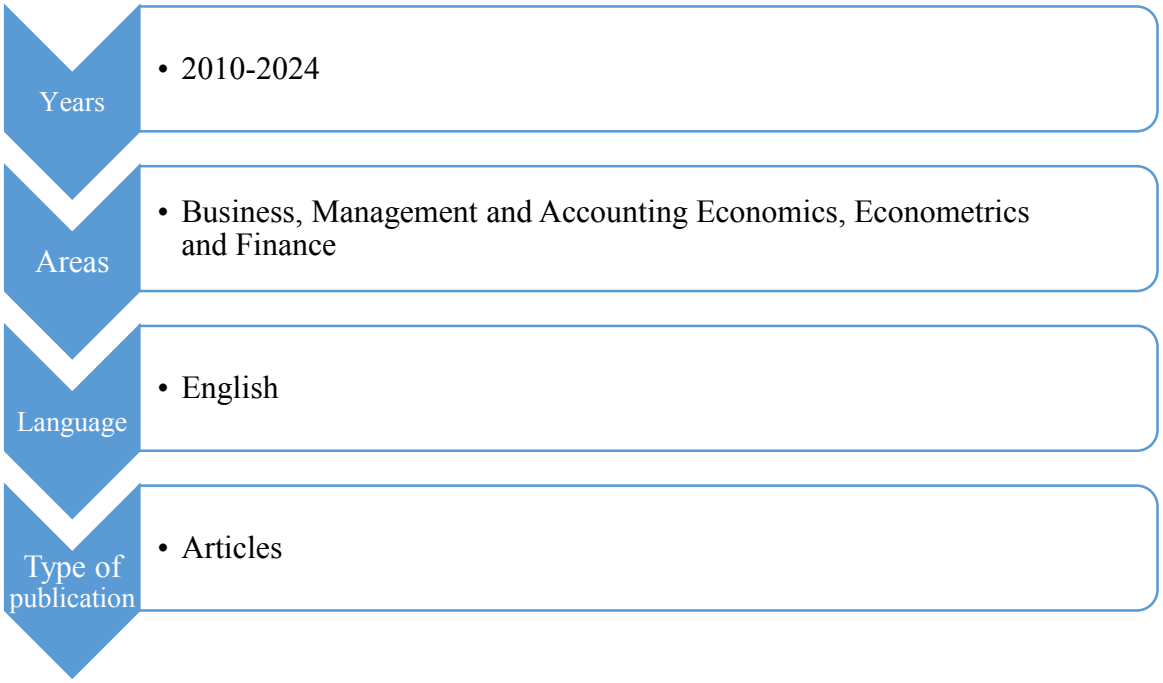

Figure 2. Filters used to refine research.

Source: Own elaboration.

The year of the publications was chosen from year 2010 to year 2024. The starting point is year 2010 which is after the global financial crisis. During the crisis, there were periods of economic turmoil. Data from researches conducted during the crisis can be irregular. The recovery and stabilization phase begin from 2010, which resulted in new macroeconomic and social circumstances that were very different from those that existed before the crisis. The articles are until end of 2024. The set of the articles was downloaded on 01.03.2025. The areas of the research were chosen to focus on business activities, resulting in two areas: 1) Business, Management and Accounting as well as 2) Economics, Econometrics and Finance. This excluded articles related to technical topics. Language of publications was reduced to English and type of publication to Articles to focus only on scientific papers.

4. Results and discussion

From 2010 to 2017 the number of papers per year was 40-110. Over years the highest increase started in 2019. In 2024 number of publications was equal to 655 papers. It is connected to new law regulations, for example Non-Financial Reporting Directive, Corporate Sustainability Reporting Directive. Greater emphasis on ecological aspects, which are increasingly being addressed. This is also linked to policies and directives which introduced non-financial reporting. Additionally, in December 2019, the European Commission presented the European Green Deal. When the analysis focuses on particular articles, the most cited works are present in table 1.

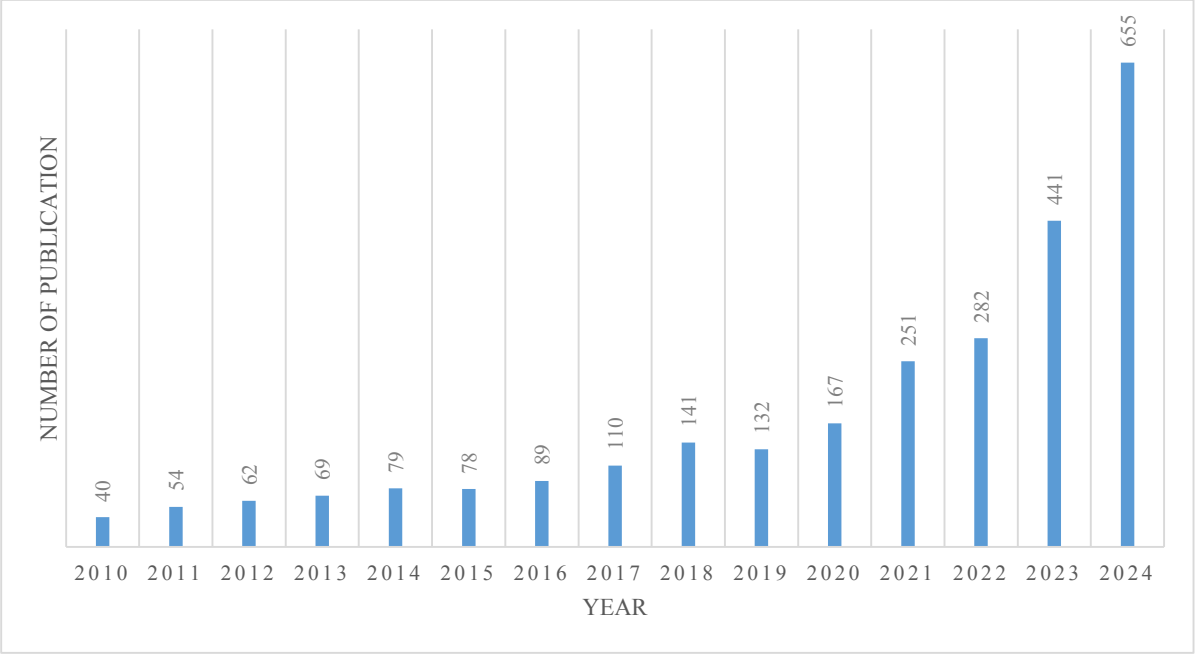

Figure 3. Number of publications in the analyzed period.

Source: Own elaboration based on Scopus database.

Table 1.

Most cited articles in the sample

No.	Authors	Title	Year	Journal	Cited by
1.	Liao L.; Luo L.; Tang Q.	Gender diversity, board independence, environmental committee and greenhouse gas disclosure	2015	British Accounting Review	1078
2.	Matsumura E.M.; Prakash R.; Vera-Muñoz S.C.	Firm-value effects of carbon emissions and carbon disclosures	2014	Accounting Review	925
3.	Bolton P.; Kacperczyk M.	Do investors care about carbon risk?	2021	Journal of Financial Economics	888
4.	Lee K.-H.; Min B.	Green R&D for eco-innovation and its impact on carbon emissions and firm performance	2015	Journal of Cleaner Production	761

Cont. table 1.

5.	Hua G.; Cheng T.C.E.; Wang S.	Managing carbon footprints in inventory management	2011	International Journal of Production Economics	670
6.	Govindan K.; Jafarian A.; Khodaverdi R.; Devika K.	Two-echelon multiple-vehicle location-routing problem with time windows for optimization of sustainable supply chain network of perishable food	2014	International Journal of Production Economics	550
7.	Li D.; Huang M.; Ren S.; Chen X.; Ning L.	Environmental Legitimacy, Green Innovation, and Corporate Carbon Disclosure: Evidence from CDP China 100	2018	Journal of Business Ethics	536
8.	Prado-Lorenzo J.-M.; Garcia-Sanchez I.-M.	The Role of the Board of Directors in Disseminating Relevant Information on Greenhouse Gases	2010	Journal of Business Ethics	496
9.	Santoyo-Castelazo E.; Azapagic A.	Sustainability assessment of energy systems: Integrating environmental, economic and social aspects	2014	Journal of Cleaner Production	471
10.	Kim E.-H.; Lyon T.P.	Greenwash vs. Brownwash: Exaggeration and undue modesty in corporate sustainability disclosure	2015	Organization Science	441

Source: Own elaboration based on Scopus database.

Most cited paper was "Gender diversity, board independence, environmental committee and greenhouse gas disclosure" written by Lin Liao, Le Luo and Qingliang Tang in 2014 (British Accounting Review). The number of citation is 1078 which is the only paper in this analysis with total number of citation over one thousand. Using a sample of 329 significant UK companies, this paper examines the relationship between corporate board composition and voluntary greenhouse gas (GHG) disclosure via the Carbon Disclosure Project. The results indicate that the likelihood and degree of GHG disclosure are positively correlated with gender diversity (more female directors), board independence, and the existence of an environmental committee.

The findings are consistent with stakeholder theory, indicating that independent and diverse boards are better able to meet stakeholder expectations and strike a compromise between environmental obligations and financial objectives. The study emphasizes how board dynamics and stakeholder interactions, in addition to internal governance concerns, influence company climate policies. To be effective, environmental committees must be sizable, autonomous, and active.

The second most cited paper was "Firm-value effects of carbon emissions and carbon disclosures" written by Matsumura E.M.; Prakash R.; Vera-Muñoz S.C. in 2014 (Accounting Review). This study examines the relationship between carbon dioxide emissions, voluntary disclosure, and firm value using data from S&P 500 companies from 2006 to 2008. The researchers find that firm value falls by an average of $212,000 for every additional thousand tons of carbon dioxide emissions. They also show that firms that disclose their emissions have a median value that is about $2.3 billion higher than similar firms that do not. The results suggest that capital markets punish both high emissions and lack of transparency,

underscoring the financial significance of environmental responsibility and disclosure. It is interesting that data from almost 20 years ago already shows the impact of carbon emission on the financial performance of companies.

"Do investors care about carbon risk?" written by Patrick Bolton and Marcin Kacperczyk was published in 2021 (Journal of Financial Economics). Even though the article is only 4 years old, it is cited in 888 papers. This paper investigates whether carbon emissions influence U.S. stock returns. The authors find that companies with higher overall carbon dioxide emissions—and those with increasing emissions—tend to yield higher stock returns, even after accounting for traditional return predictors like size, book-to-market ratio, and momentum. This "carbon premium" cannot be attributed to known risk factors or unexpected profitability. The findings also show that institutional investors selectively avoid firms with high direct emission intensity in a few industries, such as oil and gas or utilities, but this does not fully explain the observed premium. The study contributes to the growing field of climate finance by demonstrating that climate change risk is already being priced into stock markets. It shows that emissions are a significant firm characteristic affecting returns, and that investors are increasingly aware of how carbon regulations and clean energy transitions may impact different firms. Notably, the carbon premium persists across various industries and is unrelated to emission intensity or selective divestment strategies. Instead, the results suggest that investors are demanding higher returns for exposure to carbon-related risks.

The fourth most cited paper was "Green R&D for eco-innovation and its impact on carbon emissions and firm performance" written by Ki-Hoon Lee and Byung Min in 2015 (Journal of Cleaner Production). This paper uses data from Japanese manufacturing companies from 2001 to 2010 to examine how green R&D expenditure affects both financial and environmental performance. The study, which is based on the natural resource-based perspectives, finds that green R&D is a major force behind eco-innovation. The results show that better financial results and reduced carbon emissions are linked to more green R&D. The study highlights how crucial it is for businesses to build distinctive assets and competencies in order to execute successful environmental initiatives and improve overall performance.

"Managing carbon footprints in inventory management" written by Hua G., Cheng T.C.E. and Wang S. in 2011 (International Journal of Production Economics). In the paper they present a model that strikes a compromise between carbon emissions and traditional inventory costs as an alternative to the typical Economic Order Quantity (EOQ) model. The results indicate that the ideal order size usually falls between the amount that minimizes emissions and the EOQ threshold. This illustrates the trade-off between environmental responsibility and cost effectiveness. Price and carbon cap have a big impact on overall costs and order selections. Overall, the results show how cap-and-trade mechanisms force businesses to reevaluate their inventory strategy, offering the possibility of cost and emission reductions under the correct circumstances.

"Two-echelon multiple-vehicle location-routing problem with time windows for optimization of sustainable supply chain network of perishable food" written by Govindan K., Jafarian A., Khodaverdi R. and Devika K. in 2014 (International Journal of Production Economics) and it is 6th most cited article in the research. In response to mounting environmental, regulatory, and social constraints, this study examines the issue of sustainable distribution in perishable food supply chains. A unique multi-objective optimization model is proposed, which incorporates economic and environmental objectives into a two-echelon location-routing problem with time windows (2E-LRPTW). The approach seeks to optimize facility placement, product route, and delivery while reducing carbon emissions and operational costs. MHPV is a hybrid method that combines multi-objective particle swarm optimization (MOPSO) and adapted multi-objective variable neighborhood search (AMOVNS), with two leader selection strategies: grids and crowding distance. Comparative results show that MHPV outperforms traditional genetic algorithms, with crowding distance being the best leader selection approach.

"Environmental Legitimacy, Green Innovation, and Corporate Carbon Disclosure: Evidence from CDP China 100" written by Li D., Huang M., Ren S., Chen X. and Ning L. in 2018 (Journal of Business Ethics) investigates the impact of environmental legitimacy and green innovation on business carbon disclosure in China. It proposes a novel paradigm that combines external (environmental legitimacy) and internal (green innovation) mechanisms. The data show that environmental legitimacy has a negative impact on carbon disclosure likelihood, with green process innovation acting as a substantial mediator—as opposed to green product innovation. The study emphasizes the role of both external and internal drivers in supporting transparent carbon reporting and company sustainability.

On the 8th place is "The Role of the Board of Directors in Disseminating Relevant Information on Greenhouse Gases" written by Prado-Lorenzo J.-M. and Garcia-Sanchez I.-M. from 2010. This article analyses the role of boards of directors in corporate accountability for greenhouse gas emissions, which is an important part of environmental disclosure. The study reveals that boards prioritize traditional economic value generation over broader corporate social responsibility, taking into account board features such as size, activity, independence, and diversity, as well as company-specific aspects such as litigation risk and institutional context. As a result, their approach may impede transparent climate disclosures and the safeguarding of broader stakeholder interests.

"Sustainability assessment of energy systems: Integrating environmental, economic and social aspects" written by Santoyo-Castelazo E. and Azapagic A. in 2014. This paper proposes a decision-support framework for evaluating the sustainability of energy systems by incorporating environmental, economic, and social characteristics using a life cycle approach. The framework for Mexico's future energy supply combines scenario analysis, life cycle assessment, costing, social sustainability evaluation, and multicriteria decision analysis. Eleven scenarios for 2050 demonstrate that business-as-usual, fossil fuel-based routes are

unsustainable. In contrast, scenarios that emphasize renewables and nuclear energy provide better sustainable outcomes by carbon emission reduction, notwithstanding trade-offs, particularly in terms of social repercussions. The framework allows stakeholders to investigate these trade-offs, resulting in more informed and balanced energy policy decisions.

The last article in the 10 most cited paper is "Greenwash vs. Brownwash: Exaggeration and undue modesty in corporate sustainability disclosure" written by Kim E.-H.; Lyon T.P. in 2015 (Organization Science). This article examines how companies misrepresent their environmental performance through greenwashing (exaggerating positive actions) and brownwashing (downplaying them). It extends existing disclosure theory by introducing the idea of unwarranted modesty and examining how stakeholder influence, especially in a changing regulatory environment, influences this behavior. Using data comparing green claims with actual performance, the study finds that firm growth often leads to greenwashing, while deregulation and low profits contribute to brownwashing. Importantly, external scrutiny from NGOs and regulators limits both of these tendencies. The article highlights the dynamic role of stakeholder salience and suggests that other unexamined stakeholders, such as customers, may also play a role.

The most cited papers address a wide range of themes, including board diversity, carbon-related business value, investor behavior, green R&D, inventory management, and sustainable supply chains. This highlights the variety of approaches and analyses of challenges connected to decarbonization, corporate operations, financial performance, and their interrelationships.

To present more detailed information the results of the research mapping of keywords was used. The research was focused on keywords. The keywords with the highest occurrence score are presented in Table 2.

Table 2.
Most frequently occurring keywords

No.	Keyword	Occurrence
1.	carbon emission	928
2.	carbon	685
3.	emission control	520
4.	greenhouse gas	508
5.	climate change	471
6.	greenhouse gas emissions	383
7.	sustainable development	341
8.	environmental economics	287
9.	sustainability	274
10.	commerce	205

Source: Own elaboration based on Scopus databased and VOSviewer.

It can be seen that the "Carbon emission" keyword was the most used keyword in whole analysis. Additionally, 9 out of 10 the most common keywords are connected to environmental issues. It provides information that most of the articles focus more on the carbon emissions itself than influence on other factors. Keywords were also presented as network visualization maps by using VOSviewer software.

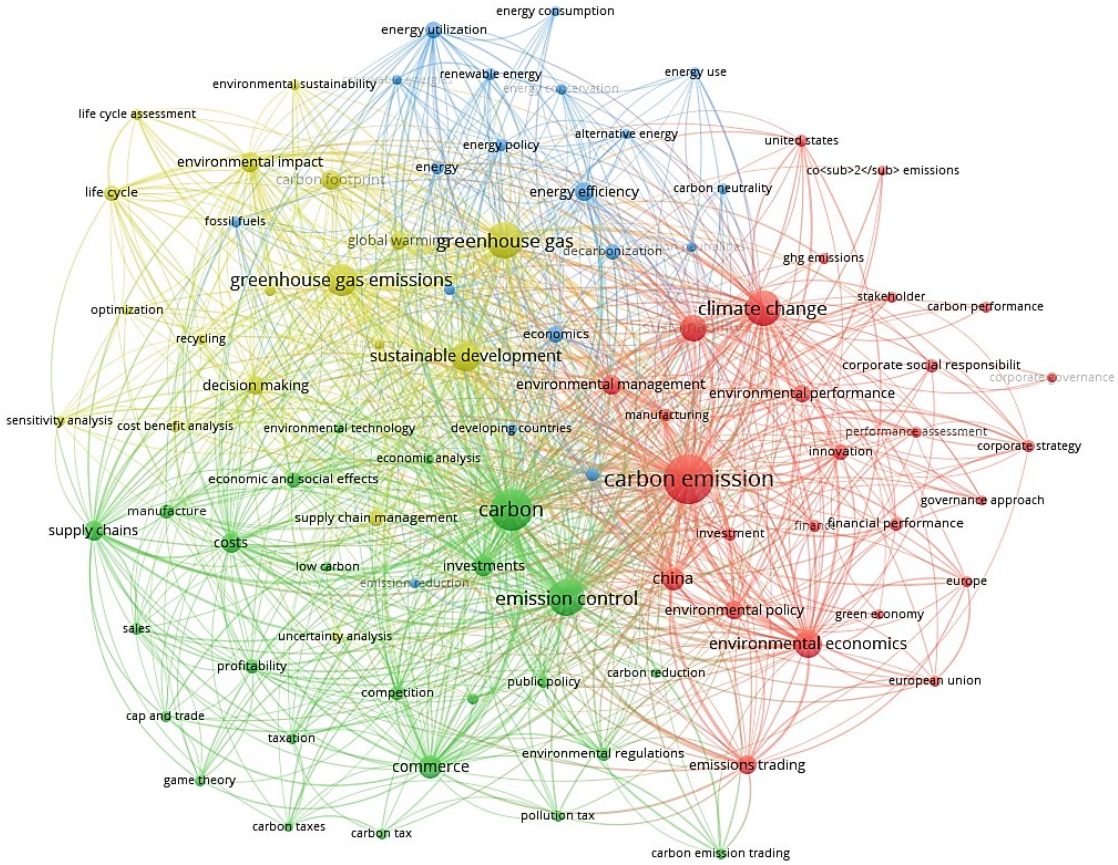

Figure 4. Network visualization map of keywords.

Source: VOSviewer.

This map depicts the co-occurrence network of keywords that appeared in at least forty articles. This enormous number is justified by the fact that there were over 2.5 thousand articles. Each node (circle) represents a keyword or term, and the links between them show how often they appear together in documents. Large nodes (e.g., carbon emission, climate change, carbon) show more frequently throughout the dataset, indicating important subjects. The network is organized into multiple color-coded clusters, with each reflecting a theme group of closely linked keywords:

- Red Cluster:
  - Core keywords: carbon emission, climate change, environmental performance, environmental policy, corporate social responsibility, corporate governance, stakeholder, carbon performance, environmental economics, green economy, corporate strategy, governance approach, investment.
  - The focus is on macroeconomic and governance issues. It focuses on performance evaluation, business behavior and international point of view (e.g., China, European Union, United States). Discussed issues are Important for corporate sustainability because it links firm behavior with regulatory and economic frameworks. It also shows the link between corporate strategies and sustainability corporate issues.

- Green Cluster:
  - Core keywords: carbon, emission control, commerce, costs, competition, profitability, supply chain management, carbon taxes, cap and trade, taxation.
  - Strongly focused on corporate decision-making, economics and market approaches. Relies on economic instruments related to reducing carbon dioxide emissions.
- Yellow Cluster:
  - Core keywords: greenhouse gas, greenhouse gas emissions, environmental impact, life cycle, life cycle assessment, fossil fuels, recycling, decision making.
  - Focused on quantification of environmental impacts, assessment methodologies, life cycle and environmental technology. Focuses on the technical basis of sustainability claims.
- Blue Cluster:
  - Core keywords: energy, energy policy, renewable energy, energy efficiency, energy use, carbon neutrality, decarbonization.
  - It includes technical and political strategies to reduce emissions. It focuses on energy-related issues such as renewable energy sources, as well as the power sector.

These studies show that corporate sustainability lies at the intersection of regulation, finance, public image, and operational efficiency. They describe decarbonization in various areas and are considered on many levels.

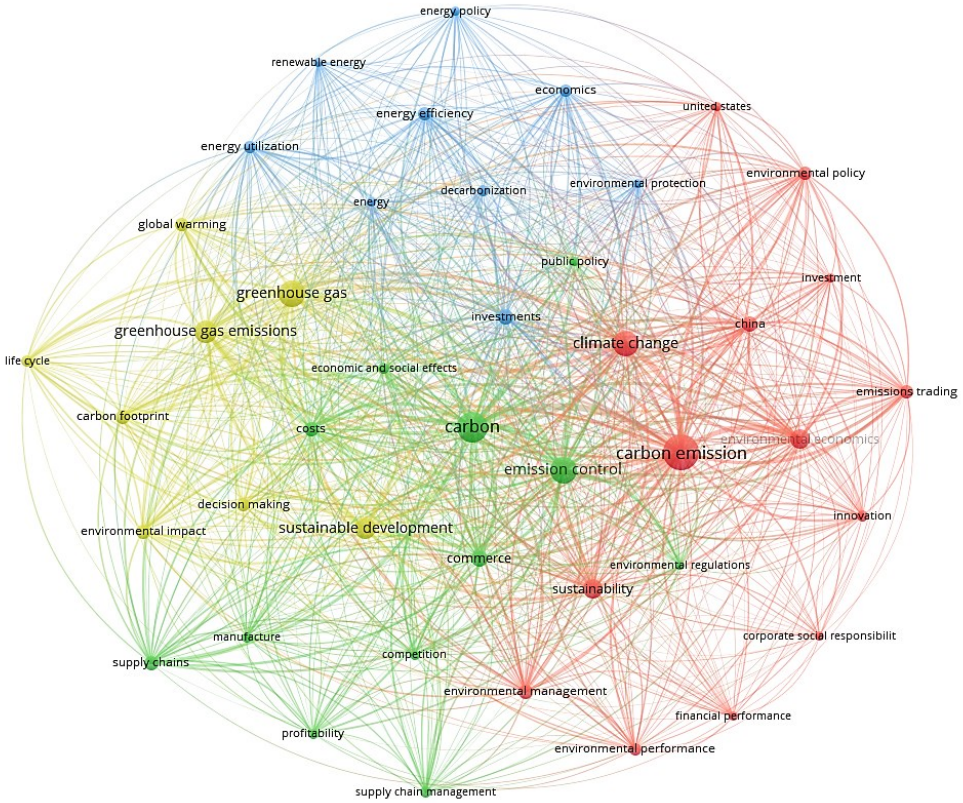

Figure 5. Network visualization map of keywords.

Source: VOSviewer.

Based on the map were keywords are occurred in at least sixty papers it can be seen also four clusters:

- Red Cluster:
  - Core keywords: carbon emission, climate change, environmental policy, emissions trading, China, United States, environmental performance, investments.
  - Focuses on politics, major economies (USA, China) and regulatory frameworks. Focuses on macroeconomics. Also focus on environmental performance and investments as a important part of the financial performance.
- Green Cluster:
  - Core keywords: carbon, sustainable development, commerce, environmental management, supply chain management.
  - Emphasizes corporate sustainability, economics, and business practices around carbon and sustainability.
- Yellow Cluster:
  - Core keywords: greenhouse gas, greenhouse gas emissions, carbon footprint, life cycle, environmental impact.
  - Related to environmental impact assessments, life cycle analysis, and emission metrics.
- Blue Cluster:
  - Core keywords: energy policy, energy efficiency, renewable energy, decarbonization.
  - Focus on energy systems, policy frameworks, and transition to renewable energy.

Carbon, carbon emissions, and climate change are at the heart of the network, serving as links across all clusters. These are the most integrative and widely discussed notions. Even if the code included phrases relating to business activity, they were less popular. The majority of the papers focus on decarbonization. According to the studies, there were some areas which were common for both maps.

- strategic and managerial perspective, focusing on macroeconomic development,
- supply chain assessment and operational management,
- energy and transformation,
- and technological innovation and renewable energy sources.

Based on this research, it can be seen that despite the large number of analyses, the majority of articles address issues related to carbon emissions and sustainable development. There are fewer articles that are based on the company's performance, its factors in the light of decarbonization, and the determinants related to corporate decarbonization are not addressed. In this context, research should focus on this part of the analysis to provide a broader picture of the companies' reactions to reducing carbon emissions.

5. Conclusions

The paper examines the relationship between corporate decarbonization initiatives and firm performance, with a focus on the changing importance of ESG (Environmental, Social, and Governance) strategies. It demonstrates how regulatory developments, particularly the European Union's Green Deal and the Corporate Sustainability Reporting Directive, have pushed major and listed corporations into non-financial reporting, with decarbonization as a main focus.

The bibliometric analysis of 2650 papers identified in the Scopus database using VOSviewer enabled a comprehensive mapping of the academic landscape related to decarbonization and corporate financial performance between 2010 and 2024. This approach allowed for the identification of core research clusters and the most influential articles in the field. To explore the financial implications of corporate decarbonization efforts, the ten most cited articles were examined. These articles confirm that decarbonization, when strategically implemented, is not only environmentally necessary but also financially beneficial. In line with these findings, the keyword co-occurrence analysis revealed several dominant thematic clusters. The red cluster, for instance, connects terms like carbon emissions, corporate strategy, and financial performance, suggesting that governance and strategy are key mediators in the decarbonization-performance relationship. The green cluster highlights terms such as commerce, profitability, and supply chain management, pointing to operational-level responses and economic optimization linked to emissions reduction. Meanwhile, the blue and yellow clusters focus more on the technological and assessment frameworks underpinning decarbonization.

Key findings reveal that, while decarbonization is often discussed, few studies have looked directly at its impact on corporate performance or the factors that drive it. Thus, the article identifies a research gap and encourages future studies to delve deeper into the strategic and financial performance consequences of business decarbonization. This analysis is theoretical. Future research could be based on empirical analysis of companies and the real impact of decarbonization on the activities of companies. Taken together, the analysis suggests that decarbonization initiatives—particularly when transparently disclosed and aligned with governance best practices—can enhance firm reputation, reduce risk, and improve access to capital, ultimately leading to stronger financial performance. However, further empirical research is required to explore causality, sector-specific impacts, and long-term performance metrics.

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