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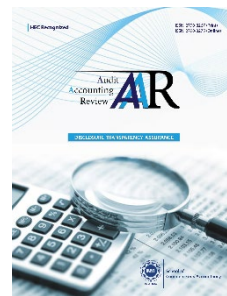
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**Title:** Mapping the Impact of Green Finance on Corporate Sustainability: A Bibliometric Analysis

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# Mapping the Impact of Green Finance on Corporate Sustainability: A Bibliometric Analysis

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## Abstract

This study examines the impact of green finance on corporate sustainability during the period 2015-2024. The study utilizes the systematic literature review approach based on 120 articles published during the above-mentioned period. These articles were obtained from the Scopus database which include themes regarding green finance and corporate sustainability. Bibliometric analysis was used to determine the intellectual evolution of thought in these articles, while their citation patterns were mapped using VOS Viewer software. The theme of green finance exhibited a significantly positive impact on digital finance mechanisms, policies, and programs, making it instrumental in promoting corporate sustainability. Specifically, it was established that firms utilizing green finance are more likely to invest in energy efficiency and other environmentally friendly technologies and also employ sustainable practices. Some other factors were found to stand in the way of consistent performance, such as financial constraints and regional differences. However, policy calibration is a highly promising way of averting such limitations. In this regard, policymakers and researchers need to develop effective green financing policies. They also need to ascertain the nature of the market and environmental problems they seek to solve. Businesses that have to take strategic investment decisions informed that green finance has a consistently positive impact on corporate sustainability, showing a better environmental performance that ensures sustainability and competitiveness for an extended period of time. Moreover, investors and fund managers need to consider green finance, since the existing evidence suggests that it would have positive outcomes and would bolster sustainability patterns. This study synthesizes the literature on green finance in corporate sustainability and provides extensive evidence regarding the issue, as well as some important

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implications and future research directions. It also provides important lessons and implications of green finance among developing countries, especially in China.

**Keywords:** bibliometric analysis, corporate sustainability, green finance, sustainability, Sustainable Development Goals (SDGs)

## Introduction

This systematic literature review suggests a consistent positive influence of Green Finance (GF) on corporate sustainability performance (Ahmed et al., [2024](#)). The various research methodologies synthesized in this review demonstrate that green finance, whether in the form of digital finance or through green financial policies, is a driver for positive environmental results (Agrawal et al., [2023](#)). Firstly, it promotes the adoption of green technology, innovation, and development of green products and services (Makeeva et al., [2024](#)). The interconnectivity between green finance, green technology, and green innovation is expounded (Zhang & Liu et al., [2022](#)). Secondly, green finance simultaneously doubles energy efficiency, lowers environmental degradation intensified through energy reliance, and drives environmentally ethical behavior among companies (Xu & Zhu, [2022](#)). Thirdly, it extends beyond purely economic considerations to contribute to achieving Sustainable Development Goals (SDGs) by positively cultivating environmental and societal change. Despite the evident positive impact, challenges persist in the form of financial constraints and regional disparities. Policy interventions, such as green finance pilot zones are recommended to overcome some of these barriers and help to accelerate progress (Lee, [2020](#)).

The ultimate impact of green finance goes beyond individual projects and helps to shape policy development, corporate sustainability strategies, investment choices, and the direction of future research (Zheng et al., [2021](#)). This supports the notion of a combined effort, which ensures that environmental considerations must be included in every financial endeavor. The development of green finance in China has made unprecedented achievements possible, providing an important reference point and practical experience for the international community to address environmental challenges, promote sustainable economic development, and achieve inclusive financial growth (Lee, [2020](#)). Additionally, this review enhances the current knowledge regarding these processes by analyzing the

multidimensional setup of how green finance affects environmental and innovative performance of companies. The results further affirm the interconnectedness of green finance, technical change, and sustainability outcomes in different countries, particularly in China and beyond, moving past the overly simplistic views of such interactions as linear cause-and-effect relationships.

The findings of this review have several implications for researchers, as well as policymakers and practitioners interested in understanding how green finance fosters environmental sustainability and innovation across diverse nations (Mudalige, [2023](#)). Green finance has become a key response to the increasing gap between economic growth and existing environmental and proximal challenges, globally. This is a financing approach that directs investment resources to projects through which economies can simultaneously grow and meet environmental conservation goals and fairness in different spheres. This has been necessitated by the inability of existing financing sources to meet the enormous capital needs for low-carbon changes and to engage in environment-friendly economic activities, making existing funds inadequate to finance this journey (Li & Umair, [2023](#)). The inadequacy of available means to meet this high investment amount has imposed increased risk perceptions on such projects, thus the realization of the efforts of individual economies to address the debt to zero discourse.

Green finance has become a key response to the increasing gap between economic growth and existing environmental and proximal challenges, globally (Li & Yang, [2022](#)). This gap has led to increasing adverse effects, which include increased energy requirements, unsustainable resource utilization, environmental pollution, climate change, and social evils such as inequality and the repercussions of excessive consumption. This strategy aims to develop and enhance sustainable development by incorporating environmental and social factors in financial execution. Through this strategy, financial resources would be directed toward projects that may contribute to the required economic development, as well as those that would ensure environmental protection and fairness. Green finance is a significant instrument for achieving SDGs. As emphasized by Sachs et al. ([2019](#)), “developing countries are confronted with daunting challenges to find a durable solution to the compelling socioeconomic, and environmental problems.”

Green finance provides an opportunity to allocate financial resources to the projects that support SDGs. This would ensure positive impacts on numerous issues, from education and healthcare to renewable energy, from sustainable infrastructure to poverty alleviation (Bhatnagar & Sharma, [2022](#)). While, there are numerous papers available on the topic, the majority of them refer to the developed world. Hence, there are enormous gaps in understanding the efficiency of green finance in less industrialized and developing countries. Some of these countries experience severe problems with sustainable infrastructure and are more vulnerable to climate change. Thus, a new avenue should be pursued to understand how green finance should be developed or adjusted for these regions.

The concept of sustainability has often functioned merely as a buzzword in scientific discussions and practices. This approach results from the overarching interpretations of sustainability used in different contexts. The most relevant and commonly accepted definition of corporate sustainability includes the development and performance of business strategies and practices that meet the present needs with a view to preserve, support, and improve human and natural resources in the future in order to provide for future generations (Gilchrist et al., [2021](#)). This definition is applicability to formulating coherence between ecological, social, governance, and economic sustainability.

Green finance is often used to understand corporate sustainability, which should not be described as a synonym. Beyond the assumption that sustainability is an appropriate add-on to any company's practices, green finance, being a part of the whole sustainability, has to be embodied in its different dimensions (Ng, [2018](#)). Ecological practices should take the environment into account and maintain balance between extraction and waste removal or the use of the resources that can be decayed, including organic materials and other products; social issues use the information on social equity, the well-being of employees and communities, and their human rights; governance regulates the use of voluntary and standardized demands on ethics and transparency; and economic sustainability ensures long-term balance with financial concerns. To conclude, instead of being contained in the scope of what companies usually do, sustainability has to be considered in the context of regular demands. Any company that focuses on these dimensions can contribute to sustainable future (Ng et al., [2021](#)).

## Literature Review

Green finance includes a wide range of financial activities in the arena of environmental projects and actions. Green finance is connected with financial investments aimed at sustainable development, environmentally-friendly products, and creating a sustainable economy (Madaleno et al., [2022](#)). While interchangeably with "green investment", green finance is distinct from climate finance. Climate finance is devoted mostly to achieving the overall environmental goals, including pollution, water, and biodiversity, thus reinforcing the related production/service expenses into a comprehensive framework. It clarifies the intricate processes involving green finance in industrial transformation and seeding innovation in green technologies (Li & Umair, [2023](#)). A new generation of studies underscores that digital finance and green financing policies intertwine in a complex mix of factors which shape the drive for sustainable industrial transitions, as well as the development and deployment of green technologies and climate change mitigation. This requires a comprehensive lens if we are to better understand the workings of the financial system in promoting and achieving environmental sustainability. A number of researches have confirmed that green financing is essential for the accelerated development of renewable energy, since it would allow industrial transformation and innovation in green technology (Li & Yang, [2022](#)).

Moreover, many previous studies also explored the impact on carbon emissions reduction within pollution-intensive industries. Moreover, energy efficiency correlates in Chinese cities with coal-electric power supply chains; this highlights the importance of leveraging green financial policies to maximize private benefits (Liu et al., [2020](#)). Furthermore, green finance could improve the efficiency of water resource utilization since it heralds a new era for sustainability with a focus on driving environmental solutions soaked in innovation (Li & Umair, [2023](#)). Green finance is a powerful force to promote sustainability development and also plays an important role in the sustainable development of agriculture, thus increasing agricultural productivity and environmental performance. Based on the data from the Agricultural Comprehensive Statistical Report of China, this study explores the possibility of digital inclusive finance for empowering agricultural productivity and environmental practices in China (Sheng et al., [2021](#)). Digital finance was cited as facilitating the access of farmers to financing for sustainable practices.

Green finance can be enhanced to help China eradicate agricultural carbon emissions (Weston & Nnadi, [2023](#)). Financing options that encourage the use of environmental sustainability practices have significant impact on China's broader economic development (Li & Umair, [2023](#)). Green finance allows for Economic development without harming the environment. This raises the question how green finance connects with FinTech and sustainable growth. Achieving economic and environmental goals is possible when using technology and expanding the availability of financial services. A study extends this concept to South Asian countries, emphasizing the link between green finance, FinTech, and sustainable development beyond China's borders (Zhang, Saydaliev, et al., [2022](#)). Enterprise behavior and green innovation examines how green finance policy impacts green innovation and firm polarization with in China (Xu & Zhu, [2022](#)). Financial incentives drive companies toward sustainable practices. Hence, it is worthy to explore how a company's reliance on external financing affects its environmental, social, and governance (ESG) performance in China. In short, green finance serves as a catalyst for sustainable agriculture, economic growth, and innovation, shaping enterprise behavior toward environmentally responsible practices (Udeagha & Muchapondwa, [2023](#)).

The literature emphasizes that the relationship between corporate sustainability and financial performance is not a simple one-way dependency. Instead, it is a multifaceted and multidirectional interaction. Researchers recognize that various factors at both the organizational and macro-business environment levels shape this relationship. Organizational-level factors include sustainability strategies in which companies' deliberate sustainability efforts impact financial outcomes (Khan, Riaz, et al., [2022](#)). Innovation capabilities, especially in green technologies, influence both sustainability and financial performance. Country level sustainability expectations are influenced by Macro-business environment factors and stakeholder expectations vary across nations. Companies operating in different countries face distinct sustainability norms. Regulatory frameworks, government policies, and regulations play a significant role in shaping corporate behavior. Industry specific characteristics pose unique challenges and opportunities related to sustainability and financial performance (Hussain et al., [2023](#)).

Green finance and climate change mitigation demand urgent action. The ecological balance is under threat, necessitating immediate measures. Key determinants for limiting climate change effects include mobilizing funds for environmentally-friendly projects (Deng & Zhang, [2023](#)). The bond market is another fundamental avenue that can be used by public and private institutions to finance such projects. Policymakers have used the bond market as a tool for financing climate-friendly projects. Green Bonds (GBs), which enable policymakers to finance sustainable projects designed by project developers and planners, have become a common green finance product (Udeagha & Muchapondwa, [2023](#)). GBs are a specialized form of pooled investment that helps investors direct their investments to industries that reduce carbon emissions or promote ecological balance (Volz, [2018](#)). On the other hand, these bonds are fundamentally different from traditional bonds in that the bond holder seeks such opportunities for financing or refinancing that have the potential to contribute to a lower carbon economy or the restoration and maintenance of ecological balance (Sachs et al., [2019](#)). Primarily, these bonds aim to lower the adverse effects of climate change by ensuring that GB-invested projects develop methods that reduce carbon outputs or respiratory systems.

The money raised from GBs can only be used in projects or activities that reduce carbon outputs and improve the respiratory system (Gilchrist et al., [2021](#)). This also provides financial benefits to the initiator firm and helps the managers boost its net income, while cutting portal parties' net costs. The market has expanded substantially since the European Investment Bank's recent publication of GBs in 2007. In 2019, the GB volume rose to a record \$250 billion, including project developers and planners from numerous nations. Despite this growth, GBs still represent a small fraction (0.5-1%) of the total bond market, indicating significant untapped potential (Ma et al., [2023](#)). Investor confidence is crucial for GBs' success. Investors trust that capital raised through GBs would be exclusively used for green projects. As this trust grows, more investors are likely to participate in the GB market. GBs contribute to achieving SDGs by fostering green innovation (Li & Umair, [2023](#)). To conclude, firms benefit from improved overall environmental, social, and governance (ESG) performance through the availability of green finance (Weston & Nnadi, [2023](#)).



## Research Gap

There is a dire need of a template for intermediating the nexus between green finance and firm sustainability performance, a topic less understood in developing economies. The literature available in this regard has largely discussed the free correlation between green finance mechanisms and sustainability outcomes (Ameer & Khan, [2023](#)), though keeping in view the prevailing financial constraints and regional disparities. Still, the exact nature of this unique relationship remains unexplored (Cui et al., [2020](#)). The mechanism is not comprehensively understood, and more so how specific policy interventions can be employed to address the challenges and facilitate green finance and sustainable practices at scale (Wang et al., [2022](#)). Likewise, it is also imperative to assess the designing and introduction of such interventions in different countries and regions of the world, which would be useful for policymakers, businesses, and investors (Dai et al., [2022](#)). Hence, it is essential to have a more in-depth understanding of the reasons for this relationship between green finance and corporate sustainability performance (Wang et al., [2023](#)). These questions are crucial to answer in order to better understand the barriers and limitations that might impede the actualization of the total benefits of green finance for sustainable development and then, for corporate sustainability performance (Steuer & Tröger, [2022](#)). This would allow to enrich the current understanding regarding green finance and corporate sustainability, especially in developing economies such as Pakistan, where limited research has been conducted in this area (Mumtaz & Smith, [2019](#)).

## Research Questions

1. What are the key findings from the existing literature about the impact of green finance on corporate sustainability performance, particularly in developing countries?
2. How do financial constraints and regional disparities mediate the relationship between green finance and corporate sustainability performance, according to the existing literature?

## Research Objectives

1. To investigate the relationship of green finance with corporate performance on sustainability.

2. To analyze how financial constraints mediate green finance's effectiveness to drive sustainability outcomes.

## **Research Methodology**

### **Data Collection**

The data for this research was obtained from the Scopus database and scientific journal articles. The search was conducted based on all subject areas covering the scope of green finance, on sustainability. The data was searched for a ten-year period, that is, from *2015-2024*, with the aim to present all-new initiatives, studies, and developments in green finance.

### **Document Type**

A total of 145 documents were listed as search results, with each document considered as a valuable source of data for the current research.

### **Access Data and Access Account**

Data was retrieved on March 31<sup>st</sup>, 2024. During the search, 145 documents were retrieved from the Scopus database and scientific journal articles.

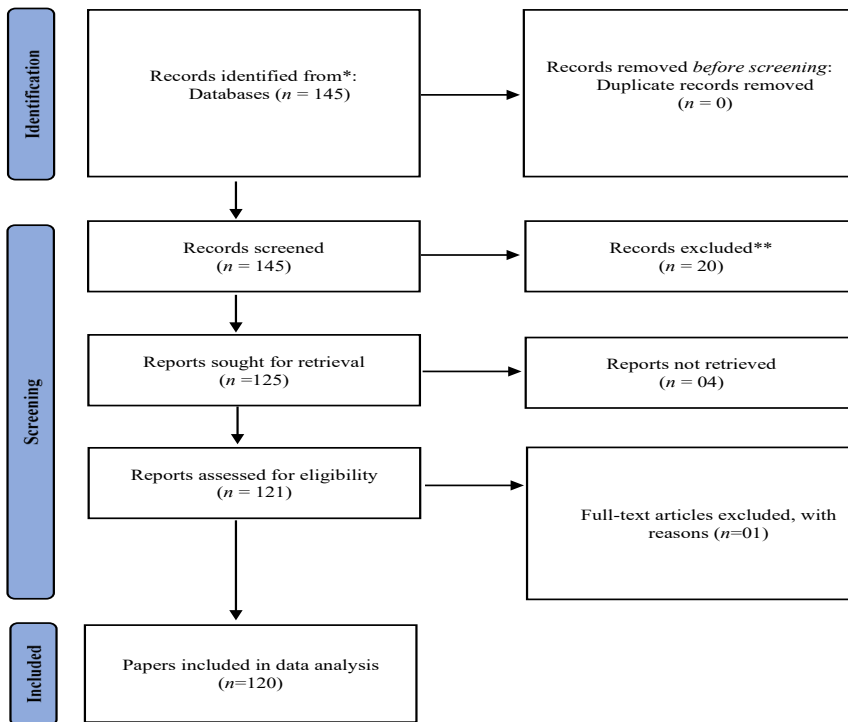
### **Source Type**

The “Stage” filter was used to monitor quality and accuracy of sources for publication. The selected articles were published in Scopus database and several academic journals including Journal of Open Innovation: Technology, Market, and Complexity, The Asian Journal of Shipping and Logistics, Sustainable Development, Journal of Risk and Financial Management, Business Strategy and the Environment, Journal of Innovation Management, SSRN Electronic Journal, Resources Environment and Sustainability, Energies, CSR, Sustainability, and Ethics & Governance. The respective search provided 145 academic journal articles for this research.

### **Final Filtered Documents**

Based on the determined criteria and filters, the number of relevant documents included **120** publications. The filtered results retrieved from the scientific journal articles formed the basis for the subsequent analysis and findings.

**Figure 1**  
*PRISMA Diagram*

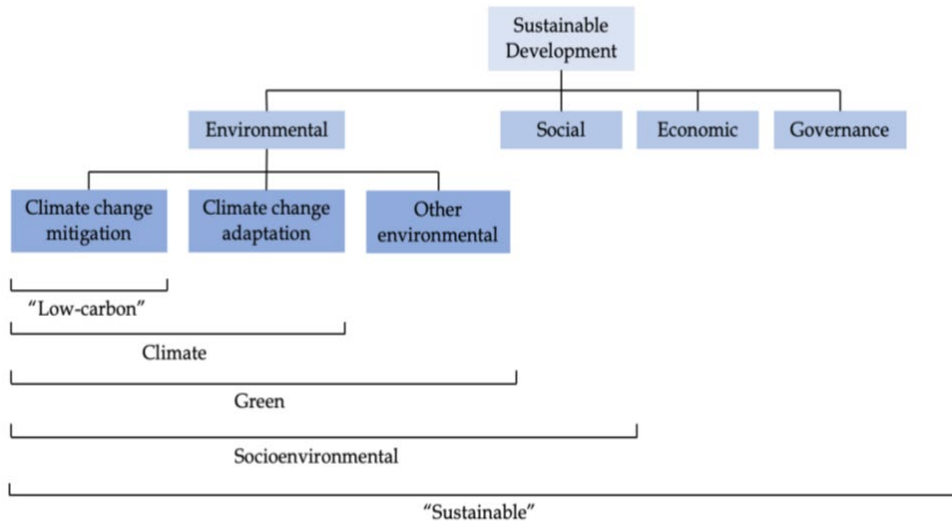


The identified keywords were “Finance,” “Sustainable Development,” “Green Finance,” and “Innovation.” The search was limited to the English language and journal papers. In sum, 120 papers met the selection criteria. The process of identification and screening of relevant works is depicted visually via the PRISMA diagram, as shown in Figure 1.

**Table 1**  
*Primary Information of the Article Set*

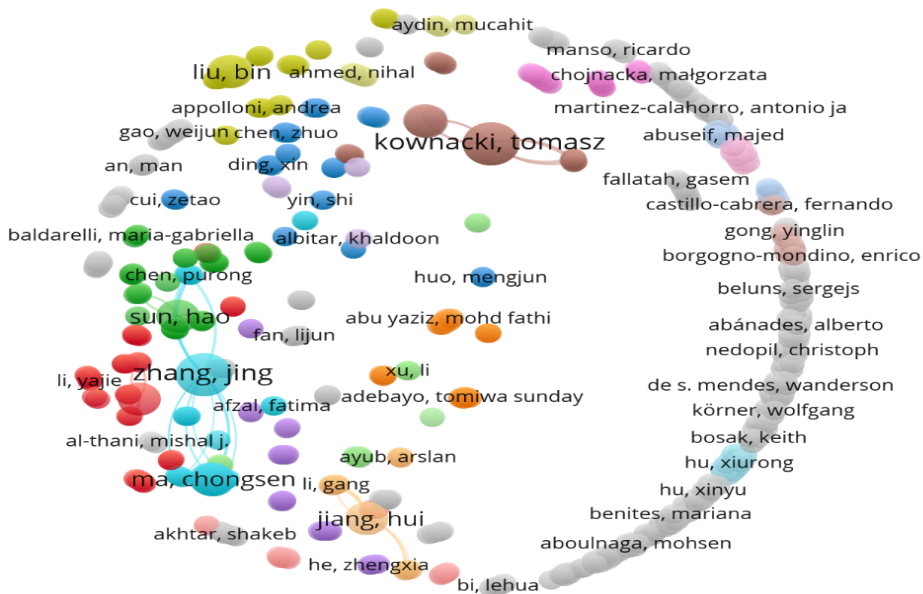
Description	Results
Timespan	2015–2024
Sources	60
Journal articles	120
Countries	24
Average citations per article	4
Authors	181
Organization	93

**Figure 2**  
*Sustainable Development*



**Bibliometric Analysis**

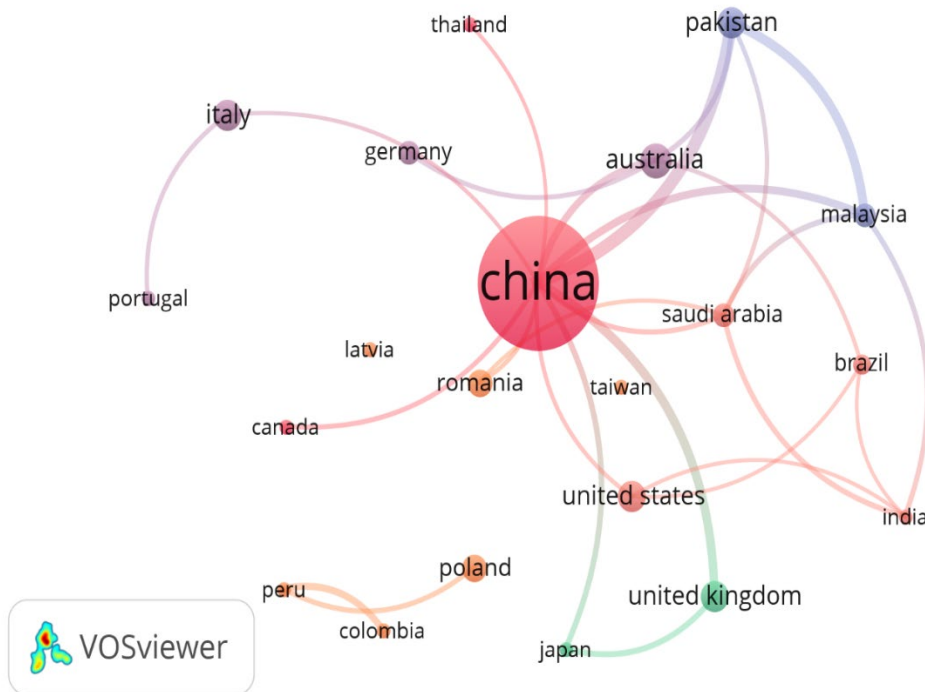
**Figure 3**  
*Authors' Bibliographic Link*

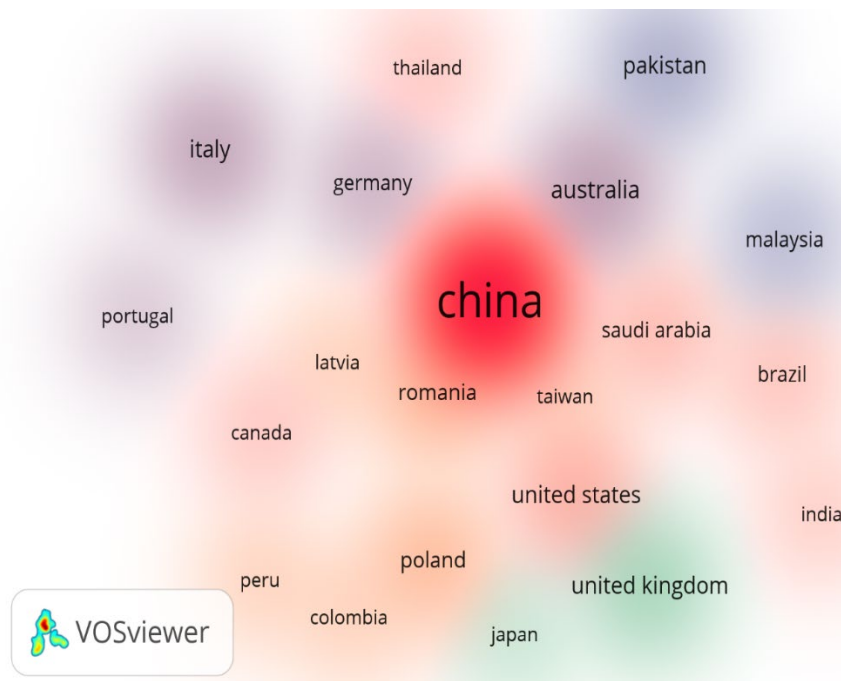




specific role of finance for green growth. The diversified structure of the diagram demonstrates that green finance is also diversified. A study by Liu et al. (2020) highlighted the crucial role of collaboration among green finance researchers in achieving comprehensive understanding of data across diverse dimensions. The diagram shows the diverse nature of the researches done by the authors. The various aspects of research comprise environmental, social, and economic aspects. The various connections between the nodes show the collaborative efforts among the authors involved in related researches. The node connections enhance the transfer of knowledge, spreading of ideas in research, and possible partnerships in various research areas. Some research on sustainability indicates that the relationships among the researchers enhance knowledge and information sharing.

**Figure 4**  
*Countries Bibliographic Link*

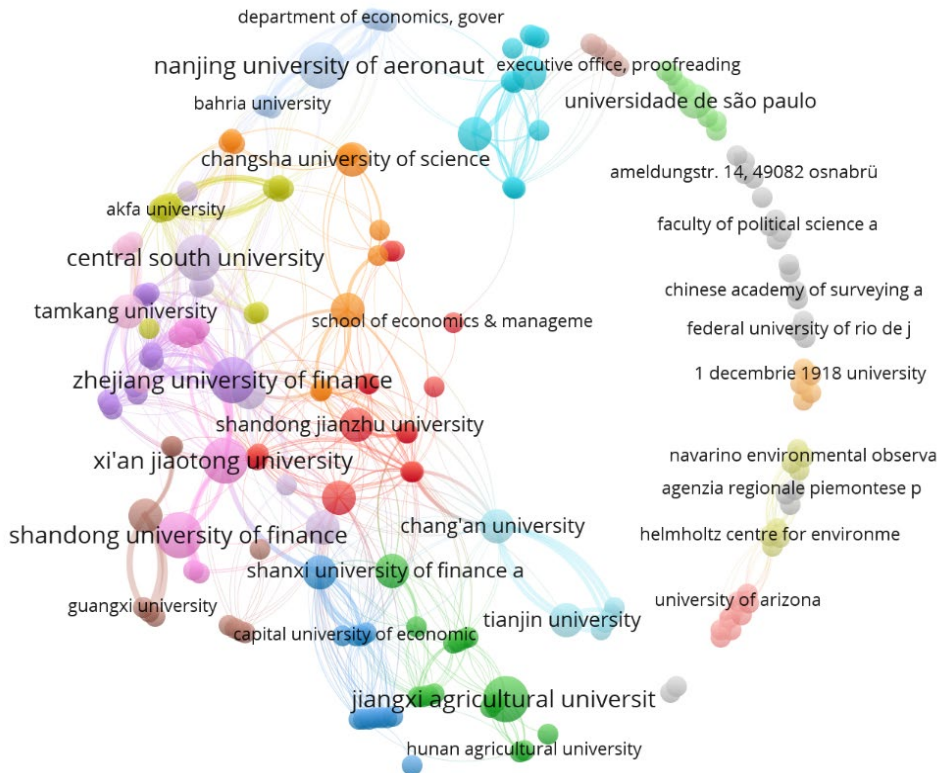




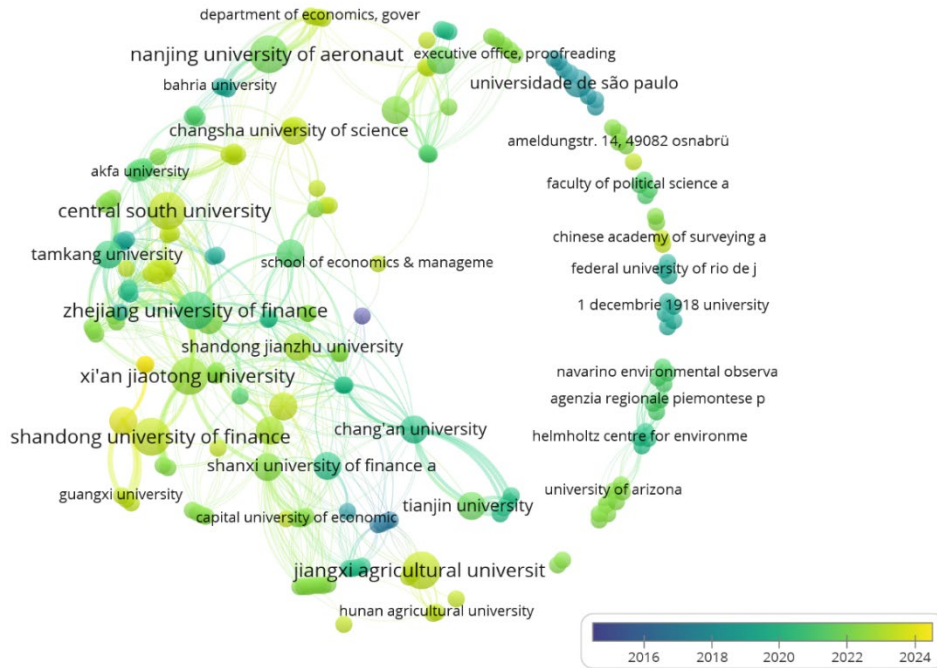
The above visualization of the research contributions of various countries in green finance and sustainable development paints China as the dominant player, closely trailed by the United States, the United Kingdom, and Germany, which are other leading contributors and investors in the two categories. Additionally, the connection created between the UDCs and green finance and the UDCs and development highlights the near-but-distant relationship between green finance and sustainable development. At a glance, science leaders have played a massive part in funding or facilitating the projects by providing startups or fully funded large-scale projects designed to increase energy efficiency, reduce greenhouse gas emissions, and revolutionize green farming and agriculture projects (Xu & Zhu, [2022](#)). However, countries have also realized that green financing plays a large part in job creation and fueling growth. However, the nations that are linking the two fields indicate that one without the other might be more viable or achievable, although they all have achieved new success-bound economies that many researchers believe are the way for other nations. The visualization in the map-form uses varied-sized dots to indicate or demonstrate the research involvement of different countries in various categories. Estonia's dot is the most prominent, followed closely by

Canada's, and others. The dot size decreases when the ranking goes down, indicating lower research involvement. The mapping shows the overview of the world wide-research engagement in the field. It remains essential in making decisions and choosing the countries that carry out research since it shows both the active and inactive countries. The visualization can assist the policymakers in identifying research resources across countries that fostering research growth and identifying potential collaborators. Li and Umair (2023) provide insights into the global trends and challenges in green finance and sustainability development, highlighting the importance of international collaboration and knowledge exchange.

**Figure 5**  
*Organizations' Bibliographic Link*



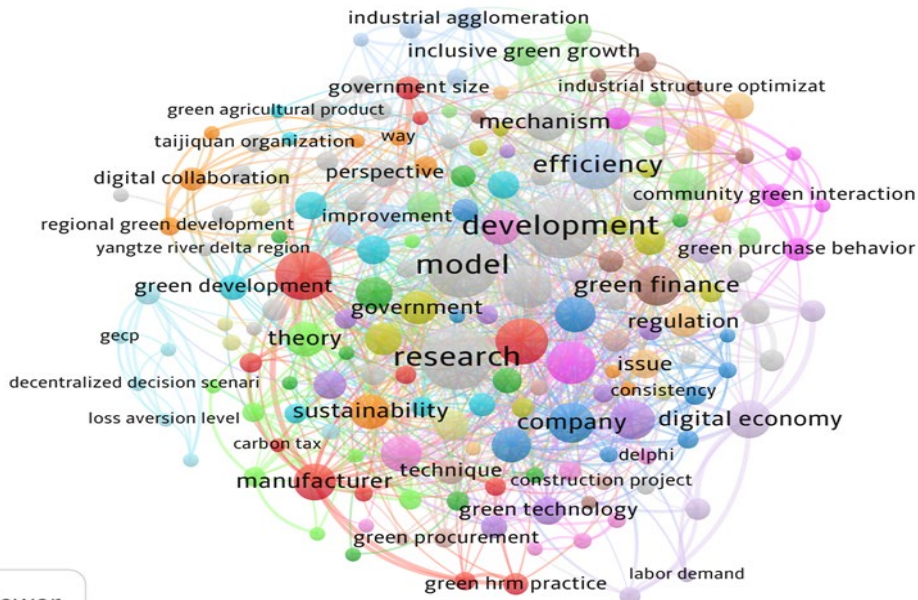




The above visualization indicates the relationships between various organizations regarding research in green finance and sustainable development, as well as the size and topics of each institution’s output. The size of the nodes represents the number of publications from the respective organization and the color represents the research field. The relationship strength is illustrated via the lines between nodes. According to the above visualization, the leading organization in research in green finance and sustainable development is the University of Cambridge, since it has the largest number of publications. The other two most significant organizations in the given field after the University of Cambridge are Oxford University and University of California, Berkeley. Considering the publication numbers and relationships with other institutions, the most crucial organization in this field is the University of Cambridge – it has more publications than any other institution and the most significant number of collaborations with other organizations. Oxford University and University of California, Berkeley also have a large number of publications and facilitate a great deal of collaboration with other institutions. The analysis of the visualization data showed that the leading organizations have numerous relationships with co-authorship, which means that the most

prominent institutions do have robust relationships and work on the research projects with one another. Another common trend comprises the relationships within the country – the visualization depicts the relationships between University of Cambridge and other UK-based institutions, such as University of Manchester, University of Leeds, and University of Southampton. Therefore, the visualization supports the idea that research in green finance and sustainable development is a global scenario, indicating that the most prominent organizations do have active involvement in different countries. It is of particular importance to such fields as green finance and sustainable development, where comprehensive and broader research is necessary to maintain their multidisciplinary nature. Economists, environmental scientists, engineers, social scientists, and other researchers need to make a unified effort to create a comprehensive approach for research in green finance and sustainable development. Ultimately, the visualization above suggests that there is sufficient research in green finance and sustainable development these days. However, the challenges that these two disciplines represent require a broader focus group, therefore, interdisciplinary research should be a priority for future research in green finance and sustainable development.

**Figure 6**  
*Keywords Co-occurrence Analysis*

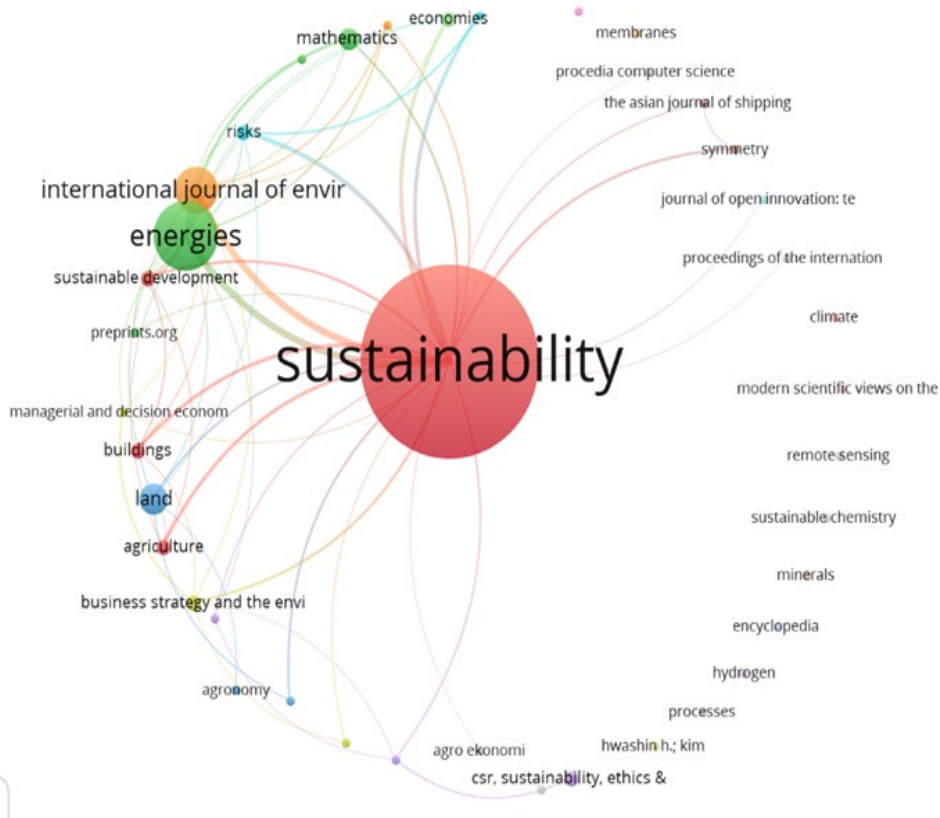


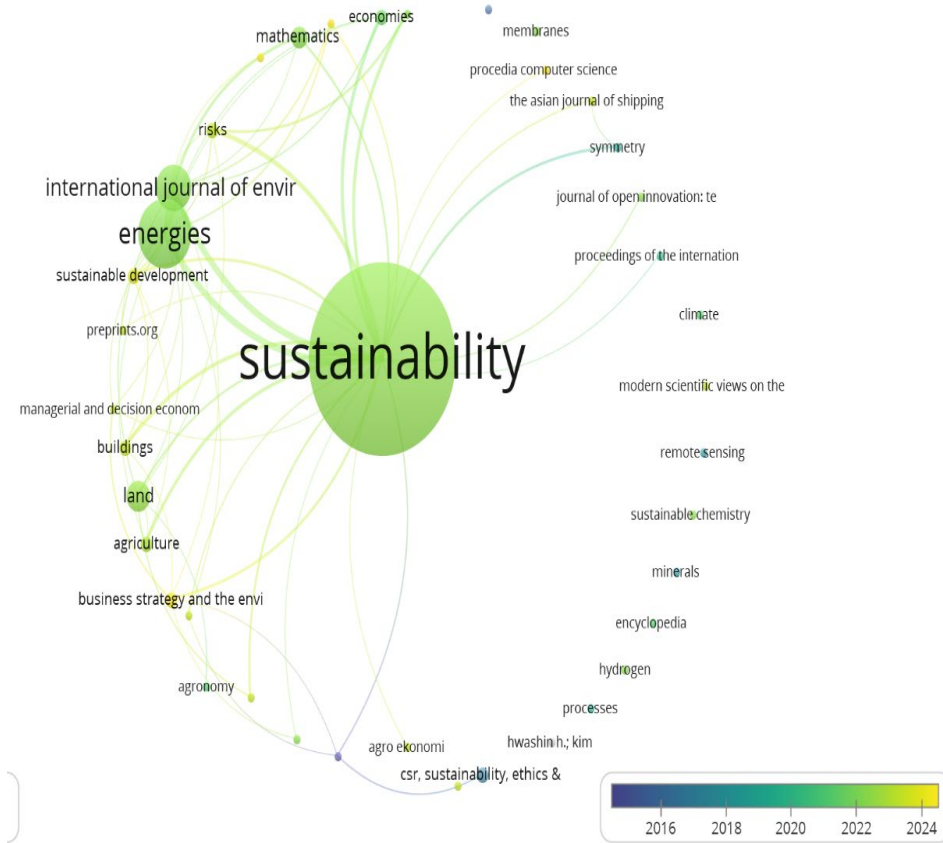
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green finance, whereas the purple cluster suggests more technical and niche areas of work (Madaleno et al., 2022). The interconnectedness of these clusters illustrates the complex and multidimensional character of green finance in shaping corporate sustainability. It shows the engagement of a broad range of stakeholders, from government to firms and the financial sector, and also reflects the consideration of environmental factors in different areas of finance and corporate strategy (Khan, Akbar, et al., 2022).

**Figure 7**  
*Journals'/Articles' Bibliographic Link*





This research provides the comprehensive bibliometric analysis of the existing research on the impact of green finance on sustainability and its connections to various sectors. In this regard, the relationships between the keywords and journals have been mapped using the software VOS viewer which aims at visualizing and analyzing bibliometric data. The keyword clouds show that the central issue is sustainability, underlined by clouds size and the connections with other keywords. By sharing the key findings, it is also possible to notice that the concept of sustainability is currently investigated through the lens of multiple disciplines, such as economics, finance, technology, and environmental science. From the list of keywords, it can be noted further that ‘green finance’ and ‘CSR, sustainability, ethics and governance’ based keywords are indicative of the surge in emphasis on both the financial and ethical perspectives, within the field of sustainability research. This analysis also helps to determine some of the relevant journals

on the topic, such as *Journal of Open Innovation*, *The Asian Journal of Shipping and Logistics*, and *Journal of Risk and Financial Management* to mention a few, in order to show the vast area that researchers have covered. This selective review of literature in the subject area offers a glimpse of what researchers are currently doing in sustainability. It brings out the shift towards a more environmentally conscious approach to tools such as green finance and a focus on ethical aspects. The study reveals that the existing research is focused on the subject matter from multiple fields and indicates that there is a need to foster a professional approach to deal with the issue of sustainability.

This analysis examines the existing literature regarding the impact of green finance on corporate sustainability, focusing on two key objectives. The existing literature presents a robust positive relationship between green finance and increased corporate sustainability performance (Ma et al., [2023](#)). This positive impact is achieved through various channels and realized through different avenues. The first is increased investment in green technologies. Green finance facilitates more green innovations and enhances the pervasiveness of the application of green products and services, thereby making the best use of energy and ensuring the least negative impact on the natural environment (Velte, [2023](#)). The second comprises enhanced environmental protection measures. According to Mustaffa et al. ([2021](#)), green finance gives firms a new environment friendly business orientation, hence takes a giant step towards changing the environment of the business. The third is improved energy efficiency. Green finance involves promoting the employment of energy efficient products and processes or the reduction of carbon emissions and resource consumption (Ma et al., [2023](#)).

When it comes to the given model of research, financial restraints can be seen as an intervening variable that lies between the broad environment or the factors at play in it and the business level strategy and organizational performance. It is possible to promote the necessity of taking into account mediators in establishing the relationship between green finance and sustainability performance; while the position of financial constraints is rather limited, the position of mediators is less clear. For example, there are findings which depict that green finance performance faces financial challenges (Zheng et al., [2021](#)). The literature reviewed in this paper is substantive in supporting the assertion that green finance determines

corporate sustainability performance. However, the analysis highlights the necessity of a more detailed investigation of financial constraints as a mediator. The mass understanding of green finance and financial limitations affecting those determinants of sustainable development would help to grasp economic success and sustainable goals for green policies, as well as successful practices to be designed and to prove their positive impact on both aspects of sustainability (Mahran & Elamer, [2024](#)).

## Conclusion

The literature review explicates the relationship between green finance, technological innovation, and environmental sustainability, particularly in China. There is much information available on this matter and it has been well analyzed. The existing studies agree that green finance drives a corporation towards becoming sustainable. Many studies showed that a greater green investment together with other sustainable measures is driven by green finance. Further, the role of digital finance and green policies cannot be understated in driving green innovation and sustainability. It was also revealed that the benefits of green finance are more than economic also in character and extend to the sociocultural and environmental realms. Green finance has enhanced the realization of Sustainable Development Goals (SDGs), reduced pollution, and induced high-quality growth of the economy. Thus, green finance is multi-dimensional and drives a broader sustainability approach (Mudalige, [2023](#)). However, it was found that there exist financial constraints that affect the growth and development of green innovation. Deng and Zhang ([2023](#)) highlighted those limitations increase the number of negative green innovations. The assertion can be supported by the fact that with the availability of various financing options including Green Bonds (GBs), green innovation can be improved by reducing their negative impacts. GBs provide a ready source of financial resources dedicated to green projects and hence are directed to environmentally inclined projects. Another indicator that such green innovation positively affects sustainability is that green finance and especially GBs help to achieve the SDGs. Policymakers, in this case, should remove the green financing barriers, while the users of funds should be in a position to appropriately utilize the investments in green innovation. With this argument and the varied research and studies already conducted, one would say green innovation is necessary and fundamental to ensure that sustainable development is realized. The topic is critical due to the fact that

financial constraints actually exist but should be mitigated to effectively enhancing sustainability through green finance. While many studies show a positive relationship, various studies have shown that there exist financial constraints. Therefore, green finance is important, although the policy and regulation issues have to be addressed.

## **Policy Recommendation for Pakistan**

### ***Tailored Green Finance Policy***

Pakistan must develop green finance policies accommodative to its economic and environmental nexus. This comprises tackling the challenges of capital availability to businesses, increasing access to green financing, and stimulating investment opportunities in renewables and sustainability technologies.

### ***Strengthening Capacity of Financial Institutions and Regulators***

Capacity building of green finance is key for the successful implementation of the green finance initiatives in Pakistan. This includes providing training and educational programs in green finance principles, risk assessment, and project evaluation.

### ***Public-Private Partnerships***

Public-private partnerships in green finance projects could benefit from the private sector's expertise and resources, at the same time ensuring robust government oversight and optimal policy alignment. This may consist of renewable energy projects, infrastructure, and green technology.

### ***Targeted Incentives***

Tax breaks, grants, and subsidies should be used to adopt green practices and green technologies. This is something that could be especially advantageous for Small and Medium Enterprises (SMEs) that might otherwise feel the financial strain of greening their activities.

### ***Investment in Sustainable Infrastructure Development***

In the long run, Pakistan needs to plan and invest in sustainable infrastructure, such as renewable energy grids, green transportation systems, and water management infrastructure. It requires for public-private collaboration and strategic planning.



Adopting these policy recommendations, Pakistan can strategically exploit green finance to achieve its SDGs, economic growth, and environmental sustainability. Policymakers have an essential part to play in promoting green finance. The current study contributes to a necessary road map for policymaking on green finance by the Government of Pakistan.

### **Future Suggestions**

This study provides a number of guidelines for academic and practical research on corporate sustainability and green finance in the future.

### ***Empirical Evidence***

Considering that the field of green finance is an ever-changing landscape, more empirical research in this area is needed to support the influence of different green finance mechanisms on firm sustainability. Follow-up longitudinal studies investigating these long-term outcomes will be informative.

### ***Geography***

Although other countries are not included in this study, green finance and corporate sustainability are also of interest to other developing/emerging economies. Hence, a comparative work could reveal the subtleties of how and why regional variation should be taken into account when it comes to understanding best practices.

### ***Investigating Novel Green Finance Instruments***

In addition to ongoing financial innovation, research should be focused on developing and implementing new green financial products, unlocking technologies, and piloting approaches. Examples of these are green bonds, sustainability-linked loans, carbon markets, and fintech-enabled green financing.

### ***Add Social Dimension***

Finally, although this research primarily investigated the environmental dimension of corporate sustainability, it is suggested that future studies are needed to examine how green finance initiatives influence social impacts and equity.

### ***Stakeholder Engagement and Policy Co-Creation***

Continued dialogue and co-creation of policies among regulators, industry, financial institutions, and civil society is essential for the further development of green finance policies to meet the needs of markets effectively and to protect the environment. Co-create solutions allow for better fit and greater impact.

By following these future research directions and practical recommendations, academics, policymakers, and business leaders can further enhance the role of green finance in delivering material and long-term corporate sustainability results in the context of developing economies, such as Pakistan.

### **Conflict of Interest**

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

### **Data Availability Statement**

The data associated with this study will be provided by the corresponding author upon request.

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