Mapping the Relationship Between Green Innovation and Financial Performance: A Bibliometric Analysis

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ABSTRACT

This research emerged due to the increasing issue of a company's sustainable development, especially the environment that affects financial performance. Finding, characterizing, and analyzing the evolution of research publishing trends investigated by researchers globally is the goal of this systematic literature review model study. Using the SR technique as the central methodology, researchers gathered 138 documents from the Scopus database between 2013 and 2023. The findings indicate that the number of publications from joint studies of different nations worldwide has significantly increased. These papers include topics such as the impacts of GI and the urgency of implementing it. Access to study data, funding assistance, and researcher interest all affect the annual rise. This study offers several recommendations to improve organizational knowledge related to GI and FP.

Keywords: Green Innovation; Financial Performance; And Sustainable Development.

Pemetaan Hubungan Antara Green Innovation dan Financial Performance: Analisis Bibliometrik

ABSTRAK

Penelitian ini muncul karena terjadinya peningkatan isu sustainable development suatu perusahaan khususnya lingkungan yang berpengaruh pada kinerja keuangan. Kajian moodel tinjauan literatur sistematis ini bertujuan untuk mengidentifikasi, mendeskripsikan, dan menganalisis pengembangan tren publikasi penelitian yang dieksplorasi oleh para peneliti di seluruh dunia. Peneliti mengumpulkan 138 dokumen yang berasal dari database scopus dari tahun 2013 hingga 2023, dengan pendekatan SR menjadi metodologi utama penelitian ini. Hasilnya menunjukkan bahwa terjadi peningkatan siginifikan pada jumlah publikasi berasal dari studi kolaboratif berbagai negara di dunia termasuk urgensi penerapan GI dan dampaknya. Peningkatan setiap tahunnya, dipengaruhi oleh: ketertarikan peneliti, dukungan dana penelitian, dan ketersediaan akses data penelitian. Studi ini menawarkan beberapa rekomondasi untuk meningkatkan pengetahuan organisasi terkait GI dan FP.

Kata Kunci: Green Innovation; *Kinerja Keuangan*; Sustainable Development.

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INTRODUCTION

Innovation is a process that originates from policies, implementations, and methods to create products and services (Farrukh et al., 2020a). Green innovation has received relatively rapid attention because of its contribution to resource conservation and environmental protection, as well as the creation of financial performance (Chouaibi et al., 2022). This is related to the fairly tight market competition, especially in responding to environmental phenomena that will pressure companies in an effort for sustainable development. The more companies realize the importance of green innovation, the more sustainable company development will be in the future (Zhang et al., 2020).

Based on empirical evidence of environmental phenomena, research explains environmental resources' sustainability as the best way to improve the company's financial performance (Farza et al., 2021). Nevertheless, implementing green innovation has advantages and disadvantages. As a result, GI needs a sizable upfront fixed investment and ongoing, steady cash flow support, which impacts increasing financial risk (Ai et al., 2024 & Khanchel et al., 2023). Green Innovation has different goals in companies; for example, Businesses prioritize quantity when implementing strategic green innovations or the other way around. Therefore, it is unclear how green innovation may affect businesses' financial success for various reasons.

According to publications in the Scopus Database, this study attempts to pinpoint current research trends regarding the connection between financial performance and green innovation (Farrukh et al., 2020b). Data from 138 papers with the keywords "*Green Innovation*" and "*Financial Performance*" served as the basis for this study. The present study aims to: (1) elucidate the primary research trends concerning the relationship between Green Innovation and Financial Performance; (2) explain the most recent issues or topics about this relationship; (3) investigate research gaps in this relationship; (4) identify research aspects based on 30 articles; and (5) identify research implications for researchers and regulators.

The main contribution of this study is to offer an overview of the trend of publication years from 2013 to 2023, keywords, leading countries and authors, types of publication documentation subject areas, and implications for research that are useful for stakeholders. This study can help researchers understand areas where there is potential for growth in future research on GI and FP. Finally, this study is important because it provides research direction in identifying future research ideas including important for investors and regulators in knowing the research implications on the discussed topic.

RESEARCH METHODS

This study employs a systematic approach to literature review analysis. The Scopus Database, which has the top ranking across several scientific domains, was selected because of its thorough data presentation. Multiple literature studies are also included to increase study accuracy and produce the best results. The VOSviewer version 1.6.17 analysis tool, which is a data processing tool (academic literature analysis, research collaboration mapping, and presenting an overview of keywords in publications) that is part of the Scopus Database, is utilized for the

discussion and conclusion section (Wilke et al., 2023). Other analysis packages also use Scopus.com search result analysis.

This literature evaluation is crucial, particularly for identifying patterns in research on financial performance and green innovation and determining which aspects of the study should be the main focus. Several aspects of research that have not been studied or whose studies are still limited can be a novelty study for researchers who have relevant topics. In addition, it will be a guide for determining plans and strategies for stakeholders and shareholders.

A total of 137 documents were accessed with the keywords "*Green Innovation*" and "*Financial Performance*". Following the trend of research publishing data searches on "*Green Innovation*" and "*Financial Performance*" in Scopus, the documents were retrieved from the mapping and analysis findings according to their appropriateness with research themes. All the information or resources used in this analysis came from scopus.com (via the "*Analyze search results*" option). Furthermore, VOSviewer 1.6.17 must be used for visualization in the analysis (He et al., 2023). Based on the data search results, the graphical data shows current data trends and adheres to the determined weights.

A minimum of two authors will independently review each abstract. Consequently, 98 studies were included, specifically from 2013 to 2023, after 39 research studies were initially eliminated. Second, after reading the complete articles, the 98 studies' quality and relevance were evaluated as follows: (1) Accuracy: The study's goals are spelled out, and the procedures for gathering data are sufficiently explained. References that back up the article's key points; (2) Consistency: The research design is founded on the study's goals; (3) Completeness: The research methodology of this study is sufficiently detailed; (4) Timeliness: This study was released between 2013 and 2023; and (5) Research questions are addressed, and objectives are met.

How financial performance has changed in connection with Green Innovation (GI) will be addressed explicitly in the final selection of 30 research papers from 2013–2023. According to the researcher's inclusion and exclusion criteria, according to the Scopus database, there has been a great deal of research on the connection between green innovation and financial performance, as evidenced by the tiny number of papers that remain after a comprehensive search of relevant literature.

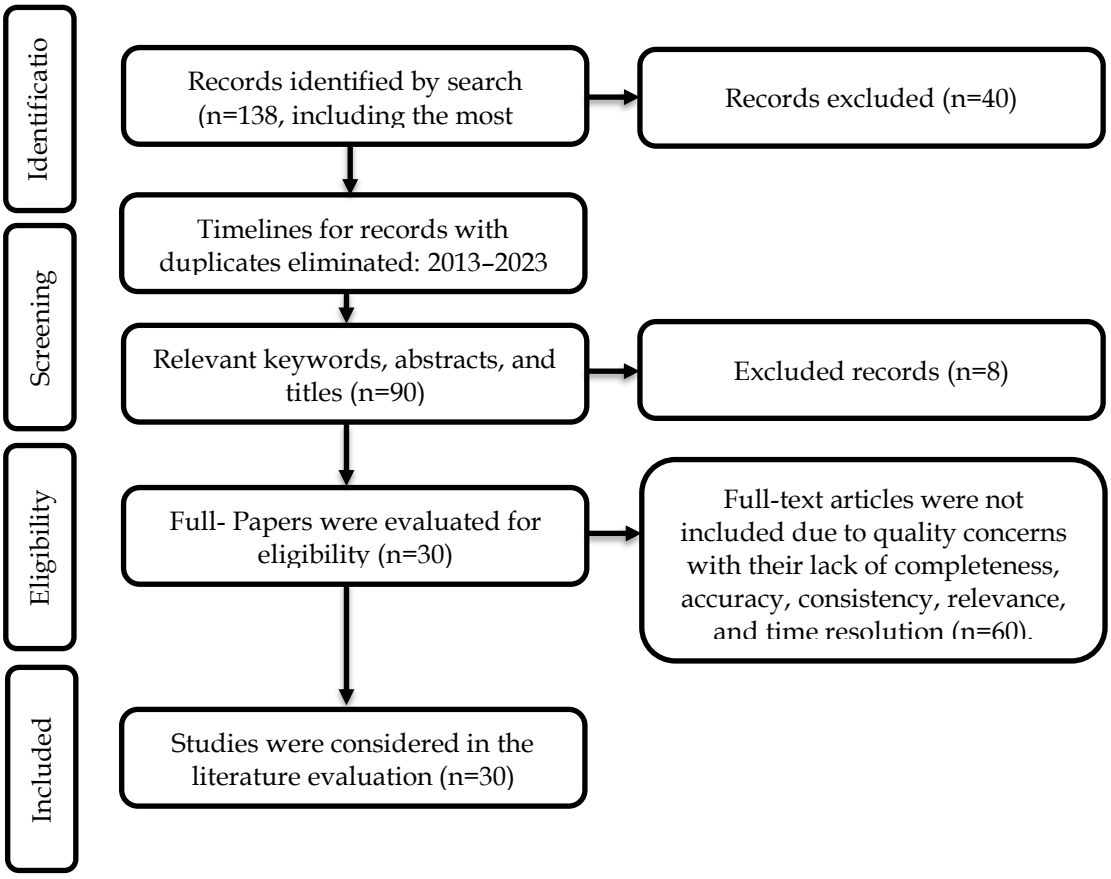

Figure 1. Selection, Assessment and Investigation of Studies (presented using Vosviewer Visualization)

Source: Research Data, 2024

Use of the keywords "(LITLE-ABS-KEY ("Green Innovation")" to analyze this research data AND "Financial Performance" TITLE-ABS-KEY Additionally, the Scopus Database contains the following: "LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013). VOSviewer version 1.6.17 processes and verifies the CSV (Excel) files including all search results data. VOSviewer is one program for showing and examining patterns in systematic literature review maps (van Eck & Waltman, 2010). The software can provide a visualizer that allows users to view bibliometric maps in depth (Kemeç & Altınay, 2023). This tool can display and present bibliometric visual maps containing unique data through identification and analysis that can be visualized in VOSviewer, as seen in the following graphic:

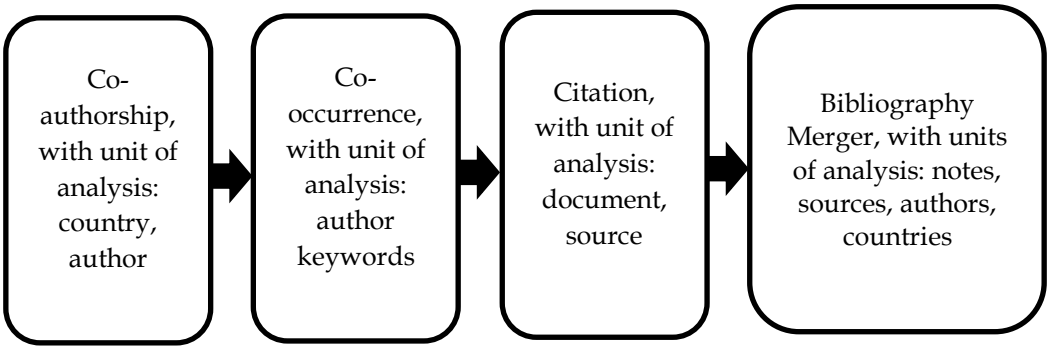

Figure 2. Analyzing systematic literature reviews with the help of the VOSviewer tool

Source: Processed from Various Data Sources

RESULTS AND DISCUSSION

Up to 98 documents were found and examined using the Scopus.com link (Analyze search result) and VOSviewer (van Eck & Waltman, 2010) to map the research subjects and review in this study and identifying the trend of research publications in the Scopus database concerning financial performance and green innovation. Although the increase is still somewhat dynamic, the mapping and review results indicate an annual growth tendency. Environmental problems that significantly affect both the surrounding environment and the environment in general are the leading cause of this growth. The following Figure 3 illustrates this trend:

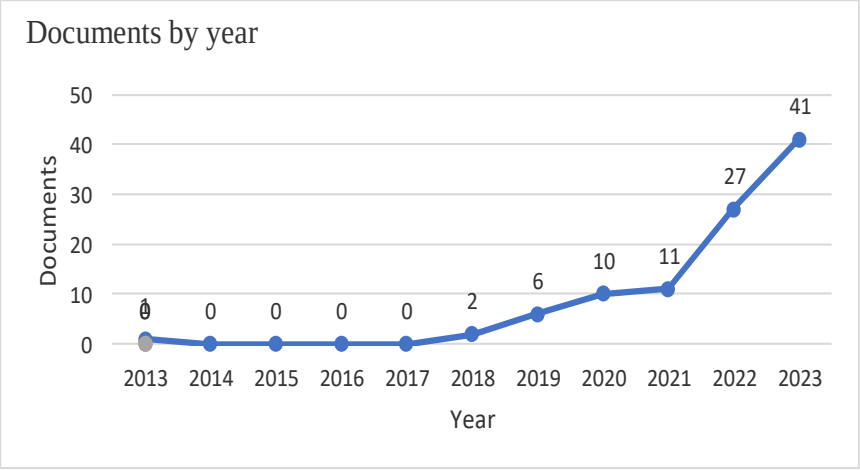

Figure 3. Publication of Green Innovation and Financial Performance Documents globally (2013-2023)

Source: Processed through Scopus, 2024

Collaborative research from multiple nations examining green innovation and financial success is the source of the growing publication trend. This is evident from the 30 papers that were chosen using researcher-selected criteria. Research funding assistance, access to available research data, and researcher interest in green innovation and financial success contribute to the annual upward trend. Thus, according to the Scopus Database, 2023 has the most publications throughout the last ten years.

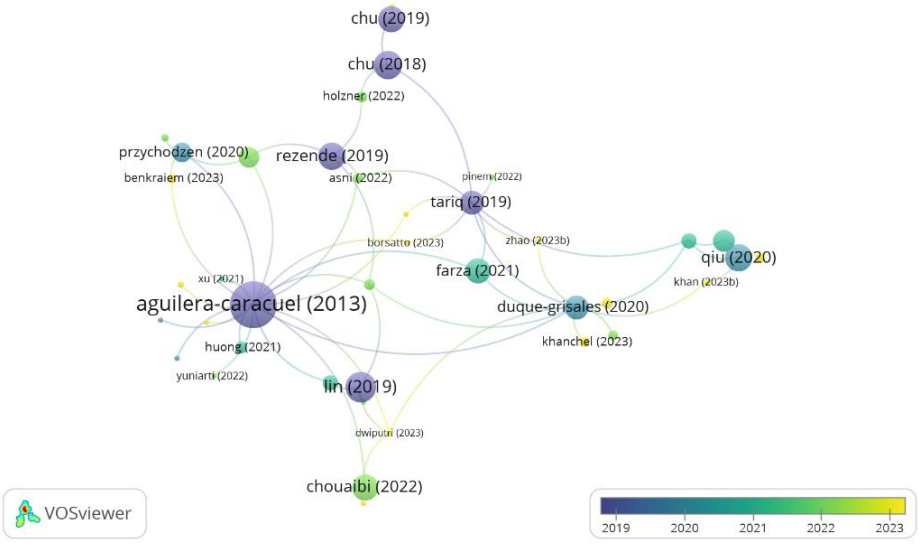

Figure 4. Analysis via VOSviewer (Jenis Analysis: Co-occurrence (semua kata kunci author)

Source: Processed via VOSviewer, 2024

In Figure 5, 10 top countries from various authors studied and published several scientific documents on green innovation and financial performance studies, these include (1) China with 47 papers (1658 citations); (2) Malaysia with 9 papers (401 citations); (3) Pakistan with 9 papers (268 citations); (4) Indonesia with 7 papers (47 citations); (5) United States with 7 papers (349 citations); (6) France with 6 papers (301 citations); (7) India with 5 papers (102 citations); (8) Italy with 5 papers (291 citations); (9) South Korea with 5 papers (217 citations); (10) United Arab Emirates with 4 papers (99 citations). Based on the data on several scientific papers, based on 47 records, it can be said that China is the nation of origin of the greatest number of authors, Malaysia and Pakistan with 9 papers, and Indonesia and the United States with the same number papers, namely 7 papers. This indicates that research on the relationship between green innovation and financial performance has been conducted in several nations.

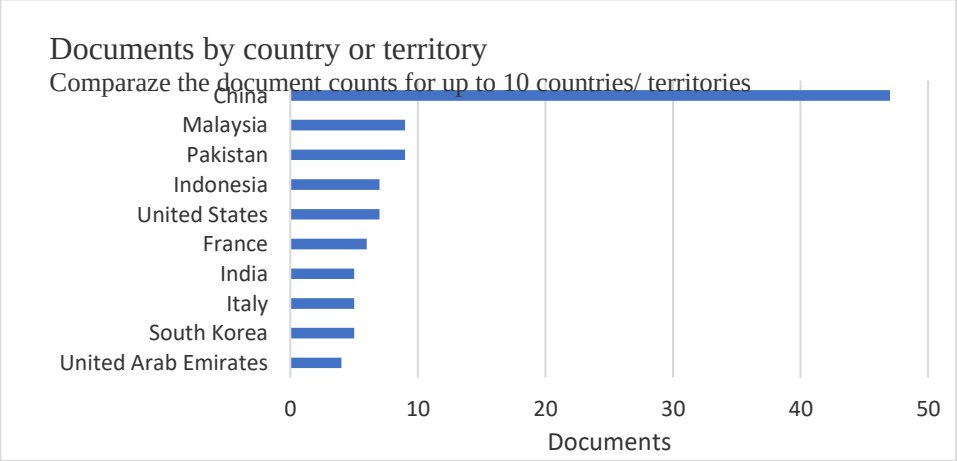

Figure 5. Top 10 Countries with the Most Documents and Documents in Scopus. Database on Green Innovation and Financial Performance

Source: Processed through Scopus, 2024

Several documents are shown, along with the author's country of origin and the fact that they have researched and published several scientific papers on green innovation and financial performance. The published study documents in Figure 6 are divided into several categories, including (1) articles (87 documents total), (2) conference papers (6 documents), (3) reviews (3 documents), (4) book chapters (1 document), and (5) conference reviews (1 document). As demonstrated by the five categories of published papers addressing green innovation and financial performance in the Scopus Database, the diversity of papers on the subject makes this one of the concerns of scholars worldwide.

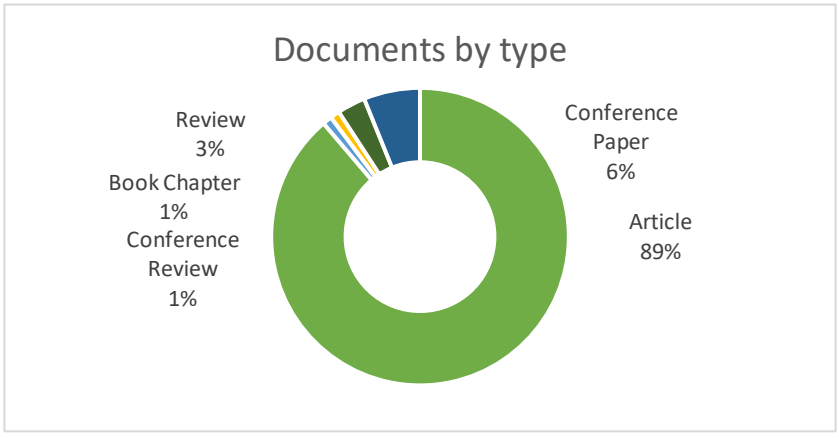

Figure 6. Document Types with the Highest Publications on Financial Performance and Green Innovation

Source: Processed through Scopus, 2024

The image displays a variety of publications about financial performance and green innovation publications that are listed in the Scopus Database. Figure 7 illustrates how several academic disciplines are intimately tied to the environment in terms of green innovation and financial performance, including: (1) 45 papers in Scopus for Business, Management, and Accounting; (2) 39 papers in

Environmental Science; (3) 34 papers in Social Sciences; (4) 29 papers in Economics, Econometrics, and Finance; (5) 21 papers in Energy; (6) 17 papers in Computer Science; (7) 13 papers in Engineering; (8) 9 papers in Decision Sciences; (9) 4 papers in Arts and Humanities; (10) 4 papers in Mathematics; and (11) papers in Other, which includes Medicine (3 papers), Multidisciplinary (2 papers), Agricultural and Biological Sciences (1 paper), Biochemistry and Genetics and Molecular Biology (1 paper), and Psychology (1 paper). These ten areas of study have the most significant quantity of documents among all the other subjects. This demonstrates that the literature review topic is examined from various angles using different scientific fields. The study of GI and FP cannot be fully understood from business, management, and accounting viewpoints alone. It must also consider the issues of environmental science, social sciences, economics, econometrics, finance, and other fields to solve the sustainability issues surrounding the topic.

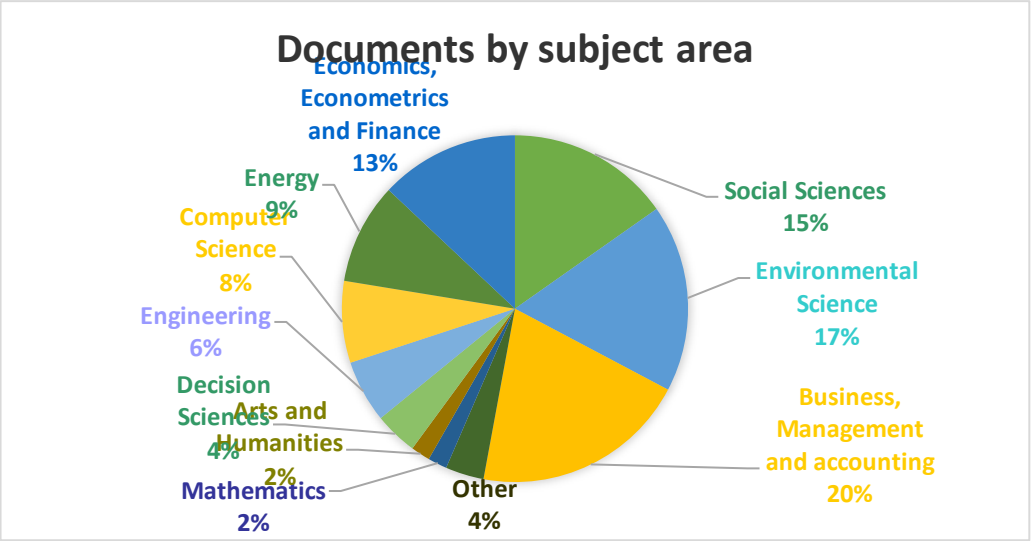

Figure 7. Most Publicated Subject Areas Regarding Green Innovation (GI) and Financial Performance (FP)

Source: Processed through Scopus, 2024

This study's systematic literature review aims to demonstrate that research on financial performance (FP) and green innovation (GI) is still being conducted and is anticipated to continue, especially business processes that must prioritize green innovation in the process of recording financial performance reports. This research trend began to develop in 2013 and was reaffirmed in 2018, and it continued to increase until 2023 when it was published in the Scopus Database. The topic of this investigation has been examined from various angles, methods, and scientific specialties. GI and FP published in the Scopus Database are documented in various document forms (at least 11 research disciplines have been identified). The following are the top ten authors whose works have been published: (1) Johl, S.K (2021, 2022 and 2023) with 100 quotes; (2) Khan, P.A (2021, 2022 and 2023) with 100 quotes; (3) Aguilera-Caracuel, J. (2013 and 2020) with 527 quotes; (4) Agustia, D. (2020 and 2022) with 26 quotes; (5) Akhtar, S. (2021 and 2022) with 90 quotes; (6) Al-Mesaiadeen, J.M. (2022 and 2023) with 0 kutipan; (7) Al-Sound, G.A. (2022 and 2023) with 0 quotes; (8) Benkraiem, R. (2023) with 22

quotes; (9) Borsatto, J.M.L.S. (2020 and 2023) with 11 quotes; and (10) Chen, L. (2022) with 74 quotes.

Research Topic Mapping 30 research documents' content analysis and problems will be discussed. Several research subjects about public space in Indonesia have been identified based on the number of articles published in the Scopus Database. According to this analysis, the following figure shows research terms associated with the research issue.

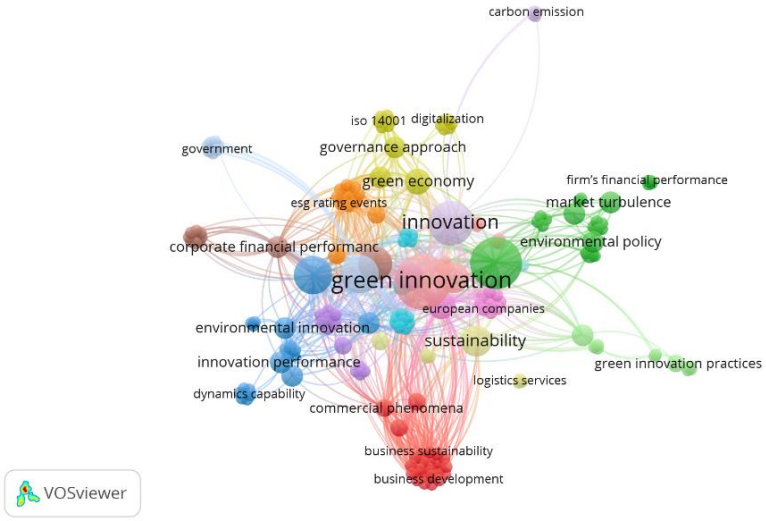

Figure 8. VOSviewer Analysis (Sort of Analysis: Co-Occurrence (All Keywords))

Source: Processed via VOSviewer, 2024

Figure 8 shows the VOSviewer examination of up to 30 research papers from the Scopus database. According to the study, seven clusters have emerged as popular research subjects for financial performance and green innovation. Until now, they have been the focus of research topics and have become serious studies globally. Each cluster's primary research topics on financial performance and green innovation have been extensively researched and published in the Scopus Database. The wide range of study topics discovered can guide future scholars in creating studies on environmental issues, mainly green innovation and its relationship to a business's bottom line.

Table 1. Analysis with VOSviewer (the research concerns related to Financial Performance (FP) and Green Innovation (GI)

Keyword in Scopus Database: "Green Innovation" and "Financial Performance"	
Cluster 1 (Red)	(24 items) business development; business sustainability; commercial phenomena; confirmatory factor analysis; conservation of natural resour; controlled study; convergent validity; emission control; energy conservation; energy intensive industry; environmental impact; environmental protection; environmental sustainability; greenhouse effect; likert scale; manufacturing; middle aged; numerical model; population research; quesstionnaire; recycling; reliability; structural equation modeling; theoretical model.
Cluster 2 (Green)	(21 items) absorptive capacity; empirical analysis; environmental and social; environmental policy; environmental regulation; financial performance; firm's financial performance; government green subsidies; green innovation disclosure; green need's tacitness; green process innovation; green product innovation; green social capital; industrial enterprise; market conditions; market resource intensity; market turbulence; product development; subsidy system; sustainable development.
Cluster 3 (Dark Blue)	(18 items) dynamics capability; organisational innovation; eco-innovation; environmental innovation; firm performance; green innovations; information processing; innovation performance; integration; marketing innovation; process innovation; supply chains; supply-chain integration; sustainable innovation; sustainable supply chain; synergy; product innovation; types of innovations.
Cluster 4 (Yellow)	(16 items) digitalization; emerging markets multinasional; environmental management; financial system; governance approach; green economy; information asymmetry; institutional ownership; internal control; iso 14001; multilatinas; multinational enterprise; ownership; r&d; research and developmant; spatiotemporal analysis.
Cluster 5 (Purple)	(11 items) current; climate; consumption behavior; demand synergies; global economies; green collaboration; green managements; industrial performance; mergers and acquisition; responsiveness models; supply chain management; taxonomy
Cluster 6 (Light Blue)	(13 items) economic and social effects, enterpreneurial orientation; environmental normative dimens; institutional framework; institutional theory; leadership commitments; neural networks; performance assessment; profitability; resource-based view; small and medium-sized enterprenuer; social sustainability; sustainability performance
Cluster 7 (Orange)	(12 items) competition (economics); corporate governance; corporate strategy; developing countries; environmental awareness; environmental governance; environmental regulation; environmental, social, and governance; esg rating events; financial constraints; manager' environmental awareness; mediating roles

Source: Processed via VOSviewer, 2024

Table 2. perspective and implications

Point View of GI and FP	research implications related to green innovation and financial performance	Problems and key solutsions	research model development
Green innovation and financial performance	Green innovation improves long-term financial performance and competitive advantage and reduces financial risks.	Companies can balance the costs of regulating innovative green practices and establish learning programs to overcome barriers to green innovation.	Exploring the impact of green innovation on various industries. Conducting interviews to identify relevant factors and researching consumer behaviour towards green products.
Company size and customer pressure on strategy impact	Customer pressure will drive manufacturers to adopt environmentally friendly practices, and collaboration with customers will increase environmental compliance and innovation.	Company size and customer pressure can drive greater environmental compliance. Larger companies face bureaucratic challenges, while smaller companies face challenges meeting customers' green expectations.	Assessing size can influence investment in green practices under customer pressure, according to company scale.
The role of ESG disclosure in green innovation	ESG disclosure enhances a company's green innovation capabilities and strong ESG practices will correlate with improved financial performance.	High ESG compliance costs will reduce financial performance, and the lack of ESG can complicate work evaluation. In addition, strict policies are needed	Assessing the role of corporate governance in ESG performance and the influence of risk management strategies, and introducing more professional environmental indicators in empirical analysis.
Economic growth and sustainable development	Green procurement policies can support sustainable economic growth and protection and increase transparency and stakeholder trust.	Economic growth has challenges on environmental degradation and resource scarcity. Policy makers must be able to promote green innovation and stakeholder investment is essential to support sustainability.	Research on the relationship between SDGs and financial performance, integration of sustainability reporting standards.

Source: Research Data, 2024

The impact of prior research on green innovation on financial performance, as determined by the articles included as samples in the systematic literature review. The results identified several factors that influence both of these things, namely GI and FP, namely: (1) Green innovation increases profitability and reduces financial risk (Tariq et al., 2019; Li et al., 2020; Xie et al., 2022; Vasileiou et al., 2022; Deb et al., 2023; Aastvedt et al., 2021), High green innovation without being balanced by other innovation activities will be detrimental to financial performance (Przychodzen et al., 2020); (2) Environmental pressures and organizational culture (Chu et al., 2019), Environmental pressures and organizational culture (Yadegaridehkordi et al., 2023); (3) Green innovation development supports sustainable business models (Farza et al., 2021) leading to lower operating costs and competitive advantage (Junaid et al., 2022); (4) Improving Environmental, Social and Governance Performance (ESG) (Zheng et al., 2022) (5) Digitalization boosts green innovation (Li & Shen, 2021).

The previous analysis reveals that climate change can substantially change the relationship between financial performance, including environmental performance, and various green innovations. Of course, companies that are proven to practice green innovation strategies have good environmental and economic performance because of their qualified human resources (Ali et al., 2020). In addition, companies that have high green innovation will produce a positive increase in stock market valuation and financial performance (Przychodzen et al., 2020; Ali et al., 2020), companies that have achieved a good level of economic scale, green innovation practices will improve the company's financial performance (Aastvedt et al., 2021). So the disclosure of green innovation (GI) can be an opportunity for future growth for companies and countries (Chouaibi et al., 2022).

The relationship between Financial Performance and Green Innovation on company size will affect the impact of green innovation strategies including on customers. Small companies provide higher returns on green innovation, for example in the international automotive industry (Wong et al., 2021). In addition, the implementation of ESG in companies encourages green innovation by increasing awareness and being able to reduce financial barriers, thus contributing to resource efficiency and corporate reputation (Chouaibi et al., 2022; Tan & Zhu, 2022; Zheng et al., 2022). Overall, green innovation supports sustainable economic growth and long-term development, leading to greater efficiency and having a positive impact on the environment.

CONCLUSION

This analysis demonstrates a rising trend in publications between 2018 and 2023. Using publications from the Scopus database, researchers examined 30 articles related to the subjects covered in this investigation. Many viewpoints, approaches, and academic fields have been used to study the relationship between green innovation and financial performance. Numerous GI and FP-related research papers have been produced and published in the Scopus database, which covers 11 different disciplines of study.

Research topics related to GI and FP can help further researchers understand the model, benefits, and functions of research. This research will provide practical and theoretical contributions to developing the diversity of

literature related to environmental issues, especially in the presentation of financial reports with green innovation. Additionally, this research issue will offer research data material examining global publication trends that have been and will be further examined. Researchers recommend that further topics focus on: (1) factors that influence GI and FP from a technological aspect; (2) the Correlation between green innovation in handling carbon emissions; and (3) Reviewing the application of green innovation practices.

Important research implications related to green innovation and financial performance, namely: first, a company implementing green innovation is greatly influenced by strict environmental regulations, although financial performance cannot be expected to be provided directly. Second, in ESG rankings it becomes the main driver, namely it can reduce financial constraints and will increase environmental awareness in managers who can support green development. Third, company size plays an important role in both developing and advanced companies. Finally, the limitations of this study are that it only focuses on analyzing 30 publications from the Scopus Database with quite limited trends and using the VOSviewer tool. Furthermore, it can further develop fields of study and tools such as Biblioshany and add Databases in analyzing.

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