

Review

Perspectives on Integrating Risk Management and Sustainability for Financial Performance: A Systematic Literature Review

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Abstract: In a continuously dynamic economy, both risk management and sustainability are elements that must be constantly monitored. This study analyzes the link between risk management, sustainability, and the financial performance of companies through a systematic literature review of key articles from bibliographic databases. A total of 9092 publications indexed in the Web of Science database (2020–2024) were analyzed using bibliometric analysis with VOSviewer. Findings suggest a positive relationship between effective risk management, sustainable business practices, and financial performance. Firms that integrate risk assessment into sustainability strategies achieve greater resilience and improved outcomes. Research highlights the importance of transparency in risk identification and reporting, particularly in sustainability reports, as a driver of long-term performance and value creation. The study also identifies disparities in implementation across industries and regions, with emerging markets facing structural challenges in adopting comprehensive risk–sustainability frameworks. These findings emphasize the need for sector-specific risk strategies and stronger policy support to maximize financial benefits. This research provides valuable insights for financial managers and researchers. The field remains dynamic, offering new perspectives for future studies and policy development.



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1. Introduction

Risk management plays a crucial role in corporate strategy, influencing financial performance and sustainability [1].

The uncertainties specific to the economic environment have required the development of good practices regarding risk management and reporting with the following elements: transparency, attitude towards risk, integration of risk into the business model, and allocation of resources committed to risk management [2].

Risk management includes the systematic identification, analysis, and mitigation of uncertainties that could negatively impact an organization's goals. Modern risk management frameworks extend beyond traditional financial risks to incorporate sustainability risks, such as climate change, regulatory compliance, and reputational concerns, which are becoming increasingly critical for firms operating in global markets [3].

Incorporating sustainability into risk management enables firms to assess ESG risks and adopt data-driven strategies for financial and operational resilience [4,5]. Respecting sustainability aspects aims to implement ESG principles for sustainable development,

integrate circular economy and energy efficiency practices, and commit to shareholders and transparency in sustainability reporting [6]. A model to be analyzed and applied that meets the needs of stakeholders is based on the Triple Bottom Line (TBL) concept—Economic (Profitability), Social (Social Responsibility), and Environment (Ecology) [7].

Risk management includes credit risk, interest rates, and the liquidity ratio, whereas financial performance is assessed using metrics like Return on Assets (ROA), Return on Equity (ROE), and Return on Investment (ROI) [8]. However, integrating sustainability considerations into risk management enables companies to enhance their financial stability while addressing long-term environmental and social challenges. Research indicates that companies with strong ESG practices often exhibit lower capital costs and higher financial returns, underscoring the financial benefits of sustainability integration [9].

Effective Enterprise Risk Management involves five key components: governance, strategy, performance review, and communication, as it aligns with business objectives and provides a multi-faceted approach to risk management [10]. Robust risk management frameworks enhance transparency and stakeholder engagement, aligning with corporate performance objectives [2]. A company's risk management framework must be effective and based on stakeholder involvement, so that it can achieve its performance objectives.

Despite its growing importance, there is no universal consensus regarding the actual impact of Enterprise Risk Management (ERM) on the financial performance of companies [11]. While many studies have found a positive correlation between ERM and financial performance, others reports describe a neutral or negative relationship [12]. However, recent research suggests that when sustainability factors are integrated into ERM frameworks, firms experience increased resilience and reduced operational risks [13]. Determinants of a company's likelihood to engage in ERM are company size, which brings complexity and exposure to risk, making ERM more necessary for larger companies to effectively manage these factors, and profitability, which provides the financial resources to invest in ERM. Moreover, companies with higher Return on Assets (ROA) tend to integrate sustainability into their ERM to optimize efficiency and long-term value creation [14].

This study employs bibliometric analysis to explore recent literature on the integration of risk management and financial performance, emphasizing the relationship between risk management practices and organizational performance. By analyzing research from the Web of Science database, this study identifies key themes, trends, and frequently used terms using VOSviewer software (version 1.6.20) [15]. Bibliometric analysis is valuable for deciphering and mapping cumulative scientific knowledge and evolutionary trends in well-established fields through the systematic organization and interpretation of large volumes of unstructured data. This method allows for a rigorous understanding of the development and interconnections in a domain over time [16] and provides a broad overview of the vast academic literature, enabling a comprehensive understanding of research trends and patterns in a given field [17].

VOSviewer facilitates the visualization of bibliographic data, including collaborative networks, documents, and sources linked to researchers, authors, and countries [15]. This study contributes by evaluating the historical and current state of risk management research while identifying future research directions. Despite extensive research on risk management, sustainability, and financial performance, there is a lack of comprehensive bibliometric analysis that systematically maps key trends, methodologies, and research patterns in this field. This study addresses this gap by analyzing existing literature to identify dominant themes.

To explore the impact of the relationship between risk management, sustainability, and financial performance, the following research questions have been developed:

- What are the main risks that could impact companies' financial performance?

- What are the methodologies used in researching the connection between risk management, sustainability, and financial performance?
- Is there a connection between risk management, sustainability practices, and financial performance? How frequently is this relationship analyzed?
- What are the critiques encountered in the specialized literature concerning the impact of risk management on financial performance?

By addressing these research questions, the study offers an overview of the current trends in integrating sustainability into risk management and financial performance. The paper is structured to explore the relationship between risk management, sustainability, and financial performance, followed by an analysis of specialized literature, a description of the research methodology, and a presentation of the results. The study's final section outlines the research findings and their implications, while also addressing the study's limitations.

2. Literature Review

Academic literature offers a wealth of research on the relationship between risk management and organizational performance. The proactive attitude of entities towards risk management demonstrates that their business success is greater than that of others who do not take risks [13,18].

Starting with the research questions, the most important aspects found in the specialized literature were outlined and analyzed. In the approach taken, following question was addressed:

- “Which are the main risks that could impact the companies’ financial performance?”, for which the authors turned their attention to financial risks.

It is certain that risks are manifested in everyday life, in a variety of ways that can be grouped in relation to different criteria, and the present study focuses on financial risks considering the field of action. Thus, financial risk includes credit risk, interest rate risk, currency exchange risk, liquidity risk, investment risk, price risk, VAT application risk, etc. All of these have an impact on the business domain of companies [19]. The risks ultimately materialize in financial losses, additional costs and reduced income; therefore, financial risk is explicitly translated into money losses. According to Blach, financial risk can be predicted based on balance sheet information [20,21], also emphasizing the idea that credit risk has a significant negative impact on financial performance, while liquidity risk management positively affects firms’ financial performance.

Also, at the company level, we can talk about operational risk (personnel, technological, distribution, political, regulatory risk)—the risk that can appear unexpectedly, at any time, causing crisis situations within the company. Operational risk arises from inconsistencies in internal processes, systems, human resources, and other internal aspects, but can also be generated by external events. Chen [22] states that organizational risk impacts the project financial performance by being negatively mediated through project Supply Chain Risk (SCR) factors, such as “demand risk, internal process integration risk, and supply risk”. Another dimension of risks concerns the strategic non-conformity that comes from the company’s inability to achieve its goals and implement its planned strategy; these non-conformities can be caused by changes that affect the proper functioning of the organization, determined by both external and internal factors [23].

According to Kaplan and Mikes [24], risks can also be grouped into internal risks (risks that manifest internally), external risks (coming from the external environment), and strategic risks (risks assumed in order to achieve strategic objectives). Additionally, some authors [25,26] highlight risk identification as the most critical stage influencing financial performance, succeeded by risk mitigation, implementation, the monitoring of ERM programs, and risk assessment.

“Credit risk, interest rate risk and liquidity risk” are key financial risk management factors that can potentially reduce the performance of the financial sector [27]. Credit risk has a significant negative impact on financial performance, while “market risk, operational risk and liquidity risk” management positively influences firms’ financial performance [21].

Liquidity is one of the major factors for industries that are highly exposed to market volatility and have significant fixed costs. Therefore, lack of liquidity often results in bankruptcy when companies face economic difficulties [28]. The risk of bankruptcy of an entity is one of the most important risks that is analyzed by investors, to be able to see the capacity of the entity to fulfill its due obligations [29].

The insurance industry faces various risks, including underwriting, compliance, reputational, credit, liquidity, strategic, operational, agency, and legal risks. If these risks are not managed effectively, they can have a negative impact on the financial performance of companies, which can lead to financial difficulties [30].

Establishing the most significant risks studied leads to the natural question:

- What are the methodologies used in researching the connection between risk management, sustainability, and financial performance?

The existing literature, as summarized in Table 1, mostly confirms the positive impact of ERM on companies’ financial performance. Additionally, many studies highlight that integrating sustainability considerations into ERM frameworks enhances resilience, reduces risks associated with environmental and social factors, and contributes to long-term financial stability. In most of the analyzed studies, the most common type of methodology used is the analysis of specialized literature, emphasizing the growing academic focus on the intersection of sustainability, risk management, and corporate performance.

Table 1. Methodology and authors’ major findings. Source: authors’ processing.

Authors	Sample	Methodology	Major Findings
[31]		Literature Analysis and Case Study	The exposure of large companies to risk seems to be increased by partnerships with the SMEs in the supply chain
[32]	300 Canadian companies	Content Analysis in Annual Reports	An emphasis on down-side risks is noted and potential up-side effects are absent
[33]	5.8 million sets of accounts of unlisted firms	Small-Business Failure Prediction Model	The use of non-financial variables as predictors of company failure improves significantly the accuracy of the model used
[34]	100 listed Malaysian companies	Content Analysis in Annual Reports	The total number of phrases dedicated to risk information is much less compared to a previous study from 2006
[35]	32 studies	Literature Analysis	Studies that show a positive impact of the environment on financial performance are more prevalent
[36]		Information Index	Financial information regarding risks is correlated with the field of activity in which the reporting entity operates
[37]	112 US firms	Empirical Analysis	Firms should consider implementing an ERM system
[38]	40 German banks	Multiple Regression Analysis	The level of sustainability a firm upholds impacts its creditworthiness
[39]	106 firms	Matched Sample and Logit Model	There is limited evidence in the sample of ERM adopters indicating significant changes in various key firm variables

Table 1. Cont.

Authors	Sample	Methodology	Major Findings
[20]	100 Polish companies	Financial Risk Analysis—an Empirical Study	The importance of identifying financial risk through balance sheet information
[40]		Literature Survey; Citation/Co-Citation Analysis	The intellectual structure of the field evolved to more proactively managing supply chain risk from system perspectives
[41]	31 banks	Analysis of Financial Reports; Correlation and Regression	The parameters have an inverse impact on banks' financial performance
[42]	10 banks	Panel Data Estimation Technique; Statistical Analysis	Important relation between banks' performance and ERM
[43]	Banks' annual reports and accounts	Descriptive statistics; OLS regression	Financial performance is determined by risk management practices
[12]		Literature Review; Balanced Scorecard (BSC)	No universal agreement about the actual influence of ERM on firm performance
[44]	7 commercial banks	Content Analysis as Analytical Tool	The extent of risk management disclosure increases with the size of the reporting banks
[45]	101 questionnaires	A Five-Point Likert Scale; Data Analysis—Structural Equation Modeling Technique	The success of ERM has a weak positive relation with the financial performance of an organization, measured through ROA, ROE, Earnings per Share (EPS)
[46]	27 papers	Literature Review	The importance of risk management process in SMEs
[47]	208 SMEs	Seemingly Unrelated Regression (SUR)	Number of executive directors raises the level of cashflow volatility
[28]	79 international shipping companies	Panel Regression	Lack of liquidity results in bankruptcy when companies face economic difficulties
[48]	62 companies quoted in National Stock Exchange (NSE)	Survey Research Design	Significant relationship between risk management and financial performance
[49]	The annual reports of selected Johannesburg Stock Exchange (JSE)-listed companies	Literature Review	Attempts to avoid all risks can lead to the sacrifice of positive rewards
[50]	Financial report of the selected company	Literature Review/Regression Analysis	Risk management practice and financial performance show no correlation
[51]	Five failed banks	Literature Review	Risk management functions should be bank-specific
[52]	Non-financial companies listed on the Milan Stock Exchange	Multivariate Ordinary Least Squares (OLS) Regressions	ERM systems lead to higher performance by reducing risk exposure
[53]	18 top-performing banks	Descriptive Statistics/EViews Software	Risk management practices have a substantial effect on the financial performance of banks of all sizes
[54]	304 SMEs	Structural Equation Modeling (SEM) in Analysis of a Moment Structures (AMOS)	The company's risk management practices significantly influence the competitive advantage and the performance of SMEs
[55]	65 non-financial Romanian firms listed on the Bucharest Stock Exchange (BSE)	Econometric Software; EViews/Panel Data Techniques	ERM adoption is associated with higher firm values
[56]		Content Analysis of Annual Reports	Numerous businesses worldwide fail to integrate sustainability initiatives into their corporate strategies

Table 1. Cont.

Authors	Sample	Methodology	Major Findings
[57]	101 articles	Literature Review	The most commonly investigated effect of ERM is on firm performance
[58]		Generalized Method of Moments (GMM) Model	Emerging sustainability risks adversely impact a firm's profitability
[59]	6 insurance companies listed on the National Stock Exchange (NSE)	SPSS Analysis Software	Moderate level of implementation of risk management practices
[60]	1233 documents	Bibliometric Analysis	Sustainability continues to be a significant global concern, posing challenges at both individual and organizational levels
[61]	286 firm-year observations	Hierarchical Panel Regression Analysis	Companies that adopt thorough risk management strategies are more likely to attain sustainable performance results
[62]	13 companies	Analysis Tool of Partial Least Square SmartPLS3	Enterprise risk management increases the company performance
[63]	58 banks	Econometric Model	Managers' negative sentiment in risk-related disclosures within annual reports is strongly associated with the future performance of banks
[64]		Literature Review	Well-executed corporate sustainability reporting significantly boosts financial performance
[65]	Expert survey where 79 experts answered	Analytical Network Process (ANP) Method	Incorporating sustainability into risk management improves decision-making and minimizes biases in qualitative assessments
[66]		VIKOR Method	The significance of incorporating sustainability factors into risk management strategies

Figure 1 illustrates the frequency of different methodologies used in research related to sustainability, risk management, and financial performance, providing valuable insights into the preferred analytical approaches in the field. The analysis of specialized literature is the most frequently used methodology, representing 31.6% of the top five methods employed. This highlights the fundamental role of theoretical frameworks and previous studies in understanding the connection between sustainability, risk management, and financial performance. Regression analysis ranks second, representing 26.3% of the methods used, highlighting its importance in the quantitative exploration of the impact of sustainability and risk-related factors on financial results. The application of Content Analysis in Annual Reports at 15.8% indicated an increased reliance on corporate disclosures to evaluate sustainability practices and risk management strategies. Structural Equation Modeling (SEM), representing 13.2%, suggests a growing interest in understanding the complex relationship between latent variables, such as sustainability practices, risk management effectiveness, and financial performance.

Overall, the distribution of methodologies, including descriptive statistics, econometric tools and case studies, underlines a diverse approach to studying sustainability, risk management, and financial performance. These findings indicate a solid methodological foundation in the field, where quantitative models such as regression and SEM are complemented by qualitative insights derived from literature and report analysis.

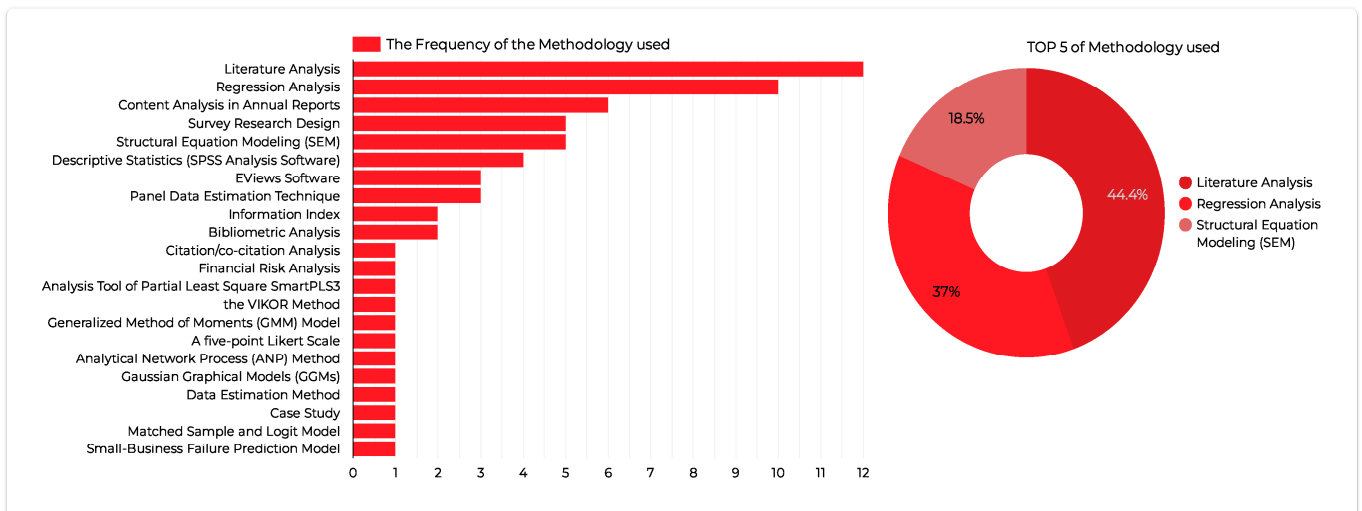


Figure 1. The most common methodologies used in the studied articles. Source: authors' processing in Tableau Public.

The documentation of the assertions for the first two questions constitutes the foundation for researching the existence of the relationship between risk management, sustainability and financial performance. The specialized literature presents various studies that analyze this link, requiring the formulation of the third research question.

- Is there a connection between risk management, sustainability practices, and financial performance? How frequently is this relationship analyzed?

Integrating sustainability considerations into ERM frameworks has become increasingly vital for enhancing company performance and securing a competitive advantage [62]. Empirical studies support the positive impact of integrating sustainability into risk management. For instance, research indicates that effective corporate sustainability reporting is associated with significant improvements in financial metrics such as Return on Equity (ROE), Return on Assets (ROA), and profit margins [67].

In the banking sector, the relationship between sustainability and financial performance is particularly pronounced. Studies have demonstrated that proper governance and Corporate Social Responsibility (CSR) practices reduce financial and reputational risks, thereby enhancing financial performance [68].

However, the effectiveness of ERM in improving financial performance is based on factors such as organizational culture and strategic alignment. Research suggests that merely implementing ERM frameworks is not sufficient in yielding desired outcomes; a developed organizational culture and continuous evaluation of strategic risk management performance are essential [69].

Considering the analysis carried out, the study also includes an examination of clarifying comments regarding the relationship between risk management and financial performance. This is performed with the objective of assessing both the strengths and limitations of the existing research, thereby shaping the following research question:

- What are the critiques encountered in the specialized literature concerning the impact of risk management on financial performance?

Research indicates that the financial performance of fund management companies is negatively affected by factors such as event identification, risk assessment, goal setting, and information communication. However, elements like risk response, internal environment, and control activities positively influenced their financial performance [70].

Despite the generally positive outlook on ERM, there are some authors who dispute the positive effects of ERM. For instance, Eikenhout, [71] states that there is minimal evidence to suggest that the implementation of ERM mitigates the negative effects on firm performance, concluding that companies that have implemented ERM tend to have lower ROA compared to companies with a lower level of ERM implementation. This hypothesis aligns with the finding of Baxter et al. [72], who found no evidence that ERM implementation mitigated the impact of the crisis. Kokobe and Gemechu [50] also conducted a study where the results of regression analysis revealed no significant correlation between risk management practices and financial performance. However, the findings indicate a strong and positive relationship between risk avoidance techniques and financial performance, suggesting that ERM remains the recommended best practice for companies.

In a related study investigating the influence of ERM and Performance Management System (PMS) on corporate financial performance, Laisaikorn and Rompho [45] identified a “weak positive correlation” between the success of ERM and PMS and financial performance metrics such as ROA, ROE, and earnings per share (EPS). The authors emphasize the importance for managers to effectively design, enhance, and implement both systems to achieve a competitive advantage. Nevertheless, the study also stated that financial risk management significantly decreases the financial performance of commercial banks [27].

3. Methodology

The study comprises a systematic content-based literature review to examine the relationship between risk management, sustainability, and the financial performance of companies. Utilizing the keywords “risk management”, “sustainability”, and “financial performance”, a number of articles from the period 2004–2024 were selected for the literature analysis. The selection criteria included thematic relevance, ensuring the inclusion of studies directly addressing these three dimensions; publication type, prioritizing peer-reviewed articles and conference papers; and publication period. Additionally, sectoral and geographical diversity was considered to provide a comprehensive perspective. Although such an analysis is performed manually and can be time-consuming, the combination of a qualitative method (in this case, the literature review) in depth with a strong quantitative analysis (bibliometric analysis) is an important benefit of content analysis.

The Tableau Public platform was used to create visual charts that facilitate data interpretation and presentation. This allowed us to generate interactive visualizations and graph information in a clear and accessible way, helping to better understand and communicate the results of our analysis. The interactive charts and graphs provide a more comprehensive understanding of the research landscape, enabling the identification of nuanced relationships and trends that may be overlooked in conventional narrative review.

For the bibliometric analysis, this study exclusively relied on the Web of Science database due to its comprehensive coverage and high-quality indexing. One key reason for this choice is the rigorous selection and validation process that WoS applies to indexed publications. Its strict inclusion criteria ensure that only peer-reviewed journals with high academic impact are considered, thereby maintaining the quality of the analyzed studies. In contrast, databases like SSRN (Social Science Research Network) include preprints and unpublished reports that have not undergone the same level of scientific scrutiny. Additionally, WoS offers compatibility with bibliometric analysis tools, providing standardized export formats (e.g., .txt, csv.) that integrate seamlessly with software such as VOSviewer. Some databases, such as Scopus, have less compatible formats with some viewing programs.

Figure 2 illustrates the systematic methodology selected to perform a bibliometric analysis, beginning with data extraction from the Web of Science database.

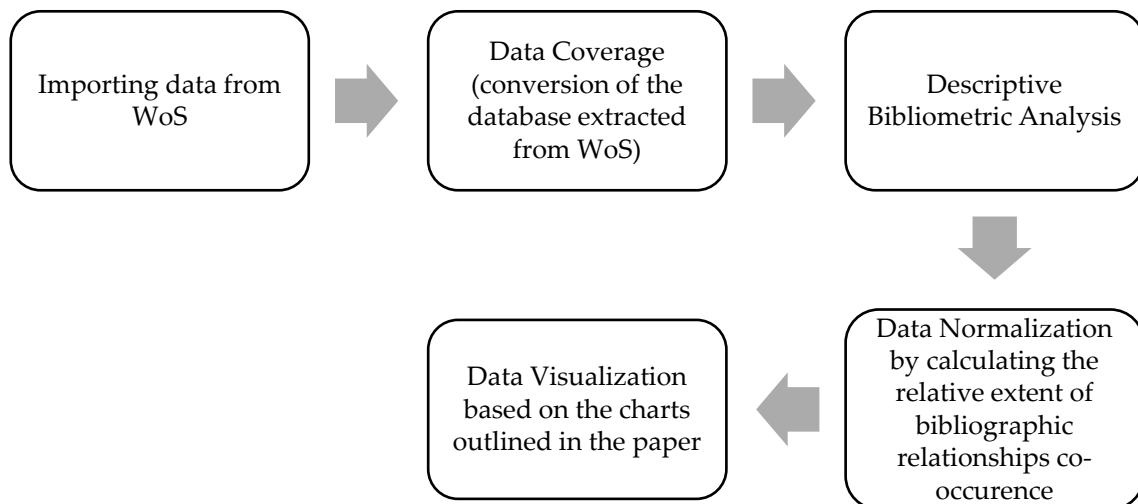


Figure 2. The data collection process. Authors' processing.

On 2 September 2024, the search terms from the phrase “risk management and the financial performance of companies” in article titles, keywords, and abstracts resulted in a total of 9092 articles, for the period 2020–September 2024. Although the keyword “sustainability” was not included in the initial search, the study aims to explore whether conclusions related to sustainability can be derived indirectly from the existing literature on risk management and financial performance. This approach allows for an unbiased assessment of the extent.

The VOSviewer program enhances analytical rigor, improving the clarity and impact of the findings [73]. While bibliometric analysis offers quantitative insights into research trends, it does not assess the qualitative depth, methodologies, or theoretical contributions of the reviewed papers. However, the integration of VOSviewer mitigates some of these limitations, providing structured visualization and data interpretation that supports a comprehensive understanding of research trends [74].

The extracted data were converted into a format compatible with VOSviewer, enabling detailed bibliometric analysis. A descriptive approach was employed to examine publication trends, key relationships, and the co-occurrence of bibliographic terms. Data normalization was conducted to calculate the relative extent of co-occurring bibliographic relationships. Finally, visualizations were created using charts and graphics, ensuring the clear and effective communication of findings, with tools like Tableau Public supporting the presentation of insights. These visualizations, created based on the papers' objectives, help to communicate the main results effectively.

The PRISMA flow chart from Figure 3 illustrates the step-by-step process of selecting studies from Web of Science to conduct a bibliometric analysis using VOSviewer. The process follows standard systematic review and scoping review methodologies to ensure the selection of relevant studies while eliminating irrelevant or duplicate records. The initial search in Web of Science identified 19,942 records. To refine the dataset, 10,850 records were removed before screening by applying a date filter (2020–September 2024). This step ensures that only the most recent and relevant studies are included in the analysis. After removing irrelevant records, 9826 studies were screened, and 726 records were excluded as they were published between September and December 2024, which were outside the predefined cutoff period.

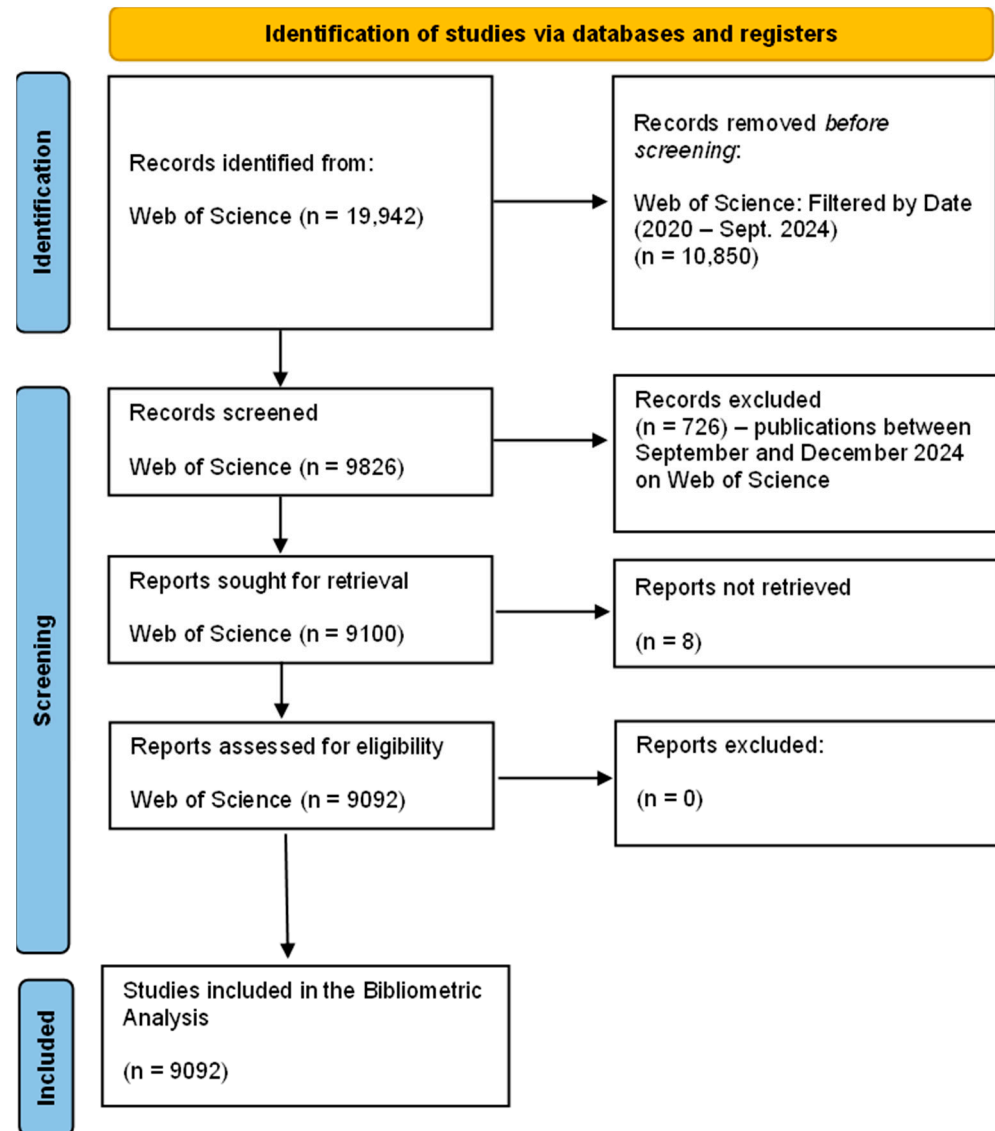


Figure 3. PRISMA flow chart.

This systematic review adheres to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a structured and transparent research process. After the eligibility assessment, 9092 studies were included in the bibliometric analysis.

The search query used in Web of Science was as follows:

ALL = (Risk Management and the Financial Performance of Companies)

This means that all indexed fields (title, abstract, keywords, and full text where available) were scanned for this phrase. The broad inclusion of search terms ensures the comprehensive coverage of studies related to risk management and financial performance, allowing for detailed bibliometric mapping. Additionally, all included materials were in English, which might introduce a language bias but ensures consistency in text analysis and interpretation. Table 2 provides a summary of the data collection process, including the source database, the total number of documents retrieved, and the search date.

Table 2. A general overview of data collection.

Database	Web of Science Core Collection
Total Documents	9092
Search Date	02.09.2024
Research Formula	ALL = (Risk Management and Financial Performance of Companies)
Period	2020–2024
Materials' Language	English

By examining publications that specifically address the interplay between risk management and financial performance, this study lays the foundation for a deeper exploration of the role of sustainability as a critical factor in strategic risk management. The analysis of this publication trend not only informs the current state of research but also identifies emerging themes and gaps in literature.

After the aforementioned sample was obtained, we performed the actual bibliometric analysis, using scientific mapping methodology through the VOSviewer software.

We began the analysis with descriptive statistics to observe general publication trends and patterns in the dataset. Following this, we analyzed the collaboration network between the authors, considering the countries of origin, to identify the interest of the academical community towards risk management and financial performance depending on the geographical regions. By establishing a minimum threshold of 40 works with the source in the same state, 15 countries were identified that met this criterion.

Finally, the distribution of the most frequently used keywords was analyzed, with the aim of observing and evaluating the links between them, considering only those keywords proposed by the authors in the published works, and a minimum threshold of 20 simultaneous occurrences was established for the analysis. Out of the total papers, 89 of the 15,221 keywords met this requirement (benefiting from 20 simultaneous occurrences).

4. Results

4.1. Descriptive Statistics

To analyze the evolution of research on risk management and financial performance, publication trends over time were examined. The analysis allows us to identify changes in publications on sustainability practices, risk management, and financial performance, providing a holistic perspective on corporate effectiveness and accountability. A graphical representation was created to illustrate the number of publications per year from 2020 to 2025.

Figure 4 illustrates the evolution of publications over time from 2020 to 2025, showing fluctuations in the number of published works. There is a steady increase in publications from 2020 to early 2023, peaking at over 200 publications. However, a sharp decline follows in mid-2023, with publication numbers dropping significantly through 2024 and stabilizing at a lower level by 2025. This trend suggests a surge in research interest during the early years, followed by a decline, possibly due to shifts in academic focus interests or data collection limitations.

Additionally, key descriptive statistics were calculated to quantify the publication dynamics, shown in Table 3. The Mean Publication Period and its Standard Deviation provide insights into the average timing of research output, while the Mean Publication Growth Rate reflects overall trends in publication activity.

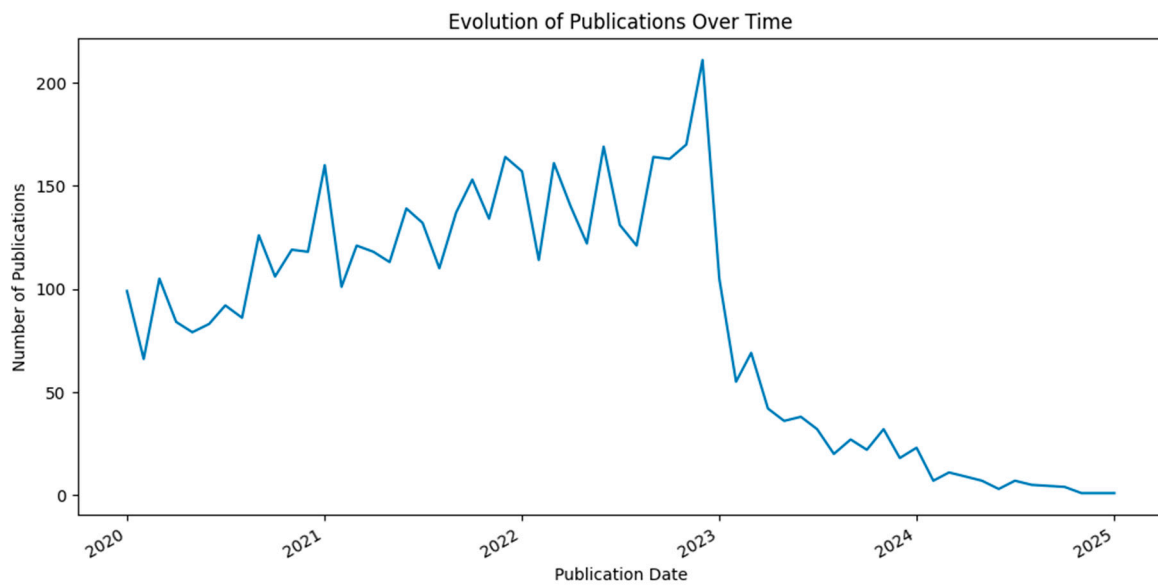


Figure 4. Evolution of publications over time.

The mean publication period of 30 October 2021 indicates a peak in academic interest in risk management and financial performance, likely driven by global corporate risk concerns. The standard deviation of 362 days suggests a steady research output rather than concentrated bursts.

Table 3. Descriptive statistics of publication trends.

Metric	Value
Mean Publication Period	30.10.2021 14:34:51
Standard Deviation of Publication Period	362 days 15:15:49
Mean Publication Growth Rate	−0.011

The mean publication growth rate of -0.011 reflects a slight decline in research activity post-2021. This trend may be due to saturation in post-pandemic financial sustainability studies and a shift towards emerging topics like ESG frameworks and digital transformation in risk management.

4.2. Authorship and Countries

The section presents a visualization analysis from Tableau Public of collaboration networks, focusing on countries/regions. It was observed that the most productive states occupy top positions in the ranking of the most cited articles. This is due to their economic size, investment in research, and economic infrastructure.

The authors' attention was first focused on the collaboration network between the authors, considering their countries of origin, to identify the interest of the scientific community in the quality of accounting information, depending on the geographical regions.

Figure 5 illustrates the global distribution of authors with published articles on risk management and financial performance between 2020 and September 2024. It highlights the countries with the highest number of authors contributing to this area, highlighting the geographical spread of academic contributions.

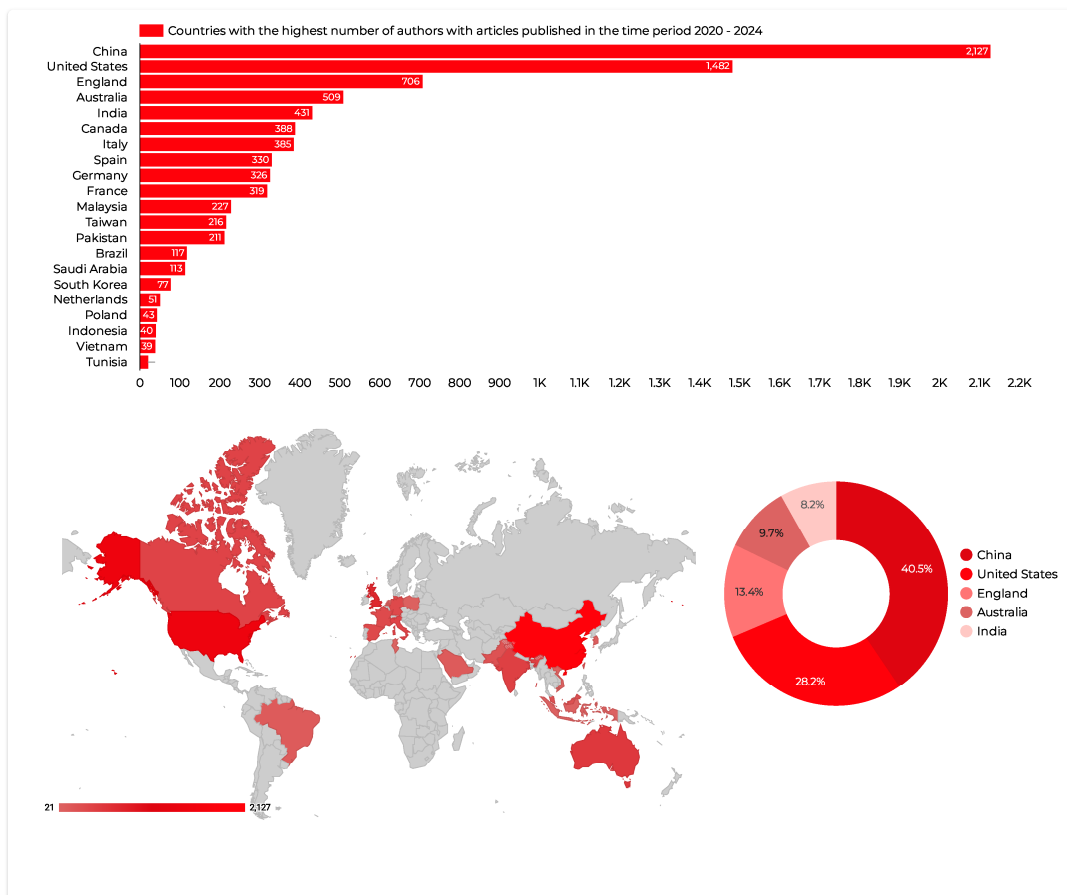


Figure 5. Countries with the highest number of authors with articles published in the time period 2020–September 2024. Source: authors' processing in Tableau Public.

In this case, the threshold value was set to 40, which means that the countries shown in the figure each have a number of authors with at least 40 published articles. A total of 15 countries met this criterion and were selected for further study and entered into the Tableau Public program to create an interactive graph. It is noted that the country with the greatest openness in terms of international collaboration is represented by China. It is followed by the United States, England, Australia, and India, which rank among the top five countries in terms of publishing research on risk management and the financial performance of companies.

China leads by a significant margin, with 2127 authors publishing research during this period, accounting for 49.3% of all top contributions. This reflects China's increasing influence and emphasis on risk management and financial performance studies, aligning with broader economic growth and expanding academic output. The United States follows, with 1482 authors, contributing to 34.3% of the publications. The strong presence of the US indicates its well-established research infrastructure and the importance given to risk management, especially in its highly developed financial markets. England ranks third with 706 authors (representing 16.4%), demonstrating its significant academic involvement in financial research, supported by its long-standing financial institutions and regulatory environment.

Other countries such as India, Australia, and Canada also have notable contributions, underscoring a growing interest in this area of research in both developed and evolving economies. The presence of countries such as Malaysia, Pakistan, and Brazil further emphasizes the global relevance of risk management and financial performance, with contributions from a variety of economic contexts. The geographic map provides a visual

representation of these data, where countries with higher author participation are marked in darker shades of red. This map further illustrates the dominance of China and the US in this academic space, while highlighting the growing research output from other regions.

4.3. Co-Occurrence of Authors' Keywords

A bibliometric analysis of authors' keyword co-occurrence examines how frequently specific keywords or phrases appear together in research papers. The correlation reflects how often two keywords are mentioned within the same paper. A stronger association between the terms results in a higher frequency of co-occurrence. Keywords within the same cluster exhibit a stronger connection, while those in different clusters have a weaker one. The relevance of each key term can be highlighted by means of connecting nodes, the size of which reflects the degree of importance: the larger the node, the more significant the term it represents within the analyzed sample.

Figure 6 highlights the relevance of the main keywords identified in the sample studied by the intensity of their connections with other keywords, analyzed based on their simultaneous appearance in the same paper. For this analysis, a minimum of 20 simultaneous occurrences of keywords was required. Out of the 15,221 keywords, 89 met this criterion. VOSviewer then assessed the degree of connectivity for each of these 89 keywords in relation to other terms or keywords.

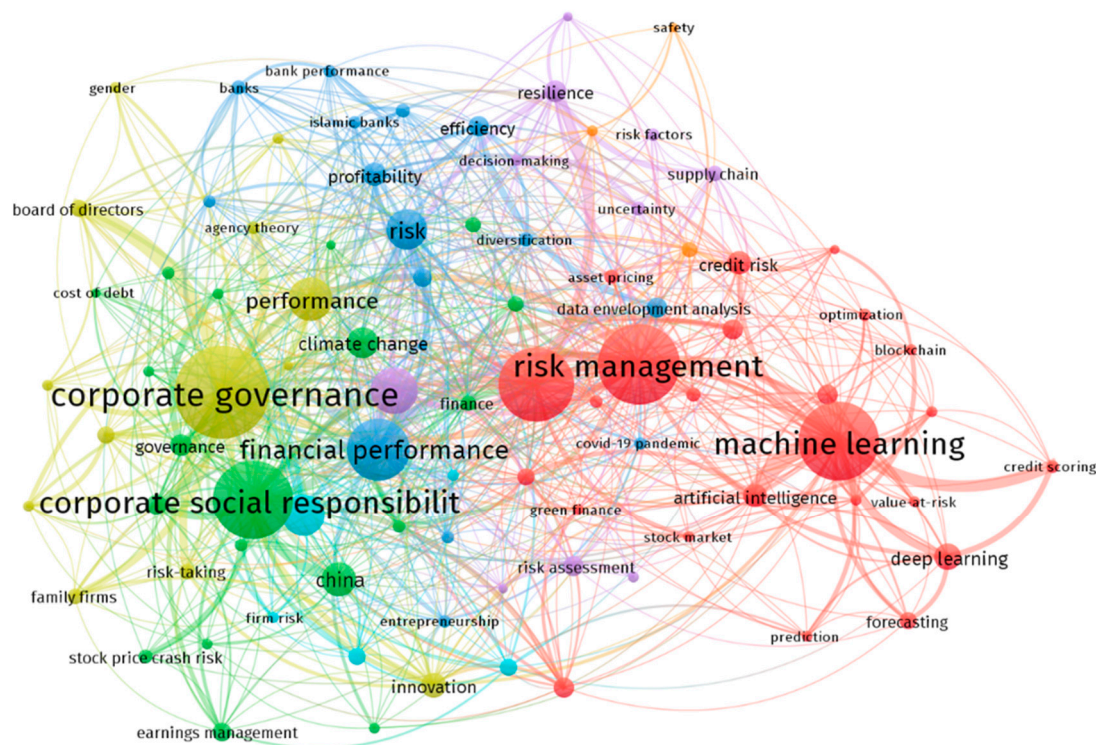


Figure 6. Map of authors' keywords. Source: authors' processing in VOSviewer (version 1.6.20).

The links between two nodes, represented graphically by curves, indicate the frequency of simultaneous occurrence of the connected terms: the thicker the link line, the more frequently the two terms appear together. Furthermore, a shorter curvature suggests a stronger relationship between the two terms.

Figure 6 illustrates the diagram generated from the authors' keywords, providing a visual representation of their interconnectedness. "Corporate governance", "Risk management", "Corporate social responsibility", "Machine learning", "COVID-19", "Financial

performance”, “Sustainability”, “Risk”, “Artificial intelligence” were the keywords that appeared the most common and were listed with the highest TLS (Total Link Strength).

At the core of the network, “Risk management” and “Machine learning” stand out as dominant themes, suggesting a strong focus on the intersection of traditional risk management practices and emerging technologies. The significant connection between these two terms indicates a growing interest in leveraging machine learning and artificial intelligence to improve risk assessment, forecasting, and decision-making processes. Related concepts such as deep learning, credit risk, and optimization are closely related, reflecting the integration of advanced computing techniques in the financial sector.

The term “corporate governance” forms another major group, closely related to “corporate social responsibility” (CSR) and “financial performance”. This cluster emphasizes the importance of governance mechanisms and CSR initiatives in shaping corporate behavior and influencing financial results. The presence of terms such as “board of directors”, “governance”, and “agency theory” indicates a strong focus on structural aspects of governance and their impact on risk management and performance.

In addition, terms such as “climate change”, “green finance”, and “sustainability” appear in close proximity to corporate governance, underscoring the growing importance of environmental and social factors in corporate risk management strategies. The link between risk-taking and performance reflects ongoing research on the balance between risk exposure and financial performance, particularly in the context of sustainability and governance practices.

4.4. Term Co-Occurrence in Abstracts and Titles

Analyzing the co-occurrence of terms in abstracts and titles is a key analytical approach for understanding the thematic structure and research trends within a specific field. Relationship analysis can be used to determine the co-occurrence of elements across different documents. This analysis helps to identify trending topics and emerging patterns in scientific research, enabling more effective monitoring and follow-up. In this study, bibliometric analysis using VOSviewer software was employed to map the co-occurrence of keywords and terms related to risk management and financial performance in article titles and abstracts.

The network visualization shown in Figure 7 highlights the co-occurrence of terms related to risk management and financial performance in academic publications indexed by the Web of Science from 2020 to September 2024. The distinct color-coded clusters reveal key topics such as process optimization, financial indices, and firm-specific factors, offering insights into the evolving discourse in the field.

To analyze the relevance of terms in abstracts and article titles, a term needed to appear for a minimum of 50 times across the articles included in the study. From a total of 114,406 keywords, 599 met the condition. For each of the 599 terms, a relevance score was calculated. An amount of 60% (359 terms) was chosen for term relevance score calculation as the default value. Thus, four clusters were created, illustrated in blue, green, red, and yellow, as depicted in Figure 7.

Different terms or phrases within each cluster are grouped around a central theme. The terms that appear most frequently are outlined as follows:

The Red Cluster (“Tools and Techniques for Assessing and Optimizing Financial Risk and Performance”) encompasses concepts, methods, techniques, and tools used to assess, manage, and optimize the risk and financial performance of companies, taking into account factors such as probability, losses, financial resources, applied technologies, and simulation and estimation processes. The terms that appear most frequently are system, process, technique, problem, outcome, tool, assessment, rate, loss, probability, challenge, application,

prediction, feature, dataset, distribution, field, use, capacity, service, network, solution, optimization, accuracy, improvement, risk assessment, estimation, financial resource, parameter, comparison, algorithm, function, simulation, criterion, concept.

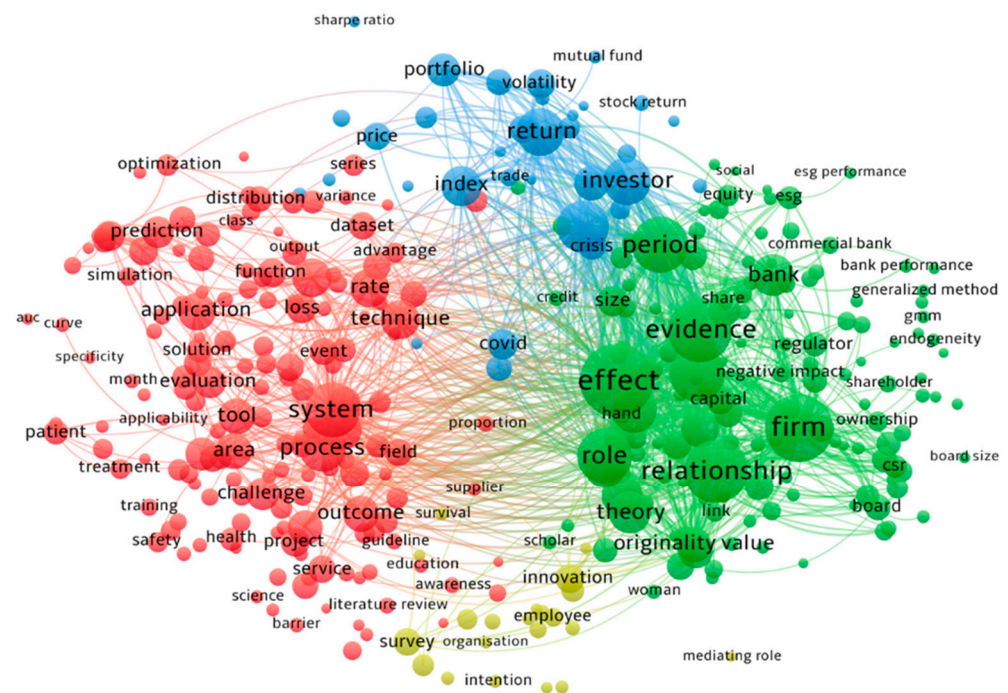


Figure 7. Map of terms in abstracts and titles. Source: authors' processing in VOSviewer.

Among the most used financial risk assessment tools are sensitivity analysis and scenario analysis, which allow for identifying and quantifying the impact of risk factors on financial indicators. For example, studies by Copeland and Weston [75] emphasize the use of these techniques to anticipate potential variations in cash flows.

To optimize financial performance, techniques such as the analysis of financial ratios (profitability, liquidity, solvency) and the Balanced Scorecard, formulated by Kaplan and Norton [76], are often used in the specialized literature.

In the context of risk and financial performance, the CAPM model (Capital Asset Pricing Model), detailed by Sharpe [77], is another example often used to determine the relationship between risk and return, being especially applied in investment bank decisions and portfolio management.

These tools and techniques give financial managers a clear view of risks and opportunities, enabling them to make informed decisions and improve the organization's financial performance. Table 4 presents the clusters created based on the keywords and terms from the diagram in Figure 7.

The Green Cluster ("Empirical and Theoretical Analysis of Institutional and Governance Factors in the Financial Performance of Companies"). This category includes terms related to the impact and relationships between different economic, governance, and institutional factors on the financial performance of firms. It focuses on the empirical and theoretical analysis of the role of banks, firms, capital, corporate governance, and social responsibility, also integrating practical and theoretical perspectives deriving from studies carried out in different periods and countries. It has 142 terms, and the terms frequently appearing in the abstracts and titles of the articles are as follows: effect, firm, evidence, relationship, period, role, sample, theory, implication, influence, bank, commercial bank, financial performance, size, country, originality value, empirical evidence, practical im-

plication, financial crisis, equity, governance, association, capital, corporate governance, corporate social responsibility, board, director, design methodology approach, policymaker.

Table 4. Keyword clusters. Source: authors' processing.

Tools and Techniques for Assessing and Optimizing Financial Risks and Performance—Cluster 1 (Red)	Empirical and Theoretical Analysis of Institutional and Governance Factors in the Financial Performance of Companies—Cluster 2 (Green)	Analysis of Financial Market Volatility and Investment Performance in the Context of Global Crises—Cluster 3 (Blue)	Adoption of Innovation and Organizational Culture in Small and Medium Enterprises—SMEs—Cluster 4 (Yellow)
Tool	Role	Portfolio	Employee
Technique	Evidence	Investor	Adoption
System	Effect	Market	Innovation
Rate	Theory	Volatility	Culture
Process	Firm	Return	Survey
Problem	Relationship	Index	Perception
Probability	Influence	Fund	Respondent
Prediction	Governance	Bond	Entrepreneurship
Outcome	Period	Asset	Questionnaire
Loss	Implication	Stock Market	Medium-Sized Enterprise
Feature	Size	Benchmark	Competitive Advantage
Challenge	Bank	Price	Intention
Assessment	Sample	COVID	Attitude
Application	Financial Performance	Financial Market	Organization

A significant example from the specialized literature is the study by Porta et al. [78], who explores the influence of legal institutions and property rights on financial performance. They showed that countries with a strong legal system and effective shareholder protections tend to have companies with superior financial performance. Shleifer and Vishny [79] also accentuate the relevance of effective corporate governance in maximizing shareholder value. They show that strong governance structures such as independent boards of directors, effective internal control mechanisms, and transparent reporting contribute to better financial performance.

The Blue Cluster (“Analysis of Financial Market Volatility and Investment Performance in the Context of Global Crises”) contains 33 terms: market, return, investor, index, asset, portfolio, COVID, volatility, stock market, fund, stock, price, financial market, stock return, mutual fund, bond, stock price, diversification, benchmark, empirical result, trade, market risk, global financial crisis. This category covers issues associated with the performance of financial markets and investments, including market volatility, and asset returns, investor behavior, as well as the effects of global crises, such as the global financial downturn and the COVID-19 pandemic.

Within the framework of the global financial crisis of 2008, Coval et al. [80] analyzed the volatility of bond and credit markets. Volatility during periods of crisis, such as 2008, highlights the significant risks associated with investing in derivative financial assets and corporate bonds. In the present situation, the COVID-19 pandemic represented another major test for financial markets. Zhang et al. [81] analyzed the effects of the pandemic on market volatility and concluded that crisis-induced volatility was one of the most severe in history, with major impacts on stock, bond, and commodity prices.

The Yellow Cluster (“Adoption of Innovation and Organizational Culture in Small and Medium Enterprises—SMEs”) has 21 terms: innovation, survey, adoption, perception, questionnaire, employee, attitude, culture, trust, medium-sized enterprise, respondent, intention, organization, SME, entrepreneurship, competitive advantage, consumer, me-

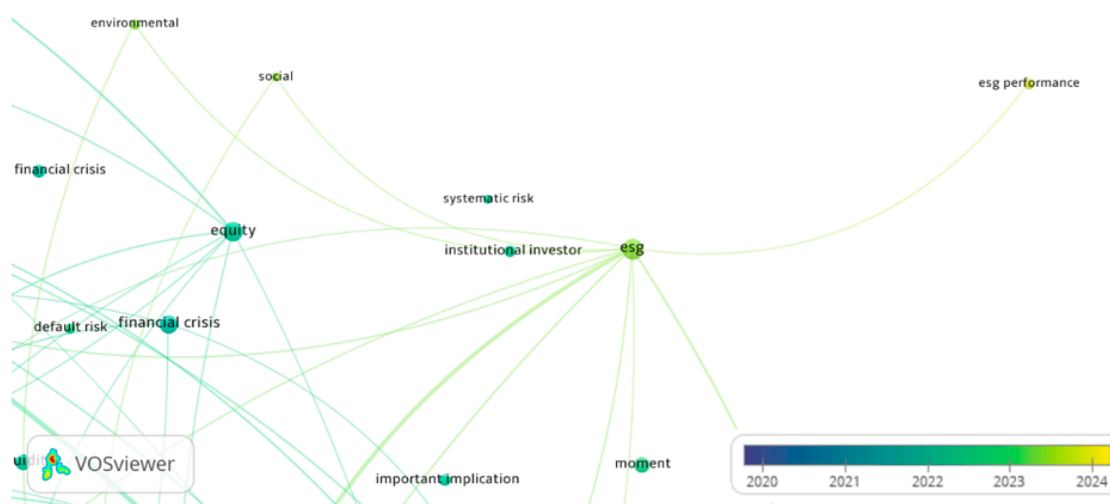


Figure 9. The density visualization map enlarged. Source: authors' processing in VOSviewer.

This VOSviewer network visualization presents key terms and their interconnections in recent academic research, focusing on topics such as investor behavior, firm performance, and evidence-based relationships. Terms in this co-occurrence map are color-coded by time, with a gradient from blue (2020) to yellow (2024), indicating recent research focus on each topic. On the right side of the map, terms like “CSR”, “ESG”, and “board” indicate a growing interest in corporate social responsibility (CSR) and environmental, social, and governance (ESG) factors.

As can be seen in the overlay diagram above, although still in relatively small numbers, researchers have recently begun to integrate Environmental Social Governance (ESG) into their work. The enlarged section of the overlay diagram placed at the top indicates that scholars are primarily focusing on solutions in response to current sustainability issues.

Overall, this visualization reveals that research in recent years has turned to analyzing the complex relationships between investor behavior, firm performance, and broader economic and societal factors. The growth of terms such as “COVID”, “ESG”, and “innovation” shows how global challenges and technological advances have influenced the field, while methodological tools such as simulation and evaluation are increasingly used to navigate this complexity. Using color to track research trends over time highlights the ongoing evolution of these research themes, with more recent topics focused on sustainability and resilience in the face of global crises.

5. Discussion

This study identifies a significant research gap in the existing literature by revealing latent connections between risk management, financial performance, and sustainability. Romanian companies such as Dedeman, Banca Transilvania, Rompetrol, and Albalact exemplify how integrating sustainable risk strategies enhances reputation and boosts sales. It extends prior knowledge by mapping how global challenges like the COVID-19 pandemic, climate regulations, and technological change shape sustainability-driven risk strategies. Despite its contributions, the study has certain limitations. It relies solely on WoS articles, potentially narrowing its scope, and it includes only eight months of 2024 data. Delayed indexing may also affect publication counts. Furthermore, most prior research focuses on developed regions, leaving emerging markets in Africa, South Asia, and Latin America understudied [83], despite their unique economic and social contexts [84,85]. To support the integration of risk management and sustainability, companies can adopt the following strategies: cultivate a sustainability-focused culture, including staff training in

risk and sustainability practices; implement integrated management systems considering the adoption of international standards, such as ISO 31000 [86] for risk management and ISO 26000 [87] for social responsibility; promote transparency through regular reporting aligned with international guidelines; engage stakeholders to identify and address key sustainability and risk concerns; and monitor and evaluate performance with clear indicators.

Figure 10 presents key recommendations and specific aspects of risk management, serving as a practical guide for structuring a risk management plan that can be tailored to the specific needs of each organization.



Figure 10. Framework for sustainable risk management strategy. Source: authors' processing.

6. Conclusions

In conclusion, this study analyzed the evolution of risk management research, focusing on the interaction between risk management, sustainability, and the financial performance of companies. The findings suggest that efficient risk management plays a major role in enhancing financial performance. This underscores the importance of adopting sustainability practices for effective risk management. This proposal is consistent with the literature, which in recent years has demonstrated a positive link between risks and performance [11,60,88], and this article further contributes to this field by highlighting the need for risks to be clearly detailed and transparent in companies' sustainability reports.

In addition, the study aligns with the conclusions of other research, confirming the significance of risk management in increasing financial performance, but stands out for its additional details regarding its systematic approach to bibliometric data and in highlighting recent trends that emphasize the contribution of sustainability in risk management. By analyzing the literature of the last four years, the study reveals that the integration of sustainability aspects is an emerging direction in this field, indicating a paradigm shift in the management of long-term financial risks.

Compared to other works, this article adds value by using in-depth relational analysis and applying VOSviewer software to explore topic networks and keyword co-occurrence,

a relatively rare approach in literature. Consequently, the most important aspects of the information content related to risk management research are highlighted (the most used methods, countries with the highest number of authors publishing articles on this topic, co-occurrence of keywords).

The results obtained from the analysis of the key terms through the graphic nodes support the research hypothesis regarding the existence of a link between risk management, sustainability, and the financial performance of companies. At the same time, the spatial distribution of the total output in the field shows that the most relevant country in terms of authors researching the topic of risk management and financial performance of companies is China, succeeded by the United States, England, Australia, and India.

The limited number of bibliometric studies addressing risk management, sustainability, and the financial performance of companies in the specialized literature gives the analysis a valuable addition to the field of finance by delivering premises for future research and a starting point regarding relevant bibliographic references on this topic. Also, the originality of this work consists of the use of an advanced method of relational analysis, which reveals not only the correlations between variables, but also the importance of adopting transparent risk management policies within companies.

Overall, the review of recent research highlights that effective risk management is important for companies seeking to improve their financial performance. The integration of sustainability practices and strong corporate governance structures are essential components that help companies manage risk more effectively. In addition, the global focus on these areas and the increasing diversity of research methodologies reflect the increasing complexity of risk management in today's business environment.

Considering the subjective nature of qualitative research, we believe that this article, based on a bibliometric analysis of scientific studies indexed in international databases, can make a useful contribution to the activity of financial research for researchers interested in the field and for future research. This study is particularly useful to managers, who can become aware of the profound impact of risks on financial performance and improve their identification and reporting processes. At the same time, the study also provides a reference base for researchers and professionals in the field, helping them to follow emerging research directions and to understand the central role of risks and sustainability in achieving organizational performance.

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Abbreviations

The following abbreviations are used in this manuscript:

ERM	Enterprise Risk Management
ROA	Return on Assets
ROE	Return on Equity
ROI	Return on Investment
PMS	Performance Management System

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