

The Role of ESG Mitigating Climate Risks within the Financial Sector

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Abstract. The financial sector faces major challenges due to risks related to climate change that impact stability and performance. This study systematically reviews how ESG criteria mitigate these risks, with the aim of uncovering methodological factors that integrate ESG in sustainable financial economic risk management and enhance financial stability. This study uses systematic literature review methodology (SLR) to analyse studies relevant to the need for sustainable financial practice between 2019 and 2024, addressing the urgent need for sustainable financial practices, with a focus on reputable Scopus journal articles. Using the PECO framework to guide ESG research; ESG strategies improve climate risk mitigation and financial performance. Key aspects: transparency, green finance, integrated risk management, stakeholder engagement, internal policies, regulatory adaptation, collaboration. This study contributes to the existing literature by highlighting effective ESG integration strategies and providing valuable information to policy makers and financial institutions to improve sustainability and effectively manage climate risks.

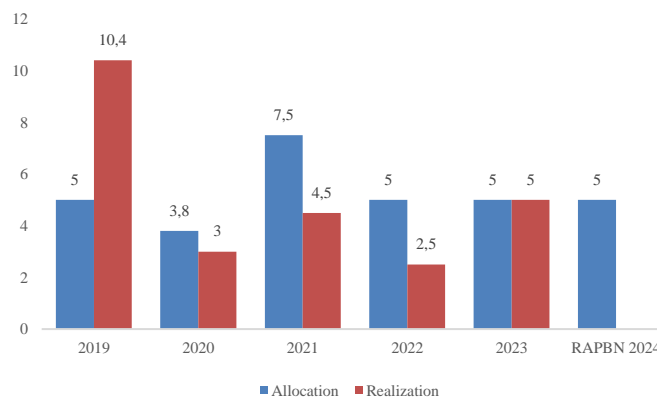
Keywords: ESG, climate risk, financial sector, systematic review of the literature, sustainability, financial stability.

I. Introduction

Climate risk has been recognised as a new source of risk for the financial system (Battiston et al., 2020). In general, the financial sector faces major challenges from climate-change-related risks, which can have a significant impact on financial stability and performance (Monasterolo & Volz, 2020). The effects of climate change include both physical risks (natural disasters) and transition risks (changes in policies, technologies, markets) that can cause financial instability and threaten the assets and operations of financial institutions (Battiston et al., 2020).

According to the data, the financial memo, along with the draught state budget for fiscal year 2024, disaster risk is one of the fiscal risks that the government needs to be aware of. This risk is included in certain fiscal risks and has a significant impact on the national economy. The following graph illustrates the impact of losses caused by natural disasters.

Graph 1. Development of Natural Disaster Management Reserve Funds 2019-2024
(in trillion rupiah)



Source : (Kementrian Keuangan, 2023)

Based on data from the *Kementrian keuangan (2023)*, from June 2019 to June 2023, the average annual loss due to natural disasters reached a high figure of Rp22,850 billion. For example, the Aceh tsunami in 2004 cost the state Rp51,400.0 billion, followed by the Yogyakarta earthquake in 2006 (Rp29,150.0 billion), the Padang earthquake in 2009 (Rp28,500.0 billion), the southeast Sulawesi earthquake and tsunami in 2018 (Rp23,100.0 billion), and the West Nusa Tenggara earthquake in 2018 (Rp18,200.0 billion). Financial losses from other natural disasters are equally significant, such as forest and land fires in 2015 (IDR 16,100.0 billion), the DKI Jakarta floods in 2007 (IDR 5,180.0 billion), and Mount

Merapi eruption in 2010 (IDR 3,630.0 billion). When losses from these natural disasters exceed the allocated budget, potential fiscal risks arise.

This can certainly endanger existing financial stability (Noth & Schüwer, 2017). Losses due to natural disasters include various types of disasters such as earthquakes, floods, tsunamis, landslides, and volcanic eruptions (Botzen et al., 2019). These losses include not only damage to physical infrastructure such as roads, bridges, and buildings, but also broader economic losses such as disruption to economic activity, increased rehabilitation and reconstruction costs, and decreased revenues for affected areas (Panwar & Sen, 2018). Disaster risk mitigation efforts undertaken by the government include the preparation of risk maps, increasing disaster management capacity, and allocating reserve funds for disasters in the state budget (Pancasilawan, 2020).

Therefore, to overcome these challenges, ESG is an important component (Krueger et al., 2019). ESG stands for Environmental, Social, and Governance, which are the three main factors used to measure the sustainability and ethical impact of investment returns in a business or company (Krueger et al., 2019). ESG criteria are becoming increasingly important in climate risk mitigation as they help identify and manage risks associated with climate change (Monasterolo & Volz, 2020). The use of Environmental, Social and Governance (ESG) has been shown to have a significant effect in increasing investment by investors, as it considers climate factors before (Krueger et al., 2019)k.

According to Boffo & Patalano (2020), ESG considerations cover various aspects. On the environmental side, ESG encourages a more sustainable management of natural resources and reduces carbon emissions. On the social side, ESG emphasises the importance of corporate social responsibility towards society and employees. Good governance involves transparency and accountability practices that can reduce the risk of corruption and corporate scandals where the company's reputation becomes good (Eccles et al., 2014). Implementing ESG principles into the decision-making process enables the financial sector to manage risks from climate change more effectively. Research shows that companies with good ESG scores tend to have more stable financial performance and fewer climate-related risks (Friede et al., 2015). In addition, financial institutions that adopt ESG principles can increase investor confidence and reduce capital cost (Giese et al., 2021).

Although many studies have shown the benefits of implementing ESG principles, there is still a significant research gap related to how ESG integration specifically mitigates climate risk in the financial sector. Most studies still focus on the general impact of ESG on corporate financial performance without examining in depth specific climate risk mitigation mechanisms (Busch et al., 2016)b. In addition, not many studies have explored how various subcomponents of ESG interact with each other in the context of climate risk management (Hartzmark & Sussman, 2019). Research on the implementation of ESG has mostly focused on large companies or specific financial institutions, while there is little research that examines how small and medium financial institutions adopt and implement ESG principles (Clark et al., 2015).

Based on several existing research phenomena, this study aims to conduct a systematic review of the role of ESG in mitigating climate risk. This study will analyse how ESG criteria can reduce climate risk in the financial sector. Through this analysis, an effective methodology can be found to integrate ESG aspects in sustainable financial risk management and understand its potential impact on financial stability.

This article seeks to fill this research gap by conducting a systematic review of this issue in the context of financial sustainability. By doing this, we aim to answer the research question How ESG factors influence climate risk mitigation and their contribution to such mitigation as well as the overall impact of the integration of ESG criteria on the performance and financial stability of companies.

II. Review of the literature

Stakeholder Theory

Stakeholder theory states that organisations have responsibilities not only to shareholders, but also to a wider group of stakeholders, including employees, customers, suppliers, communities, and the environment (Freeman, 1984). Meanwhile, Donaldson & Preston (1995), divide stakeholder theory into three categories: descriptive, instrumental, and normative. This theory emphasises that companies should not only focus on maximising shareholder wealth but also consider the interests of all stakeholders to create long-term value and sustainability.

Stakeholder theory highlights that financial institutions integrate environmental, social and governance (ESG) principles to meet stakeholder expectations, improve their reputation, and ensure long-term viability (Lokuwaduge & Heenetigala, 2017). By adopting ESG strategies, institutions can build trust with stakeholders, including investors, customers, and communities, thus strengthening their competitive advantage (Alsayegh et al., 2020). This integration not only meets the ethical and social demands of

stakeholders, but also mitigates operational and reputational risks that lead to sustainable growth and financial stability (Kulova & Nikolova-Alexieva, 2023).

Legitimacy Theory

Legitimacy theory is a concept that focusses on the congruence between the social values inherent in an organisation's activities and the norms of acceptable behaviour in the broader social system. Legitimacy can be defined as the perception or assumption that an entity's actions are desirable, appropriate, or feasible within a socially constructed system of norms, values, beliefs, and definitions (Suchman, 1995). Organisations are considered legitimate or have legitimacy if their activities conform to societal expectations. When there is a gap between these values, a threat to the organisation's legitimacy may arise, which may manifest itself in legal, economic, or social sanctions (Dowling & Pfeffer, 1975). This theory is particularly relevant in the context of companies engaging in environmental information disclosure, where these disclosures are often used to gain, maintain, or improve their legitimacy in the eyes of the public (O'donovan, 2002).

Legitimacy theory is particularly relevant in the context of the application of environmental, social and governance (ESG) in mitigating risks in the financial sector. The implementation of ESG can enhance a company's legitimacy, as it demonstrates a commitment to socially and environmentally responsible business practices. By adopting ESG policies, financial institutions can strengthen their legitimacy in the eyes of stakeholders, which in turn can increase trust and support from those stakeholders (Deegan, 2019). Furthermore, companies that prioritise ESG can improve their image and reduce reputational risks, thus strengthening their long-term stability and sustainability (Mousa & Hassan, 2015).

Environmental, Social, and Governance (ESG)

Environmental, Social, and Governance (ESG) is an important element of the financial sector, guiding sustainable and ethical investment strategies (Widyawati, 2019). The components of ESG include environmental considerations such as climate change and resource depletion, social factors such as labour standards and community impact, and governance aspects that include corporate behaviour and executive compensation (Popescu et al., 2022). The ESG framework originated from Corporate Social Responsibility (CSR), which evolved into a comprehensive investment strategy that aligns financial objectives with sustainable practices (Billio et al., 2024; Macneil & Esser, 2021).

ESG factors play an important role in risk management and driving sustainability in financial institutions (Yu, 2023). ESG principles help financial institutions mitigate risks associated with environmental degradation, social unrest, and poor governance (T. T. Li et al., 2021). By addressing these risks, financial institutions can improve their resilience and long-term performance (Tashtamirov, 2023). Research shows that incorporating ESG factors into the risk management process not only helps to identify potential risks but also to capitalise on sustainable growth opportunities (Kalfaoglou, 2021; Yu, 2023).

Climate Risks

Climate risks fall into two main categories: physical and transitional. Physical climate risk refers to the direct impacts of climate change, such as extreme weather events, sea level rise, and long-term changes in climate patterns that can damage assets, disrupt supply chains, and affect productivity (Boschi, 2023; Street et al., 2019). Transition risks, on the other hand, are related to the social and economic changes required to mitigate climate change, including changing market dynamics, policy measures, and technological advances aimed at reducing carbon emissions (Faccini et al., 2021; Ginglinger, 2020).

In the financial sector, climate risks have significant implications for green finance and sustainable investment practices (Tripathy, 2017). As awareness of these risks increases, institutional investors are increasingly considering physical and transitional climate risks in their investment decisions (Krueger et al., 2019). This includes assessing the impact on the value of real estate, debt, and equity, as well as ensuring compliance with existing regulations, thereby directing capital flows to more sustainable investments (Sanderson et al., 2019). Furthermore, financial institutions are also encouraged to disclose their climate risk exposure and strategies to mitigate these risks, which in turn can improve reporting transparency and encourage long-term economic activity (Myklebust, 2022).

III. Research Methods

Review of the systematic literature

In recent years, systematic literature review (SLR) has become an increasingly popular knowledge synthesis method (Mengist et al., 2020). SLR is a method to map key concepts in a research area and identify the main sources of research topics (Thomé et al., 2016). This study will use the SLR approach to see how ESG criteria can reduce climate risk in the financial sector.

The SLR framework introduced by O'Malley (2005) employs the Scoping Review method. This approach is used to map the existing literature on a broad topic, identify research gaps, and determine the extent of current evidence. It provides a comprehensive literature map that is instrumental in identifying gaps and thus generating new research questions. Conducting a systematic literature review involves five main stages, which are

Table 1. Framework Systematic Literature Review

Originator	Purpose	Stages
Arksey & O'Malley, (2005)	<ol style="list-style-type: none"> 1. Map the scope, reach, and types of research activities carried out in the field of interest. 2. Determine the need and potential costs of conducting a comprehensive systematic review. 3. Identify research gaps. 4. Synthesise and disseminate the results of research. 	<ol style="list-style-type: none"> (1) Identify research questions. Research questions of breadth and scope to clearly define parameters and ensure coverage. (2) Identify relevant studies. Develop comprehensive search strategies to find relevant studies with the appropriate use of databases. (3) Study selection. In contrast to systematic reviews, inclusion and exclusion criteria in SLRs are not predetermined but develop over time. Familiarise researchers with existing evidence. The selection was performed by quickly reviewing the title and abstract to exclude studies that did not meet the criteria. (4) Graph the data. Data from included studies were extracted and organised in a consistent format. Data extraction forms are used to capture important information such as: <ol style="list-style-type: none"> 1. Research characteristics: author, year of publication, research design 2. findings and conclusions (5) Compile, summarise, and report the results. This synthesis is narrative in nature. The results are summarised to highlight key findings, identify trends, and discuss implications for the financial sector. Any gaps in the literature will also be noted to suggest areas for future research.

However, the term “green financing” is defined in different ways by different scholars. The scope and content of the definitions, on the other hand, are similar (Lindenberg, 2014). Due to the breadth of the terminology used in green finance, we narrowed them down to Environmental, Social, and Governance (ESG) in finance, climate risk management in the financial sector, and sustainable finance or green finance based on the contents of the papers and their usefulness. Therefore, we identified the best-related scope of green finance for our review. We extracted the resource using the following keywords from the databases: All = (“ESG” OR “environmental, social, governance”) AND (“climate risk” OR “climate finance” OR “carbon finance”) AND (“sustainable finance” OR “green finance”). The search mainly focused on mapping existing literature on sustainability finance in the fields of business and economics, social sciences, environmental sciences, and other multidisciplinary fields.

We identified the most relevant climate risk mitigation scopes for our study. We extract resources using keywords from the Google Scholar database. We established criteria to include and exclude articles for review. In doing so, we used a variety of search mechanisms to organise and identify the most important and relevant studies. Initially, we set a period for published research. All searches from 2019 to 2024 are included, and other searches are excluded. This period was chosen to ensure that articles with related climate risk mitigation were still relevant and up to date. Second, we only included research written in English. Finally, we only included documents presented as articles and reviews in journal proceedings; we excluded other types of documents and articles in the media. The selection criteria were based on the PRISMA statement (Haddaway et al., 2022).

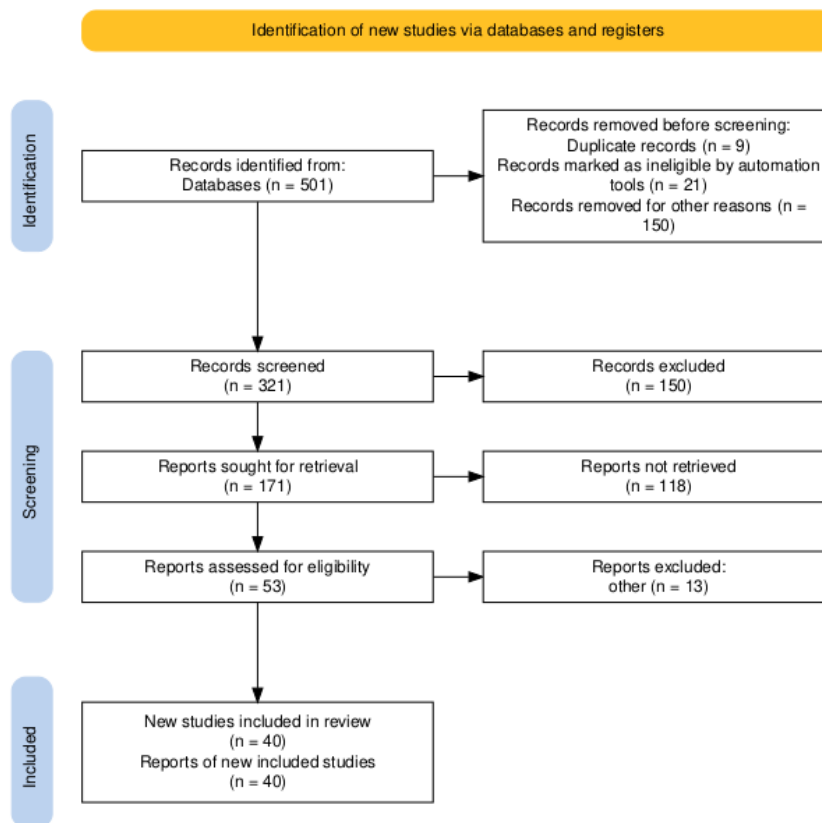


Figure 1. The PRISMA flow diagram

The flow chart illustrates the detailed screening process used in our study. Initially, 501 records were identified from databases. After removing 9 duplicate records, 21 records marked as ineligible by automation tools due to incomplete data or unsuitable abstracts, and 150 records removed for other reasons, such as being online books instead of articles. Of these, 150 records were excluded because they were published in lower-quality journals. We sought to retrieve 171 reports, but 118 were not freely accessible. Of the 53 reports assessed for eligibility, 13 were excluded because their theories, samples or results did not address the research questions. Ultimately, 40 new studies were included in the review.

IV. Results and Discussion

Identify Research Questions

In this study, the PECO (Population, Exposure, Comparison, Outcome) framework was used to formulate and answer the research questions. According to da Silva Bastos, PECO is an effective tool for formulating research questions that can guide the literature search process and synthesise evidence systematically. The use of the PECO framework also facilitates the identification and selection of relevant literature, reduces bias, and increases the reliability and validity of research findings (Livoreil et al., 2017).

Research Question (RQ) : *RQ1* What ESG factors influence climate risk mitigation?

		<i>RQ2</i> How do these factors contribute to mitigation of climate risk?
		<i>RQ3</i> How does the integration of ESG criteria impact a company's performance and financial stability?
PECO framework	:	
Population	:	Financial institutions or companies involved in investment or asset management.
Exposure	:	Implementation of specific ESG strategies.
Comparison	:	Companies that do not implement ESG strategies or use non-ESG approaches.
Outcomes	:	The effectiveness of climate risk mitigation is measured through various indicators such as reduced carbon emissions, resilience to climate change, better financial performance, and other long-term impacts.

The existing framework is used to identify significant differences in the implementation of ESG strategies across different financial organisations and their impact on the mitigation of climate risk. In several studies, it was found that companies that implement ESG strategies tend to perform better in terms of environmental sustainability and long-term financial performance (Sassen et al., 2016).

This research question focuses on the importance of exploring the different ESG strategies implemented by an organization. This is because not all ESG strategies will yield the same results in the context of climate risk mitigation. Some companies may focus on reducing carbon emissions through green technology, while others may emphasize more on internal policies that support sustainability.

The study conducted by Eccles et al., (2014), shows that different ESG approaches can produce varying results depending on the specific context and implementation of each strategy. By focusing on climate risk mitigation, this study aims to provide more specific insights into the contribution of ESG to environmental sustainability. Companies that adopt ESG strategies generally show better resilience to climate change risks, which is reflected in improved long-term financial and operational performance (Zhou et al., 2022).

Identify Relevant Studies

The subsequent phase involved developing keywords and search terms derived from the scoping study, relevant literature, and internal agreement (Tranfield et al., 2003). (Chang et al., 2021) emphasized the importance of ensuring search terms encompass as much pertinent literature as possible while still retaining specificity and relevance.

The article search strategy employed the Scopus database, which is capable of filtering a larger number of articles based on predefined search queries. This process also included applying specific filters to ensure that only high-quality and reputable sources were included in the review. The filters applied were as follows: publication year from 2019 to 2024, source type limited to open access journals, document type restricted to articles, and language set to English. Keywords used in the search were “ESG” OR “environmental, social, governance” AND “climate risk” OR “climate finance” OR “carbon finance” AND “sustainable finance” OR “green finance”. Additionally, artificial intelligence tools such as Scispace and Elicit.org were utilized to assist in analyzing the findings from the collected studies.

The search strategy was designed to ensure broad yet specific coverage, using a combination of words that covered various aspects of ESG, climate risk and finance. The use of OR and AND logic on keywords helped in expanding the search to include synonyms and relevant related topics. The databases selected were the most relevant and comprehensive in the field of financial management, with a focus on open access publications to ensure openness and accessibility of research results.

Study Selection

Inclusion and exclusion criteria were made clear to ensure that only relevant and high-quality studies would be included. These criteria cover various aspects such as the type of study, the population studied, the concepts explained, and the research context. This approach helps avoid bias and ensures that the review results are reliable and valid (McShane et al., 2016).

In this study, inclusion and exclusion criteria were applied based on the Population, Concepts and Context (PCC) guidelines from the Joanna Briggs Institute. This method requires researchers to systematically consider the characteristics of the population being studied, the concepts being studied, and the context in which the research is conducted (Gagliardi et al., 2019). By applying PCC guidelines, this

research can ensure that the selected studies are truly relevant to the research questions and review objectives (Suba & Pelter, 2019).

Table 2. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population	Studies involving global financial institutions, including banks, investment firms, insurance companies, and asset management companies. Research focusing on institutional investors and their ESG practices.	Studies focused on non-financial sectors, such as manufacturing, retail, or services. Research involving individuals or retail investors rather than institutional investors.
Concept	Studies examining the implementation and impact of ESG (Environmental, Social, and Governance) strategies. Research that investigates the mitigation of climate-related risks through ESG strategies. Studies analyzing the relationship between ESG practices and market volatility. Research exploring the long-term financial stability of institutions adopting ESG strategies.	Studies that do not explicitly address ESG strategies. Research focusing solely on environmental sustainability without considering social and governance aspects. Studies that do not link ESG practices to climate risk mitigation or financial stability. Purely theoretical or conceptual papers without empirical data.
Context	Studies conducted in the context of global financial markets. Research focusing on various geographical regions, including but not limited to North America, Europe, Asia-Pacific, and emerging markets. Studies considering the regulatory and policy environment related to ESG and climate risk.	Studies limited to a specific non-financial industry context. Research focusing exclusively on regional issues without broader applicability to global financial markets. Studies not addressing the regulatory or policy implications of ESG strategies.

We also added some additional inclusion and exclusion criteria to clarify how a study could be included in our research population as follows:

Table 3. Additional Criteria

Additional Criteria	Inclusion	Exclusion
Language	Studies published in English.	Studies published in languages other than English.
Publication Date	Studies published within the last 5 years to ensure relevance and currency.	Studies published more than 10 years ago unless they are seminal works that provide foundational insights.
Study Design	Empirical studies, including quantitative, qualitative, and mixed-method research. Observational studies, including cohort, case-control, and cross-sectional studies.	Editorials, opinion pieces, and non-peer-reviewed articles. Literature reviews without new empirical data.

Qualitative studies that explore perceptions, experiences, and motivations related to ESG practices.
 Meta-analyses and systematic reviews that include new empirical data or comprehensive synthesis of existing research.

Graph The Data

This research review addresses the role of ESG in climate risk mitigation in the financial sector. The review draws on scholarly works from various fields of business, management, economics and finance. After defining key variables and setting research boundaries, we identified and collected relevant studies from various academic journals. The following table details the number of studies published in each journal, as well as the research methods used in those studies. This information provides a comprehensive overview of the distribution and methodological approaches in sustainable finance and ESG-related research.

Table 4. Sustainable Finance Studies Published by Journal

Journal	Number of Studies (N)
Building and Environment	1
Circular Economy and Sustainability	1
Current Global Practices of Corporate Social Responsibility	1
Ecological Economics	2
Economic Analysis and Policy	2
Energies	1
Energy Economics	4
Energy Research & Social Science	1
Finance research letters	1
Global Finance Journal	3
Green Bonds and Sustainable Finance	1
International Review of Economics & Finance	2
Journal of Business Research	1
Journal of Cleaner Production	1
Journal of International Financial Markets, Institutions and Money	2
Journal of Sustainable Finance & Investment	2
Jurnal of Environmental Management	2
Rajagiri Management Journal	1
Renewable Energy	1
Research in International Business and Finance	1
Resources Policy	1
Settling Climate Accounts Navigating the Road to Net Zero	1
Sustainability	5
Technological Forecasting and Social Change	2
Total	40

Tabel 5. Research Methodologies

Number of Studies (N)	Qualitatif (%)	Quantitatif (%)	Theory/Conseptual	Mixed Methods (%)
40	25%	37.5%	12.5%	25%

From these tables, we can see the distribution of studies based on the journal in which they were published and the research methods applied in these studies.

Compile, Summarize, and Report the Results.

RQ1 *What ESG factors influence climate risk mitigation*

1. Shifts in Capital Market Value Creation

The role of capital markets is increasingly crucial in the context of climate risk mitigation (Cepni et al., 2023). Despite this, there is an inherent inability of capital markets to efficiently recognize the importance of sustainable development (Dmuchowski et al., 2023). This shortfall can be attributed to two main factors.

First, capital markets often fail to reward sustainability-related behavior adequately because the metrics and valuation methods employed do not capture the long-term value of such initiatives (Anwar et al., 2024). Traditional financial performance indicators overlook the benefits of sustainable practices, thus deterring companies from pursuing these initiatives. Second, investors typically focus on shorter investment horizons, disregarding the long-term impact of market failures (Gunningham, 2020). This short-termism leads to insufficient funding and attention towards sustainable projects (Zhou et al., 2022).

However, the evolving landscape of international regulations and emerging market realities necessitate a paradigm shift from the traditional focus on maximizing investor wealth to a more holistic and sustainable approach (Debrah et al., 2022). Integrating ESG (Environmental, Social, and Governance) considerations into the investment decision-making process is imperative. Companies and investors must adopt strategies that factor in the social and environmental impacts of their investments (Xu et al., 2023). This shift towards sustainable value creation will enhance the resilience of capital markets against climate risks and ensure the generation of long-term value for all stakeholders.

2. Transparency and Reporting

Transparency in ESG reporting is pivotal for effective climate risk mitigation within the financial sector (Cepni et al., 2023). Clear and standardized reporting frameworks enable investors to make more informed decisions regarding the climate risks companies face and their management strategies (Kouwenberg & Zheng, 2023). This transparency allows investors to identify high-risk companies and allocate capital more efficiently towards those that are more sustainable (Nguyen et al., 2021).

Moreover, increased transparency in ESG reporting incentivizes companies to be more proactive in managing climate risks and enhancing their environmental sustainability efforts (Sahu et al., 2024). Frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD) provide a structured and consistent method for disclosing climate-related information, which aids companies in reporting their climate risk management practices comprehensively (Madaleno et al., 2022).

This level of transparency not only strengthens the financial sector's resilience to climate risks but also boosts investor confidence in sustainable capital markets (Galletta et al., 2022). By ensuring that investors have access to reliable and comparable ESG data, transparency fosters a more stable and forward-looking financial environment that is better equipped to handle the long-term impacts of climate change.

3. Green Finance Innovation

Innovations in green financial products, such as green bonds and climate bonds, offer new tools for investors to support projects that aim to mitigate and adapt to climate change (Qian & Yu, 2024). These products provide opportunities for investors to allocate funds to environmentally beneficial projects while still achieving competitive returns (Jiang et al., 2023). This approach also aids in portfolio diversification and reduces risks associated with climate change (Managi et al., 2022).

Green finance innovations encourage companies to adopt more sustainable business practices by providing access to cheaper and more sustainable capital (Malecki, 2021). The issuance of these products typically includes strict transparency and reporting requirements, ensuring that the funds are used as intended (Zairis et al., 2024). Such transparency not only ensures accountability but also builds trust among investors.

Furthermore, green finance innovations significantly contribute to climate risk mitigation and promote a broader transformation towards a low-carbon and sustainable economy (Dikau & Volz, 2021). By facilitating investment in sustainable projects, these financial products drive the transition to more environmentally friendly practices and technologies, reinforcing the global effort to combat climate change (Mavlutova et al., 2023).

4. Integrated Risk Management

Integrated risk management that incorporates ESG factors allows companies to effectively identify, measure, and manage climate risks (Erhemjants et al., 2024). By embedding climate risk into the enterprise risk management (ERM) framework, companies can better anticipate the negative impacts of climate change and take advantage of opportunities associated with the transition to a low-carbon economy (In & Schumacher, 2021). This comprehensive approach encourages companies to perform stress testing and scenario analysis, considering various potential future climate conditions (Broccardo et al., 2024).

Additionally, integrated risk management builds resilience to climate disruptions, such as natural disasters or climate-related policy changes (Madaleno et al., 2022). This proactive stance enables companies to minimize financial and operational losses caused by climate change and enhances their competitiveness in a market increasingly focused on sustainability (Baldi & Pandimiglio, 2022). By integrating climate risks into their risk management processes, companies can strengthen their relationships with stakeholders—including investors, customers, and regulators—who increasingly expect rigorous climate risk management (Broadstock et al., 2021).

5. Stakeholder Engagement

Active engagement with stakeholders, including investors, customers, and communities, is critical for effective climate risk mitigation (Chen et al., 2024). By engaging with stakeholders, companies can better understand their expectations and concerns regarding climate change, allowing these perspectives to inform business strategies (Zhang et al., 2024). This interaction also facilitates alliances and collaborations that support sustainability initiatives, such as the development of green technologies or the implementation of emissions reduction programs (Mneimneh et al., 2023).

Furthermore, stakeholder engagement enhances transparency and accountability in how companies address climate risks (Dikau & Volz, 2021). Involving stakeholders in the decision-making process increases trust and support from various parties, thereby strengthening the company's market position (Dmuchowski et al., 2023). Effective stakeholder engagement also contributes to building a positive reputation as an environmentally responsible company, attracting more investors and customers who prioritize sustainability (Durrani et al., 2020).

6. Internal Policy Development

The development of internal policies that support environmental sustainability is a critical step in mitigating climate risk within the financial sector (Y. Li et al., 2023). Companies should implement policies that set targets for emissions reduction, energy efficiency, and sustainable resource use (Sahu et al., 2024). These policies help companies comply with increasingly stringent environmental regulations and create long-term value by reducing dependence on finite natural resources (Wu et al., 2023).

Strong internal policies also foster innovation and the development of environmentally friendly technologies. By incorporating sustainability goals into business strategies, companies can develop more sustainable products and services, enhancing their competitiveness in the market (Zhang, 2023). Furthermore, these policies help build a corporate culture that prioritizes environmental responsibility, increasing employee engagement and motivation to support sustainability initiatives (Babic, 2024).

7. Adapting to Regulations

The financial sector must adapt to evolving regulations related to climate risk mitigation. Governments in various countries are increasingly implementing regulations that encourage companies to adopt more sustainable business practices and reduce carbon emissions. The financial sector needs to ensure that it complies with these regulations and take proactive steps to meet the requirements (In & Schumacher, 2021).

Adapting to regulations also includes building internal capacity to understand and implement climate-related regulations. This includes employee training, development of appropriate reporting systems, and integration of regulatory compliance into business processes. By adapting to regulations, the financial sector can reduce legal and reputational risks, and increase their resilience to climate-related policy changes (Malecki, 2021).

8. Collaborative Initiatives

Collaboration between companies, governments and non-governmental organizations is essential in addressing climate risks. Collaborative initiatives allow different parties to share resources, knowledge and technology to achieve common sustainability goals. Through collaboration, companies can develop innovative solutions that are more effective in reducing emissions and increasing resilience to climate change (Ma et al., 2023).

Collaborative initiatives also create opportunities to build strategic alliances that can strengthen a company's position in the market. For example, partnerships with green technology companies can help companies adopt the latest technologies to reduce their carbon footprint. In addition, collaboration with governments and non-governmental organizations can improve companies' access to funds and incentives that support sustainability initiatives. Collaborative initiatives can thus accelerate the transition to a low-carbon economy and increase the resilience of the financial sector to climate risks (Anwar et al., 2024).

RQ2 *How do these factors contribute to climate risk mitigation?*

The integration of Environmental, Social and Governance (ESG) factors into financial strategies significantly improves climate risk mitigation. The implementation of a robust ESG strategy enables companies to identify and manage climate change-related risks more effectively. By incorporating environmental considerations, companies can reduce carbon emissions and minimize their environmental footprint, thereby directly mitigating climate risks. For example, companies that adopt green technologies and energy-efficient practices are better positioned to handle regulatory changes and reduce their vulnerability to climate-related disruptions (Sassen et al., 2016; Zhou et al., 2022).

Social factors in the ESG framework ensure that companies maintain strong relationships with stakeholders, including employees, communities and investors. This stakeholder engagement is critical to understanding and addressing the diverse impacts of climate risks. Companies that actively engage with stakeholders tend to develop climate strategies that are more comprehensive, inclusive and sustainable, thus promoting long-term resilience. Stakeholder engagement has been shown to increase transparency and accountability, which in turn strengthens climate risk management practices (Chen et al., 2024; Dikau & Volz, 2021).

Likewise, governance factors play an important role in institutionalizing climate risk mitigation. A strong governance structure ensures that climate risk is integrated into the organization's overall risk management framework. This includes establishing policies and procedures that require regular climate risk assessment and reporting. Companies with strong governance frameworks are more likely to adopt best practices in sustainability and demonstrate resilience to climate risks. Effective governance ensures that climate change-related risks are systematically managed and mitigated through strategic planning and operational adjustments (Erhemjamts et al., 2024; Broadstock et al., 2021).

RQ3 *How does the integration of ESG criteria impact a company's performance and financial stability?*

The integration of ESG criteria has a major impact on a company's financial performance and stability. Companies that incorporate ESG factors into their business strategies often experience improved financial performance. ESG practices result in operational efficiencies, such as reduced energy consumption and waste, thereby lowering operating costs and increasing profit margins. Research shows that companies with strong ESG performance tend to have better financial returns and lower stock price volatility (Eccles et al., 2014; Chang et al., 2021). ESG integration promotes long-term financial stability by mitigating various risks, including regulatory, reputational and market risks. Companies that proactively address environmental and social issues are less likely to face regulatory fines, lawsuits and reputational damage. This proactive stance not only protects companies from potential liabilities but also attracts investors who increasingly prioritize sustainability in their investment decisions. As a result, firms with strong ESG performance enjoy better access to capital and lower cost of debt (Sahu et al., 2024; Qian & Yu, 2024). ESG also increases firms' resilience to market changes and external shocks. By implementing sustainable practices, companies can be more resilient to economic downturns and environmental crises. ESG-focused companies are typically more agile and adaptable, allowing them to make changes quickly in response to market and environmental changes. This resilience is reflected in their ability to maintain steady growth and financial stability over the long term. In addition, companies that integrate ESG factors tend to build stronger brands and customer loyalty, thus supporting sustainable financial performance (Mavlutova et al., 2023; In & Schumacher, 2021).

V. Conclusion

The research systematically reviewed existing literature to demonstrate that Environmental, Social, and Governance (ESG) criteria significantly mitigate climate-related risks in the financial sector. By implementing ESG strategies, financial institutions can effectively manage both physical and transition risks associated with climate change, thereby enhancing financial stability and performance. This integration of ESG factors leads to more sustainable financial practices, which are crucial in the face of increasing climate-related challenges.

A notable novelty of this study lies in its methodological approach, utilizing a systematic literature review (SLR) guided by the PECO framework for the finance management research. This approach provided a comprehensive analysis of ESG's impact on climate risk mitigation, identifying specific strategies that contribute to financial stability. The study also highlighted the importance of transparency, green finance, integrated risk management, stakeholder engagement, internal policies, regulatory adaptation, and collaboration as key aspects of effective ESG integration.

Future research can explore the integration of ESG criteria with traditional financial risk management frameworks. Studies could investigate the impact of ESG adoption on the cost of capital and investment returns across different asset classes. It would also be beneficial to examine the role of technological innovations, such as fintech and blockchain, in enhancing ESG implementation. By addressing these areas, future research can provide deeper insights into the interplay between ESG factors and financial performance, offering more comprehensive strategies for risk management and value creation in the financial sector.

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