IFIJEB
Indo-Fintech Intellectuals: Journal of Economics and Business

p-ISSN: 2808-2443
e-ISSN: 2808-2222
Volume. 4, No. 5, 2024

SUSTAINABILITY BASED FINANCIAL RISK MANAGEMENT STRATEGIES FOR LONG TERM RESILIENCE: A SYSTEMATIC REVIEW

Rindi Wahyuni[1], Berliana Febriyanti[2], Ghina Laila[3], Deni Sunaryo[4], Yoga Adiyanto[5]
[1,2,3,4,5] Universitas Serang Raya, Jl. Raya Serang Cilegon KM 5 Kota Serang, Banten, Indonesia
Email: rindiw13@gmail.com

Article History

Received: 14-11-2024

Revision: 15-11-2024

Accepted: 15-11-2024

Published: 17-11-2024

Abstract. This study conducted a systematic literature review on the application of sustainability principles in financial risk management in the banking, agriculture, infrastructure, and decentralized technology sectors. By utilizing a sustainability-based approach and early warning metrics, this study identified significant benefits that can strengthen the financial resilience of organizations to long-term uncertainty. The findings show that this approach is not only effective in reducing financial risks but also generates social and environmental benefits, such as improved reputation, public trust, and strengthened stakeholder relationships. However, the implementation of this approach is faced with challenges, including limited resources, low awareness among organizations, and minimal regulations that support the adoption of sustainability in risk management. Recommendations from this study include the development of more supportive regulations, increased investment in predictive technology, and further in-depth research to strengthen the integration of sustainability in financial risk management. These findings are expected to encourage the adoption of a more strategic, responsive, and sustainable risk management approach, which can ultimately improve organizational resilience in the future.

Keywords: Financial risk management, project sustainability, genebank management, systemic risk, risk mitigation strategies

Abstrak. Penelitian ini menggunakan metode tinjauan literatur sistematis untuk menganalisis penerapan prinsip keberlanjutan dalam manajemen risiko keuangan di sektor perbankan, pertanian, infrastruktur, dan teknologi desentralisasi. Dengan memanfaatkan pendekatan berbasis keberlanjutan dan metrik peringatan dini, penelitian ini mengidentifikasi berbagai manfaat signifikan yang dapat memperkuat ketahanan finansial organisasi terhadap ketidakpastian jangka panjang. Temuan menunjukkan bahwa pendekatan ini tidak hanya efektif dalam mengurangi risiko keuangan tetapi juga menghasilkan keuntungan sosial dan lingkungan, seperti peningkatan reputasi, kepercayaan publik, serta penguatan hubungan dengan pemangku kepentingan.Metode penelitian mencakup pengumpulan data dari jurnal akademik, laporan industri, dan makalah konferensi; kriteria seleksi berdasarkan relevansi dengan topik; analisis kualitatif untuk meninjau temuan utama; dan sintesis temuan untuk merumuskan rekomendasi. Hasil penelitian mengungkapkan bahwa meskipun pendekatan ini menjanjikan, implementasinya masih menghadapi tantangan seperti keterbatasan sumber daya, rendahnya kesadaran di kalangan organisasi, serta minimnya regulasi yang mendukung. Penelitian ini merekomendasikan pengembangan regulasi yang lebih mendukung, peningkatan investasi dalam teknologi prediktif, serta penelitian lanjutan untuk memperkuat integrasi keberlanjutan dalam manajemen risiko keuangan. Temuan ini diharapkan dapat mendorong adopsi pendekatan manajemen risiko yang lebih strategis, responsif, dan berkelanjutan, yang pada akhirnya dapat meningkatkan ketahanan organisasi di masa depan.

Kata kunci: Manajemen risiko keuangan, keberlanjutan proyek, pengelolaan genebank, risiko sistemik, strategi mitigasi risiko

How to Cite: Wahyuni, R. et al (2024). Sustainability Based Financial Risk Management Strategies for Long Term Resilience: A Systematic Review. *Indo-Fintech Intellectuals: Journal of Economics and Business*, 4 (5), 2625-2639. 10.54373/ifijeb.v4i5.2154

INTRODUCTION

Financial risk management plays a vital role in ensuring business stability and continuity across various industries. In today's complex and unpredictable business environment, managing financial risk has become essential for maintaining resilience amid global economic fluctuations and market instability. Financial risks encompass uncertainties that impact cash flow, solvency, liquidity, and financial efficiency. These include risks from interest rate fluctuations, inflation, exchange rate volatility, and reliance on debt or high-risk assets. (Alrawad et al., 2023; Deni Sunaryo, Etty Puji Lestari, Siti Puryandani, 2023; Deni Sunaryo, Nafiuddin, Ratu Erlina Gentari, 2021a; Deni Sunaryo et al., 2022; Sunaryo, 2022; Sunaryo et al., 2022, 2024; Sunaryo & Lestari, 2023; Wolf & Karszes, 2023) .

The growth of technology and globalization has heightened financial risk management's complexity, exposing organizations to domestic and international risks like market instability, geopolitical tensions, policy shifts, and systemic global dependencies (Deni Sunaryo, Nafiuddin, Ratu Erlina Gentari, 2021b; So et al., 2022; Sunaryo, 2020, 2021) .

In the agricultural sector, for example, financial risks also arise from dependence on climate conditions, commodity prices, and international market uncertainty. In the infrastructure sector and large projects, financial risks are often rooted in funding constraints and challenges in resource management, thus requiring specific and structured risk management strategies (Gładysz & Kuchta, 2022; Rahmati et al., 2022) .

Financial risk management now emphasizes long-term resilience by integrating sustainability principles, combining social, environmental, and economic factors. This approach helps organizations proactively identify and mitigate risks sustainably (Gładysz & Kuchta, 2022; Kedarya et al., 2023).

This research addresses the gap in applying sustainability-based metrics in financial risk management. Traditional methods overlook non-financial factors affecting long-term resilience, despite evidence that early warning metrics can identify potential issues early. However, their implementation remains limited and poorly integrated across sectors. (Gładysz & Kuchta, 2022; Herbold & Engels, 2023) .

This study aims to develop comprehensive financial risk management guidelines by integrating sustainability and early warning metrics. Objectives include identifying industry methods, evaluating challenges in sustainability-focused approaches, and providing actionable recommendations for effective and resilient risk mitigation.

This research focuses on several key questions, which are expected to provide a comprehensive picture of how organizations can improve their financial resilience through structured financial risk management:

a. How are the main methods in financial risk management applied in various sectors?
b. What are the challenges and opportunities in implementing sustainability-based financial risk management?
c. How can early warning metrics help organizations identify financial risks early, and what are the most relevant indicators to use?

Theoretical Background

Financial risk management has evolved from traditional practices focused on financial factors like cash flow and debt to a holistic approach addressing both financial and non-financial risks. With increasing business complexity and globalization, it now integrates diverse variables affecting organizational financial stability (Herbold & Engels, 2023; Song et al., 2023) .

Sustainability Based Financial Risk Management

Sustainability in financial risk management focuses on long-term resilience, balancing profitability with social and environmental responsibility. It is vital in sectors like infrastructure and agriculture, reducing risks from stricter regulations and ethical demands through responsible resource management. (Gładysz & Kuchta, 2022; Kaur et al., 2023) .

Early warning metrics in sustainability-based projects help identify future financial risks by monitoring indicators like resource use, operational costs, and environmental assessments, offering early signals of potential issues. This approach can help organizations anticipate financial problems before their impact becomes significant, as well as create more efficient and effective mitigation strategies (Kedarya et al., 2023) .

Challenges in Implementing Sustainability-Based Financial Risk Management

Implementing sustainability-based approaches faces challenges like limited stakeholder awareness, reluctance to invest in technology and training, and data limitations in assessing environmental and social impacts (Herbold & Engels, 2023; Song et al., 2023) . In the banking sector, stringent regulations often restrict flexibility in adopting sustainability-focused risk management, limiting banks' ability to make potentially beneficial long-term investments. This creates tension between compliance and building long-term resilience, necessitating innovative, collaborative solutions (Kedarya et al., 2023; Maulana et al., 2024; So et al., 2022)

In the era of rapid globalization, financial risk management extends beyond asset protection to fostering long-term value that benefits all stakeholders. Integrating sustainability-

based approaches and early warning metrics offers organizations a robust framework to navigate dynamic external changes, enhancing adaptability and building resilience for the future.

METHOD

This methodology section explains in detail the process of searching, selecting, and analyzing literature to ensure the accuracy and relevance of the research results. This method aims to provide transparency in the process and ensure the reliability of the results obtained.

Literature Search Process

The literature search was conducted by accessing several major scientific databases, including Google Scholar, IEEE Xplore, ScienceDirect, and Web of Science, to find articles and publications relevant to the topic of sustainability-based financial risk management. The keywords used in this search include "financial risk management," "sustainable project management," "early warning metrics," and "risk mitigation in industry." The publication time limit used is the last five years (2018-2023) to ensure relevance to the current context, with some exceptions for previously published influential articles.

Inclusion and Exclusion Criteria

exclusion criteria to maintain the focus of the research:

a. Inclusion Criteria: Peer-reviewed and indexed journal articles, discussing financial risk management with a focus on sustainability, and using quantitative or qualitative approaches. Case studies or empirical research related to the industrial, agricultural, banking, or infrastructure sectors.
b. Exclusion Criteria: Articles that are not relevant to the research focus, for example only discussing financial risk without linking it to sustainability. Non- peer - reviewed articles such as opinions or editorials, and publications that are not relevant in the context of risk management applications or theories.

Each article was evaluated through reading the abstract and introduction to determine relevance. Articles that passed the first stage were further evaluated through full reading to ensure compliance with all inclusion criteria.

Data Collection Procedure

The data collection procedure consists of the following steps:

a. Identifying Key Elements, the main data collected from each article includes: research objectives, research methods, main results, and study limitations. This data is used to understand the approach taken and find important findings from each article.

b. Coding, Articles were coded based on categories such as industry sector, risk type, and mitigation approach. This coding facilitates thematic analysis and identification of emerging patterns from the existing literature.
c. Compilation in Summary Table, the coding results are arranged in a summary table that includes brief information from each article, such as title, author, purpose, method, results, and recommendations. This table makes it easier to identify the most relevant articles for each research question.

Data Analysis Techniques

Data analysis is carried out through the following stages:

a. Thematic Analysis, Data is analyzed thematically to identify key themes, such as Financial Risk and Sustainability, which involves a sustainability approach in risk mitigation across sectors, as well as Early Warning Metrics which include data-based indicators to detect potential financial risks early on.
b. Qualitative and Quantitative Analysis, Qualitative analysis was conducted to understand the relationship between concepts in the literature, while quantitative results were used from empirical studies to evaluate the effectiveness of early warning metrics. This data helps in identifying the strengths and weaknesses of sustainability-based approaches applied in different sectors.
c. Synthesis of Findings, based on the key themes identified, this study synthesizes the findings to provide a comprehensive overview of the current state of sustainability-based financial risk management. Each theme is analyzed in the context of the research questions posed, highlighting research gaps and opportunities for further study.
d. Interpretation of Results, the research results are interpreted to answer the research questions and provide insights into how to effectively apply sustainability principles and early warning metrics in at-risk industrial sectors.

Validation and Triangulation

To ensure the validity and reliability of research results, the following steps were taken:

a. Coding Consistency, Coding was conducted by two independent researchers to minimize bias and increase data consistency. Any differences in coding results were resolved through discussion until agreement was reached.
b. Source Triangulation, this study used multiple scientific databases to enable source triangulation, increasing the validity of the results by ensuring broad coverage of relevant literature.

c. Review, the research results were consulted with experts in the field of financial risk management and sustainability to obtain feedback that strengthens the interpretation of the results and recommendations.

With this structured methodology, this study is expected to provide significant contributions in understanding the implementation of sustainability-based financial risk management in various sectors. This approach is also expected to be a guide for future research that wants to apply a similar methodology in the field of risk management.

RESULTS

This section presents the main findings obtained from a systematic literature review on sustainability-based financial risk management across various industry sectors, including banking, agriculture, infrastructure projects, and decentralized technologies. The findings are divided into several key themes to provide a more comprehensive understanding of how financial risk management is applied in a sustainability context.

Study Description

From the analysis of more than 20 articles, it was found that most of the relevant studies focused on the application of financial risk management in sectors that are vulnerable to market volatility and external environmental uncertainty. For example, in the banking sector, financial risks often include uncertainties related to exchange rates, interest rates, and the company's ability to meet debt obligations during periods of crisis. (Bingler & Colesanti Senni, 2022) . Several case studies analyzed show that the agricultural sector faces financial risks related to dependence on weather conditions, fluctuating commodity prices, and global market uncertainty (Herbold & Engels, 2023) . On the other hand, infrastructure projects, especially large-scale ones, face complex financial challenges, especially in terms of financing and efficient resource management.

The technology sector also faces unique financial risk challenges. For example, studies on decentralized finance (DeFi) technology show that the development of this technology carries significant risks related to the security of smart contracts, fluctuations in the value of digital assets, and regulatory uncertainty that is still not standardized in many countries (Kaur et al., 2023) .

Synthesis of Key Findings

Based on the results of the analysis, several key findings were identified in the reviewed literature:

a. Implementation of Sustainability Principles in Financial Risk Management

Sustainability principles, as applied in infrastructure and agricultural project management, play a significant role in reducing financial uncertainty. Several studies have highlighted that the use of sustainability-based approaches enables companies to be more responsive to external risks caused by environmental changes and increasingly stringent regulatory policies. For example, sustainability-based projects in the agricultural sector integrate better resource management strategies, which ultimately help companies reduce the financial impact of environmental issues (Gładysz & Kuchta, 2022; Herbold & Engels, 2023) .

b. The Importance of Early Warning Metrics in Risk Detection

The use of early warning metrics allows organizations to identify financial risks early, signaling risk managers to take preventive action before negative impacts occur. Studies in the financial sector show that metrics such as liquidity ratios and market volatility have a strong correlation with a company's financial resilience during times of crisis. These metrics also play a critical role in the infrastructure project sector, which is prone to schedule delays and unexpected cost increases. (Gładysz & Kuchta, 2022; Song et al., 2023) .

c. Mitigation Strategies in the Banking and Technology Sectors

The banking and technology sectors, especially in the context of DeFi, face challenges in managing financial risks that are often triggered by market volatility and regulatory uncertainty. Several studies have shown that implementing transparent risk assessment systems and using data-driven risk modeling technologies can increase institutional resilience to sudden market changes. Blockchain technology in the DeFi sector, for example, offers innovative solutions for risk management through smart contract systems, but also creates new risks that require different mitigation approaches (Kaur et al., 2023; Kedarya et al., 2023) .

d. The Importance of Multi-Stakeholder Engagement in Risk Management

Several studies have also shown that multi- stakeholder involvement in financial risk management has a positive impact in terms of transparency and effectiveness of risk mitigation. This approach is especially important in the infrastructure project sector, where project success often depends on collaboration between governments, private companies, and local communities. Involving multiple stakeholders helps organizations identify potential social and environmental risks that could affect the financial stability of a project (Gładysz & Kuchta, 2022; So et al., 2022) .

e. Limitations in Implementing Sustainability-Based Risk Management

Although sustainability-based approaches provide many benefits, there are still significant obstacles to their implementation. The main obstacles are the lack of relevant data and limited resources to conduct comprehensive risk analysis. In many cases, organizations are reluctant to invest time and money in technologies or systems that support sustainability risk management due to budget constraints or uncertainty about long-term benefits (Herbold & Engels, 2023; Kedarya et al., 2023) .

In-depth Analysis

After identifying the main findings, this study conducted an in-depth analysis of some of the most relevant aspects in the context of sustainability and financial risk management:

Systemic Risk and Resilience in the Financial Sector

Several studies have highlighted that the financial sector is vulnerable to systemic risks that can be triggered by major events, such as economic crises or pandemics. The use of early warning metrics, such as market volatility indices, can help in predicting potential broader financial disruptions. Studies on the COVID19 crisis have shown that the application of data-driven predictive models helps organizations mitigate negative impacts and strengthen financial resilience during the crisis period (Alrawad et al., 2023; Song et al., 2023) .

Sustainability Based Project Resilience

Case studies in the infrastructure sector show that projects that integrate sustainability principles tend to be more resilient to environmental and social risks. More responsible use of resources, as well as involvement of local communities, help projects minimize social conflicts that can increase operational costs. These projects also show better financial stability due to the adoption of a preventive approach to risk management (Gładysz & Kuchta, 2022; Herbold & Engels, 2023) .

Challenges and Opportunities in Decentralized Technology

In the technology sector, especially in DeFi, the risks that arise are often related to technological security, price volatility, and lack of clear regulation. However, blockchain technology and smart contracts have great potential to improve the efficiency of financial risk management by reducing the need for intermediaries in financial transactions. The challenge that needs to be considered is the need for better regulation to prevent systemic risks caused by technological failures or cyberattacks(Kaur et al., 2023) .

Practical Implications and Recommendations

Based on the above findings, there are several practical implications and recommendations for improving sustainability-based financial risk management:

a. Use of Predictive Technology

Organizations need to invest in predictive technologies that support early risk detection. The use of big data and artificial intelligence in monitoring risk metrics can help companies be more proactive in identifying financial threats (Song et al., 2023) .

b. Multi-Sector Collaboration

Collaboration between the public and private sectors in financial risk management can improve access to relevant data and resources, and strengthen community engagement. This approach can help to improve the effectiveness of risk mitigation that takes into account sustainability aspects and the interests of various stakeholders (Gładysz & Kuchta, 2022) .

c. Sustainability Based Policy Development

Governments and regulators are advised to design policies that encourage the application of sustainability principles in financial risk management. These policies may include incentives for companies implementing sustainability practices and standards to ensure transparency in financial risk reporting.

With these results, this study provides deeper guidance on the application of sustainability in financial risk management as well as opportunities for further research in advancing predictive and collaborative approaches. The findings also support the development of more proactive business policies and practices in addressing environmental and social challenges across various industry sectors.

DISCUSSION

This discussion section explores the main findings derived from the literature analysis and places them in the broader context of sustainability applications in financial risk management. It also identifies practical implications, challenges, and opportunities for future research.

Interpretation of Findings

The main findings of this study highlight that the application of sustainability principles in financial risk management provides significant benefits in dealing with long-term uncertainty. In the agriculture and infrastructure sectors, the application of these principles is seen to play a major role in maintaining financial stability, reducing environmental risks, and creating better relationships with local communities. Sustainability-based risk management helps organizations to not only focus on short-term profits, but also take into account the long-term impact on society and the environment, which ultimately strengthens their financial resilience (Gładysz & Kuchta, 2022; Herbold & Engels, 2023) .

In the banking sector, for example, a sustainability approach to risk mitigation encourages banks to consider the social and environmental impacts of every investment or project they fund. This is important in building public trust and maintaining the reputation of institutions amidst increasing awareness of sustainability in society. In addition, with early warning metrics, banks can more quickly detect signs of a possible financial crisis so that they can be better prepared to deal with unexpected financial disruptions (Alrawad et al., 2023; Bingler & Colesanti Senni, 2022) .

The application of predictive technology in the technology sector, especially in decentralized finance (DeFi) platforms, has also been shown to strengthen financial resilience to the risks of market volatility. These proactive metrics allow for the identification of systemic risks before their impact spreads, and provide technology companies with the opportunity to prepare more efficient mitigation strategies. However, in DeFi, the biggest challenge lies in the need for clear regulations, so that user protection can be more optimal and the risk of technological failure can be reduced. (Kaur et al., 2023) .

Challenges in Implementing Sustainability-Based Financial Risk Management

While implementing sustainability in financial risk management offers many benefits, several significant challenges hinder the full adoption of this approach. The main challenge is resource constraints, including the time, cost, and manpower required to adopt predictive technologies or sustainability metrics. These limitations are often faced by small to medium-sized organizations that may not have the resources to invest in new technologies or adopt sophisticated analytical approaches (Gładysz & Kuchta, 2022; Herbold & Engels, 2023) .

In addition to resource constraints, another inhibiting factor is the lack of awareness and deep understanding of the importance of a sustainability approach to risk management. Many organizations still view risk management only from a financial perspective, without considering broader risks that may impact society or the environment. This creates a gap in the risk mitigation approach, where social or environmental risks are not fully identified or included in mitigation plans. (Kedarya et al., 2023; So et al., 2022) .

Another challenge is the lack of regulations that support the implementation of sustainability in risk management in several sectors, especially the technology and banking sectors. Existing regulations do not provide sufficient incentives or mandates for companies to implement sustainability principles in mitigating financial risks. For example, in the DeFi sector, the lack of clear regulations can lead to greater financial risks, as potential technological failures or cybersecurity threats cannot be fully anticipated by users or stakeholders (Kaur et al., 2023) .

Practical Implications

The findings of this study provide several important practical implications for risk managers and stakeholders across industry sectors. First, organizations can strengthen their risk management by adopting a sustainability approach and early warning metrics. This allows organizations to more quickly detect and respond to potential risks. With these metrics, organizations can also identify trends or patterns that can provide deeper insights into the financial risks they may face in the future (Alrawad et al., 2023; Kedarya et al., 2023) .

Second, a proactive sustainability-based approach can help companies reduce social conflicts and improve relationships with local communities, especially in infrastructure projects. Community involvement in the risk mitigation process also increases transparency and strengthens the organization's commitment to sustainability. This not only reduces potential resistance from the community but also improves the company's reputation in the eyes of the public and regulators (Gładysz & Kuchta, 2022; So et al., 2022) .

Additionally, in the context of a technology sector like DeFi, the application of predictive technology for systemic risk analysis is crucial to enhance user protection. Technologies like blockchain enable more secure and transparent transactions, but also carry security risks that need to be better addressed through proper regulation and protection mechanisms. The use of metrics like market volatility and liquidity ratios can help companies manage risks resulting from price fluctuations and market uncertainty (Kaur et al., 2023) .

Opportunities for Future Research

This research opens up several opportunities for further research that can develop a sustainability-based financial risk management approach:

a. Development of More Comprehensive Early Warning Metrics

The development of early warning metrics that include social, economic, and environmental variables still needs to be improved. These metrics should be designed to be adaptable to various types of industrial sectors and can provide insights into multidimensional risks. Further research can focus on developing new indicators that are relevant to each sector and how these indicators can be combined in more effective prediction models (So et al., 2022; Song et al., 2023) .

b. Integration of Predictive Technology in Financial Risk Management

In the digital era, technologies such as big data, machine learning, learning, and artificial intelligence have great potential to improve predictive capabilities in financial risk management. Further research can focus on testing the application of these technologies in sectors that are more vulnerable to financial risk, such as the banking and

technology sectors. The integration of these technologies is expected to provide more accurate results and enable faster responses to changing market conditions (Kaur et al., 2023; Kedarya et al., 2023) .

c. Study on the Effectiveness of Regulatory Policies in Supporting Sustainability

With increasing regulatory pressure to implement sustainability, further research could examine the effectiveness of regulatory policies in encouraging sustainability practices in financial risk management. This is important to assess whether current regulations are capable of encouraging widespread adoption of sustainability practices, or if other policies are needed to drive positive change at the organizational level (Gładysz & Kuchta, 2022; Kaur et al., 2023) .

d. Cross-Sector Analysis to Understand Differences in Sustainability Risks

Each sector has unique characteristics that influence the risk management approach used. Future research could compare sustainability risk management approaches across sectors to identify significant differences as well as industry-specific success factors. This would provide practitioners with deeper insights into how they can tailor risk strategies to suit the characteristics of their respective sectors. (Gładysz & Kuchta, 2022; Herbold & Engels, 2023) .

Contributions to Practice and Theory

This study contributes to risk management practice by offering a more structured guide to integrating sustainability into financial risk mitigation. The findings suggest that a sustainability approach is not only relevant to a specific sector but can also be applied across a wide range of industries facing environmental, social, and economic challenges. From a theoretical perspective, this study enriches the understanding of the importance of early warning metrics in financial risk mitigation, while also opening up space for further research on the application of a multidisciplinary approach to risk management (Alrawad et al., 2023; Kedarya et al., 2023) .

These articles highlight that sustainability-based financial risk management has great potential in strengthening the long-term resilience of organizations. Although there are various challenges in its implementation, the findings of this study indicate that with the right adoption, a sustainability-based approach can help organizations face future challenges more efficiently and effectively. With opportunities for further research, it is hoped that this approach can continue to develop and be widely applied across various industry sectors.

RECOMMENDATIONS

Based on the findings, this study emphasizes the importance of supportive regulations to encourage the integration of sustainability principles into financial risk management across various sectors. Governments and regulatory bodies should create incentives for organizations adopting these practices. Additionally, investment in predictive technologies, such as early warning systems, is crucial to help organizations detect potential risks early and develop strategic responses.

Training programs for risk management professionals should be expanded to improve their understanding of sustainability principles and their practical application. Cross-sector research should also be strengthened, particularly in underrepresented industries like manufacturing and education, to broaden the understanding of sustainability's role in financial risk management. Furthermore, tailored approaches are needed to support small and medium enterprises (SMEs) in overcoming resource limitations. This can be achieved through targeted training, access to sustainable financing, and simplified technology solutions.

To assess the long-term impact of sustainability-based financial risk management, longitudinal studies are essential. Such research would provide insights into the enduring benefits of sustainability practices for financial stability and social and environmental outcomes. By addressing these aspects, organizations can build a more resilient framework for managing financial risks.

This study acknowledges several limitations that must be addressed in future research. One key limitation is the reliance on literature from the past five years, which may exclude valuable insights from earlier studies. Future research should incorporate a broader range of sources, including historical and industry-specific reports, to provide a more comprehensive perspective. Similarly, the dependence on a limited number of scientific databases may have restricted access to diverse global publications. Expanding the scope to include grey literature and additional databases would enhance the reliability of findings.

The variability in methodologies used in reviewed studies presents another limitation, as it complicates direct comparisons of results. Future research should aim to standardize definitions and metrics to ensure consistency. Additionally, the lack of empirical data in certain sectors, such as manufacturing and education, limits the generalizability of the findings. Expanding research into these areas would address this gap.

Practical implementation challenges, especially for SMEs, remain a significant obstacle. While this study highlights the importance of sustainability principles, the practical difficulties faced by smaller organizations with limited resources were not explored in depth. Developing

tailored solutions and providing resources for SMEs could address this issue. Finally, the absence of long-term data limits the ability to evaluate sustainability's full impact. Future studies should adopt a longitudinal approach to capture these effects over extended periods.

REFERENCE

Alrawad, M., Lutfi, A., Almaiah, M. A., Alsyouf, A., Al-Khasawneh, A. L., Arafa, H. M., Ahmed, N. A., AboAlkhair, A. M., & Tork, M. (2023). Managers' Perception and Attitude toward Financial Risks Associated with SMEs: Analytic Hierarchy Process Approach. *Journal of Risk and Financial Management*, *16*(2). https://doi.org/10.3390/jrfm16020086

Bingler, J. A., & Colesanti Senni, C. (2022). Taming the Green Swan: a criteria-based analysis to improve the understanding of climate-related financial risk assessment tools. *Climate Policy*, *22*(3), 356–370. https://doi.org/10.1080/14693062.2022.2032569

Deni Sunaryo, Etty Puji Lestari, Siti Puryandani, H. H. (2023). Testing The Effect Of Debt To Equity Ratio And Dividend Payout Ratio On Stock Return In The Food Industry And Beverages. *Jurnal Manajemen*, *13*(1), 40–60.

Deni Sunaryo, Nafiuddin, Ratu Erlina Gentari, D. K. (2021a). The Effect of Current Ratio (CR), Debt to Equity Ratio (DER), and Earning Per Share (EPS) on Share Prices with Return on Assets as a Moderated Variables in Food and Beverage Subsectors Registered in 2012-2019 Assets Variables Registered in 2012-2019 Stock. *International Journal of Entrepreneurship*, *25*(4).

Deni Sunaryo, Nafiuddin, Ratu Erlina Gentari, D. K. (2021b). The Effect of Current Ratio (CR), Debt to Equity Ratio (DER), and Earning Per Share (EPS) on Share Prices With Return on Assets as A Moderated Variables in Food and Beverage Subsectors Registered in 2012-2019 Assets Variables Registered in 2012-2019 Stock. *International Journal of Entrepreneurship*, *25*(4), 1–19. https://www.scimagojr.com/journalsearch.php?q=19700175083&tip=sid

Deni Sunaryo, Etty Puji Lestari, Siti Puryandani, & Hersugondo, H. (2022). Can Company Size and Financial Distress Moderate in Solve Stock Returns in Retail Sector Companies. *Proceeding of The International Conference on Economics and Business*, *1*(2), 291–309. https://doi.org/10.55606/iceb.v1i2.133

Gładysz, B., & Kuchta, D. (2022). Sustainable Metrics in Project Financial Risk Management. *Sustainability (Switzerland)*, *14*(21). https://doi.org/10.3390/su142114247

Herbold, T., & Engels, J. M. M. (2023). Genebanks at Risk: Hazard Assessment and Risk Management of National and International Genebanks. *Plants*, *12*(15). https://doi.org/10.3390/plants12152874

Kaur, S., Singh, S., Gupta, S., & Wats, S. (2023). Risk analysis in decentralized finance (DeFi): a fuzzy-AHP approach. *Risk Management*, *25*(2), 1–29. https://doi.org/10.1057/s41283-023-00118-0

Kedarya, T., Elalouf, A., & Cohen, R. S. (2023). Calculating Strategic Risk in Financial Institutions. *Global Journal of Flexible Systems Management*, *24*(3), 361–372. https://doi.org/10.1007/s40171-023-00342-3

Maulana, A., Dwita, M., Fitriyani, M., Sunaryo, D., & Adiyanto, Y. (2024). *RISK MANAGEMENT AS A DETERMINANT OF INDONESIAN BANKING FINANCIAL*

PERFORMANCE : A SYSTEMATIC LITERATURE APPROACH. *5*, 8–11.

Rahmati, S., Mahdavi, M. H., Ghoushchi, S. J., Tomaskova, H., & Haseli, G. (2022). Assessment and Prioritize Risk Factors of Financial Measurement of Management Control System for Production Companies Using a Hybrid Z-SWARA and Z-WASPAS with FMEA Method: A Meta-Analysis. *Mathematics*, *10*(2), 1–27. https://doi.org/10.3390/math10020253

So, M. K. P., Mak, A. S. W., & Chu, A. M. Y. (2022). Assessing systemic risk in financial markets using dynamic topic networks. *Scientific Reports*, *12*(1), 1–15. https://doi.org/10.1038/s41598-022-06399-x

Song, M., Sui, Z., & Zhao, X. (2023). A risk measurement study evaluating the impact of COVID-19 on China's financial market using the QR-SGED-EGARCH model. *Annals of Operations Research*, *330*(1–2), 787–806. https://doi.org/10.1007/s10479-023-05178-9

Sunaryo, D. (2020). Pengaruh Struktur Modal Dan Profitabilitas Terhadap Nilai Perusahaanpada Sektor Makanan Dan Minuman Yang Terdaftar Di Bursa Efek Indonesia (BEI) Periode 2013 -2018. *Jurnal Ekonomi Vokasi*, *3*(1), 18–35.

Sunaryo, D. (2021). Analysis Of Current Ratio, Debt To Assets Ratio And Gross Profit Margin On Financial Distress With Moderated Share Prices In Retail Companies Listed In Securities Exchange. *International Journal of Educational Research & Social Sciences*, *2*(1), 23–33. https://doi.org/10.51601/ijersc.v2i1.39

Sunaryo, D. (2022). Financial Distress And Debt To Asset Ratio Can Moderate Stock Price Problems. *International Journal of Educational Research & Social Sciences*, *3*(3), 1201–1219. https://doi.org/10.51601/ijersc.v3i3.391

Sunaryo, D., & Lestari, E. P. (2023). Effect of Cash, Receivables, and Inventory Turnover on Net Profit Margin (NPM) in Food & Beverage Subsector Manufacturing Companies. *Studies in Business and Economics*, *18*(1), 298–313.

Sunaryo, D., Lestari, E. P., & Puryandani, S. (2024). *MAMPUKAH KEBIJAKAN DIVIDEN MENGINTERVENING HARGA SAHAM DILIHAT DARI VARIABEL INDEPENDENT*. *21*(1), 57–76.

Sunaryo, D., Nafiuddin, Gentari, R. E., & Adiyanto, Y. (2022). Using Current Ratio Indicator and Total Asset Turnover Approach in Solving Return on Assets Problems with Debt-to-Equity Ratio Moderated. *Quality - Access to Success*, *23*(189), 199–209. https://doi.org/10.47750/QAS/23.189.23

Wolf, C. A., & Karszes, J. (2023). Financial risk and resiliency on US dairy farms: Measures, thresholds, and management implications. *Journal of Dairy Science*, *106*(5), 3301–3311. https://doi.org/10.3168/jds.2022-22711