Mapping Research Trends in Portfolio Diversification across Sustainable Finance, Financial Technology, and Economic Resilience: A Bibliometric Analysis

Aulia Zahrani[1], Payamta[2], Sri Hartoko[3]
[1,2,3] Faculty of Economics and Business, Universitas Sebelas Maret
Corresponding author: auliazahrani@student.uns.ac.id

Abstract

Objective: To map the development and trends of research on portfolio diversification at the intersection of Sustainable Finance, Financial Technology (FinTech), and Economic Resilience through a bibliometric analysis of 79 relevant articles sourced from Scopus. This study identifies key themes, patterns of scholarly collaboration, topic evolution, and research directions amidst the global financial market driven by digital and sustainability. Design/Methodology: A bibliometric approach analyzed 79 publications on portfolio diversification. Techniques used included keyword mapping, co-occurrence, bibliographic linkages, and thematic analysis to uncover research clusters, topic trends, and the relationship between portfolio diversification, sustainable investing, fintech, digital assets, risk management, and economic resilience. Findings: Portfolio diversification remains rooted in Markowitz's modern portfolio theory but has evolved to include sustainability, digital technology, and resilience. Emerging themes include ESG investing, green finance, crypto assets, blockchain, DeFi, NFTs, AI in portfolio optimization, and crisis risk mitigation (e.g., COVID-19). The integration of sustainable and digital assets improves portfolio efficiency due to their low correlation with traditional assets. Income diversification and sustainable investments strengthen the resilience of the financial sector and market stability. The shift from traditional risk-return optimization to multidimensional risk management includes environmental, social, governance, and systemic risks. Research Limitations and Implications: Limited to the publications analyzed, the study does not fully represent the global literature. The findings offer insights for academics, investors, managers, and policymakers on the integration of sustainable finance, fintech, and resilience in portfolio diversification. Future research should expand the database coverage, extend the observation period, and explore cross-disciplinary relationships more deeply.

Keywords: *Diversifikasi Portofolio; Sustainable Finance; ESG; Financial Technology (FinTech); Economic Resilience; Bibliometric Analysis; Portfolio Optimization; Risk Management; Artificial Intelligence; Digital Asset.*

INTRODUCTION

One of the key ideas in investment management is portfolio diversification, which aims to lower risk without sacrificing projected profits. The idea is based on Markowitz's contemporary portfolio theory and is still evolving as new investment products emerge, the world economy shifts, and the concern for sustainability increases. According to research, diversification is still an important tactic for creating an effective portfolio in a variety of market conditions (Alda, 2025).

The conventional investment paradigm has shifted to consider environmental, social, and corporate governance (ESG) factors as a result of sustainable financing growth. Although the benefits are not linear if applied excessively, ESG implementation has been shown to lower company-specific risks and improve investment stability. These results suggest that sustainability considerations are becoming a more important part of contemporary portfolio diversification methods (Norrasate Sritanee, 2026).

Additionally, a number of technology-based innovations, including cryptocurrencies, stablecoins, blockchain, decentralized finance

(DeFi), and non-fungible tokens (NFTs), have emerged as a result of the financial sector's digital transition. As these digital assets differ from traditional financial instruments in terms of risk and correlation characteristics, their existence creates new potential for diversification (Klaus Grobys, 2025).

According to previous research due to its very low correlation with international stock and bond markets, cryptocurrencies have the potential to improve portfolio efficiency. However, to optimize diversification gains, investors should consider the best allocation techniques due to the high volatility of digital assets (Colombage, 2024).

The application of artificial intelligence and machine learning techniques in portfolio management has also been driven by developments in financial technology. Compared to traditional mean-variance-based optimization techniques, algorithms such as Random Forest, XGBoost, cluster analysis, and news sentiment analysis have been shown to increase investment success (Seitshiro, 2025).

Portfolio diversification is becoming increasingly important for economic resilience, especially in times of economic crisis, pandemic, and geopolitical uncertainty. It has been proven that diversification across countries, industries, and asset classes increases portfolio stability and reduces the impact of market shocks (Nupur Gupta, 2023).

Additionally, the banking industry demonstrates how diversifying revenue streams helps make financial organizations more stable, especially during unpredictable economic times such as the COVID-19 pandemic. The main tool to improve the long-term resilience of the financial system is diversification (Felisitas Defung, 2026).

Research on portfolio diversification is growing rapidly, but there are still few studies that combine sustainable finance, financial technology, and economic resilience. Most previous studies have concentrated on a specific topic, so it is impossible to provide a comprehensive picture of the general direction of future research (Azra Zaimovic, 2024).

The bibliometric approach is a useful technique for mapping research trends, determining dominant topics, author collaboration patterns, publication progress, and future study orientation. Thus, the purpose of this study is to use bibliometric methods to examine the evolution of portfolio diversification research in relation to sustainable finance, financial

technology, and economic resilience (Mykhailo Kuzheliev, 2025).

LITERATURE REVIEW

Modern Portfolio Theory

According to Harry Markowitz's modern portfolio theory, investors can diversify their assets with minimal correlation to get the best balance between risk and return. As a fundamental principle of contemporary investment management, the idea of efficient limits continues to be the basis for much of today's research (Gabriel Malta Castro, 2022).

Portfolio Diversification

The goal of portfolio diversification is to lower risk unsystematically by distributing investments among various assets. By combining assets of various qualities, diversification allows investors to earn more consistent returns. Despite the increasing convergence of global markets, research shows that international diversification still offers substantial advantages. However, due to the increasing interconnectedness between markets, the effectiveness of diversification tends to decline during times of crisis (Azra Zaimovic, 2024).

Sustainable Finance

Investment strategies that consider sustainability by incorporating ESG considerations into the decision-making process are referred to as sustainable finance. The goal of this strategy is to strike a balance between long-term sustainability and financial gains. ESG-based investments, especially those that consider the environment, have been shown to lower company-specific risks and improve investment stability. However, excessive ESG investment can result in additional expenses that lower business productivity (Norrasate Sritanee, 2026). It has also been proven that pension funds based on Socially Responsible Investments (SRIs) maintain a high level of diversification and have a lower portfolio concentration than traditional funds (Alda, 2025).

Financial Technology and Portfolio Diversification

Through the use of blockchain technology, cryptocurrencies, artificial intelligence, and machine learning, financial technology has completely changed the way investors manage their portfolios (Rebeka Gulyás, 2025). Due to their very low correlation with conventional assets such as stocks and bonds, cryptocurrencies have the potential to increase diversification. While there will be more investment volatility, adding cryptocurrencies to the portfolio can increase the Sharpe Ratio (Claudio Boido, 2025).

Portfolio optimization strategies can also be used to create stablecoins,

resulting in digital instruments that are more stable than individual stablecoins. It has been proven that diversification techniques increase resilience to the failure of certain assets (Klaus Grobys, 2025). Due to their minimal connection to the stock market, NFTs, DeFi, and Bitcoin can be used as additional tools to lower portfolio risk (Pruchnicka-Grabias, 2025).

Economic Resilience

The ability of an economic system to survive, adapt, and recover from various financial crises and economic shocks is known as economic resilience. One of the important strategies to increase economic resilience is investment diversification. Compared to the direct diversification approach, multi-asset portfolios consisting of BRICS stocks, bonds, gold, oil, and other instruments have proven to perform better during times of crisis (Nupur Gupta, 2023). Revenue diversification has also been shown to increase bank stability and reduce volatility in the banking industry during the COVID-19 pandemic (Felisitas Defung, 2026). In addition, it has been proven that diversification of non-interest income enhances the long-term stability of financial institutions and strengthens the resilience of banks (Waqas TARIQ, 2021).

Blibiometric Analysis

Bibliometric analysis is a quantitative technique that analyzes publications, citations, keywords, collaborative networks, and intellectual relationships between studies to assess the evolution of a research topic. This approach is often used to determine research patterns, dominant themes, and potential areas for further research. (Mykhailo Kuzheliev, 2025). Because bibliometric methods systematically combine the study of sustainable finance, financial technology (fintech), and economic resilience, they are well-suited for tracking the growth of portfolio diversification researc (Kin-Yip Ho, 2023).

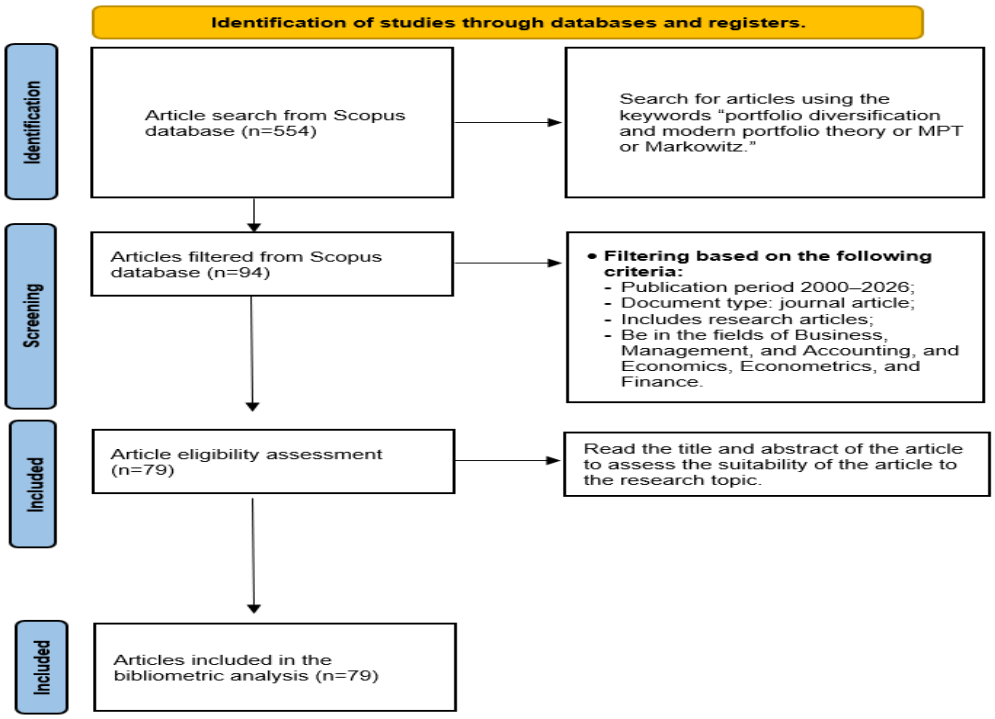
RESEARCH METHODS

Bibliometric analysis was used in this study to explain the diversity of portfolios. The stages of the PRISMA protocol of identifying, screening, feasibility, and inclusion are used to address the research problems mentioned above (Christopher Hansen, 2022). Bibliometric analysis is a quantitative technique that uses linkages between publications, authors, citations, and keywords to evaluate, map, and display the knowledge structure of a research subject (Nees Jan van Eck, 2010). This method allows researchers to recognize the patterns of collaboration,

dominant topics, research trends, and intellectual advancement of a field. The analysis period used by the authors is 2000 to 2026. The following keywords are used in document searches: portfolio diversification as well as MPT, Markowitz, or contemporary portfolio theory

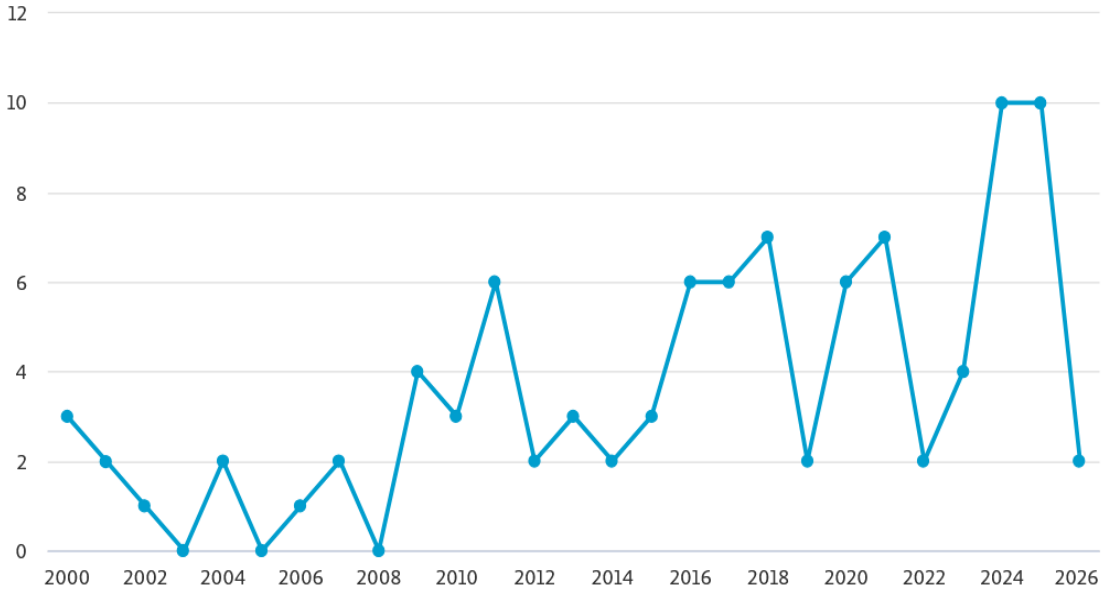
A total of 554 documents were found after using keywords. After that, 94 papers were found by limiting the subjects to the domains of Business, Management, and Accounting, as well as Economics, Econometrics, and Finance, and also limiting the documents to articles and English. To verify that the papers are relevant to the debate in this study, the feasibility study stage involves reviewing the document based on abstracts and titles.

Feasibility studies assess the relevance of the article to this bibliometric. The article is said to be feasible if there is a discussion about portfolio diversification. At the feasibility study stage, the final result was 79 articles. Furthermore, bibliometric analysis uses VOSViewer as a tool to visualize articles. The last query used in this study was (TITLEABSKEY (portfolio AND diversification) AND TITLE-ABS-KEY (MODERN AND PORTFOLIO AND THEORY) OR TITLEABSKEY (MPT) OR TITLEABSKEY (MARKOWITZ)) AND PUBYEAR > 1996 AND PUBYEAR < 2027 AND (LIMITTO (DOCTYPE , "ar")) AND (LIMITTO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "SPARK PLUG") AND (LIMITTO (LANGUAGE , "English").



RESULTS AND DISCUSSION

4.1 Amount Publications

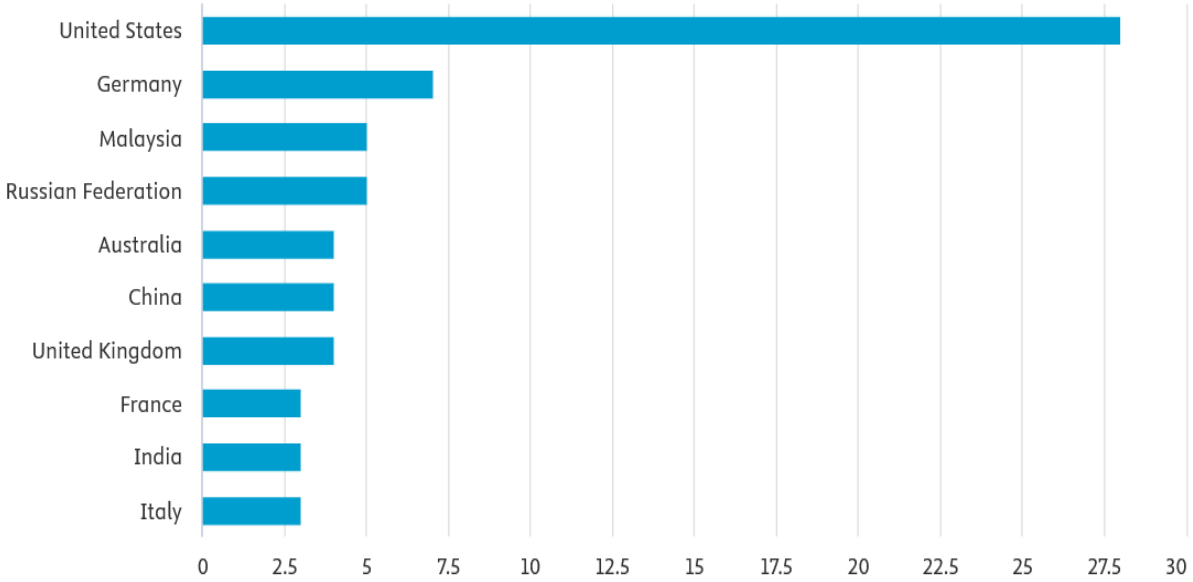


Based on annual publications, research on portfolio diversification in the context of sustainable finance, financial technology (FinTech), and economic resilience shows an increasing growth trend between 2000 and 2026, despite annual fluctuations. Between 2000 and 2008, there were only about 0–3 publications each year. This suggests that conventional portfolio diversification theory, particularly Modern Portfolio Theory, remained the main focus of research throughout the period.

The number of publications increased between 2009 and 2015, reaching six documents per year. After the global financial crisis, there has been an increase in studies on risk management, ESG (Environmental, Social, and Governance), and sustainable investments. In addition, publications increased more steadily between 2016 and 2021, averaging 6-7 documents per year. This reflects the growing interest in research on blockchain, cryptocurrencies, green finance, sustainable finance, and the application of digital technologies for portfolio optimization.

The high level of academic interest in ESG, FinTech, artificial intelligence, economic resilience, and the influence of global uncertainty on investment diversification methods is demonstrated by 10 papers published annually, which peak between 2024 and 2025. Meanwhile, a decline in publications in 2026 cannot be attributed to a decline in research interest as the data may not cover the full year of indexing. Overall, this pattern suggests that research on portfolio diversification in the areas of sustainable finance, financial technology, and economic resilience is growing, becoming interdisciplinary, and becoming an important subject in the contemporary investment literature.

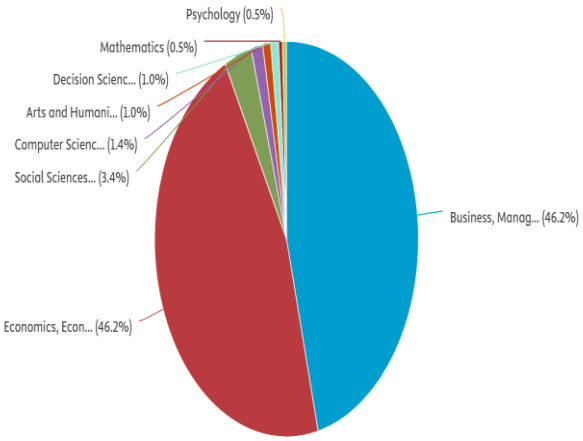
4.2 Journals by Country



Based on the analysis of journals by country, research on portfolio diversification in the context of sustainable finance, financial technology (FinTech), and economic resilience is still focused on a small number of countries. With 28 articles, the U.S. contributed the most, demonstrating its position as a research center in risk management, blockchain, cryptocurrencies, ESG, FinTech, and portfolio diversification. With seven papers, Germany is in second place, followed by the Russian Federation and Malaysia, with five papers each. Meanwhile, France, India, and Italy submitted three papers each, while Australia, China, and the United Kingdom contributed four papers each.

These results suggest that although portfolio diversification research has expanded internationally, countries with sophisticated financial systems, strong innovation ecosystems, and high research capacities continue to dominate this field. In addition, the increased contribution from Asian countries shows increasing interest in financial digitalization, sustainable finance, and economic resilience. Overall, these findings show that research on portfolio diversification in the areas of sustainable finance, financial technology, and economic resilience is increasingly global and multidisciplinary, with much room for growth, even in developing countries such as Indonesia.

4.3 Journals by Subject Area

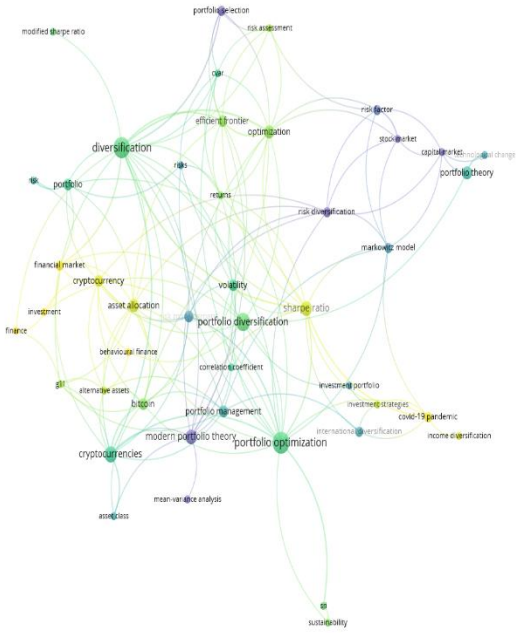


Analysis of journals by field of study revealed that the fields of Business, Management and Accounting, as well as Economics, Econometrics and Finance accounted for 46.2% of all publications on portfolio diversification in the context of sustainable finance, financial technology (FinTech), and economic resilience. This shows that studies on portfolio diversification continue to focus on financial market analysis, risk

management, investment management, and portfolio optimization. In addition, the research also extends to other disciplines including computer science (1.4%), decision-making science (1.0%), arts and humanities (1.0%), mathematics (0.5%), psychology (0.5%), and social sciences (3.4%). The involvement of these various disciplines suggests that the research subject of portfolio diversification has become interdisciplinary.

The increasing use of technologies such as blockchain, artificial intelligence, machine learning, and data analytics in investment management is reflected in the contribution of computer science. Meanwhile, social sciences and psychology emphasize the importance of investor behavior, financial literacy, and social factors in investment decision-making. Overall, these findings show that portfolio diversification research in sustainable finance, financial technology, and economic resilience integrates technological, social, and behavioral perspectives alongside economic and financial aspects, making it a thriving and relevant field of study in the contemporary financial system.

4.4 Co-occurrence of keywords



In the context of sustainable finance, financial technology (FinTech), and economic resilience, this study shows the relationship between phrases that often appear together in studies on portfolio diversification. The connecting line indicates the relationship between the research subjects, and the larger the size of the node, the more often the term appears in publications. The study reveals that the main concepts guiding the research are portfolio optimization, portfolio diversification, and diversification. The research's emphasis on risk management and portfolio optimization is demonstrated by the close relationship between these three subjects and current portfolio theory, asset allocation, portfolio management, volatility, efficiency limits, and the Sharpe ratio.

In addition, the increase in research in the field of FinTech and digital assets is reflected in the creation of terms such as cryptocurrencies, bitcoin, alternative assets, and behavioral finance. Meanwhile, terms such as income diversification, SRI (Social Responsible Investment), sustainability, and the COVID-19 pandemic show that sustainable investment and economic resilience are getting more attention. Overall, these findings suggest that research on portfolio diversification in sustainable finance, financial technology, and economic resilience is evolving in a multidisciplinary manner, incorporating elements of risk management, sustainability, financial technology, and economic resilience into contemporary investment decision-making.

CONCLUSIONS AND SUGGESTIONS

Conclusion

Using bibliometric techniques, this study seeks to map the evolution of research on portfolio diversification in relation to sustainable finance, financial technology (FinTech), and economic resilience.

According to the findings, the number of publications increased between 2000 and 2026, reaching a peak in 2024 to 2025. This shows that sustainable investment, financial technology, and economic resilience are getting more and more academic attention. The United States is the country that contributes the most publications, followed by Germany, Malaysia, the Russian Federation, Australia, China, and the United Kingdom. These results show that, although developed countries still dominate, research on portfolio diversification has spread around the world.

Business, management, and accounting, along with economics, econometrics, and finance, are the academic disciplines that dominate research. However, the involvement of additional disciplines such as computer science, social sciences, mathematics, and psychology suggests that these studies are increasingly interdisciplinary. Portfolio optimization, portfolio diversification, and diversification were found as the main study themes based on the co-emergence analysis of keywords.

In addition, the study's shift in focus towards the incorporation of sustainability, financial technology innovation, and economic resilience is demonstrated by the emergence of terms such as bitcoin, sustainability, socially responsible investment (SRI), income diversification, and the COVID-19 pandemic. Overall, research on portfolio diversification in the areas of sustainable finance, financial technology, and economic resilience is still evolving and is an important subject to assist contemporary investment decision-making in the face of global economic instability.

Suggestions

To get a more comprehensive picture of the literature, additional studies are suggested to increase the number of data sources by combining the Scopus, Web of Science, and Dimensions databases. In-depth bibliometric techniques such as co-citation analysis, bibliographic merging, and thematic evolution can also be used in future studies to determine the development of the research theme. To make a greater contribution to future advances in portfolio diversification theory and practice, further research may focus on cutting-edge subjects including artificial intelligence, machine learning, green finance, digital assets, and ESG investing.

Reference

Alda. (2025). Importance of portfolio optimization in SRI and conventional pension funds. *Financial Innovation*, 1-37.

Azra Zaimovic, A. A.-B. (2024). INTERNATIONAL PORTFOLIO DIVERSIFICATION BENEFITS: AN EMPIRICAL INVESTIGATION OF THE 28 EUROPEAN STOCK MARKETS DURING THE PERIOD 2014–2024 . *South East European Journal of Economics and Business*, 96-112.

Christopher Hansen, H. d. (2022). How to conduct a meta-analysis in eight steps: a practical guide. *Management Review Quarterly*, 1-19.

Claudio Boido, M. A. (2025). The contribution of cryptocurrencies to portfolio diversification. *Investment Management and Financial Innovations*, 26-35.

Colombage, A. J. (2024). Portfolio diversification possibilities of cryptocurrency: global evidence. *Applied Economics*, 1-17.

Felisitas Defung, A. P. (2026). BANK DIVERSIFICATION STRATEGY AND STOCK PRICE VOLATILITY DURING COVID-19 IN AN EMERGING

COUNTRY. *Corporate and Business Strategy Review*, 129-139.

Gabriel Malta Castro, ,. C. (2022). Improvements to Modern Portfolio Theory based models applied to electricity systems. *Energy Economics*, 1-16.

Kin-Yip Ho, K. T. (2023). A novel approach to portfolio selection using news volume and sentiment. *International Review of Finance*, 903-917.

Klaus Grobys, J.-P. J. (2025). A stablecoin that's actually stable: A portfolio optimization approach. *Journal of Financial Stability*, 1-17.

Mykhailo Kuzheliev, D. Z. (2025). "Expanding portfolio diversification through cluster analysis beyond traditional volatility". *"Investment Management and Financial Innovations"*, 147-159.

Nees Jan van Eck, d. L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 523-538.

Norrasate Sritanee, T. K. (2026). Nonlinear Effects of ESG on Firm-Sp ecific Risk: Evidence from Thailand. *GLOBAL BUSINESS & FINANCE REVIEW*, 145-149.

Nupur Gupta, P. M. (2023). "Enhancing portfolio resilience during crisis periods: Lessons from BRICS indices and multi asset strategies". *Investment Management and Financial Innovations*, 99-111.

Pruchnicka-Grabias, I. (2025). Optimal Shares of NFT, DeFi and Bitcoin on Czech, Hungarian, and Polish Equity Markets. *Comparative Economic Research. Central and Eastern Europe*, 21-37.

Rebeka Gulyás, V. A. (2025). Unlocking blockchain-driven financial opportunities: optimizing portfolios with cryptocurrencies and European stock markets. *Frontiers in Blockchains*, 1-11.

Seitshiro, E. M. (2025). Leveraging Markowitz, random forest, and XGBoost for optimal diversification of South African stock portfolios. *Data Science in Finance and Economics*, 205-233.

Waqas TARIQ, M. U. (2021). BANK MATURITY, INCOME DIVERSIFICATION, AND BANK STABILITY. *Journal of Business Economics and Management*, 1492-1511.