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BIBLIOMETRIC STUDY OF FINANCIAL LITERACY AND RISK TOLERANCE ON INVESTMENT DECISIONS

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ABSTRACT

This study aims to analyze trends and developments in research on the relationship between financial literacy, risk tolerance, and investment decisions. Employing a bibliometric analysis methodology, the study utilizes data from international publications in the Google Scholar database collected through Publish or Perish software. The analysis covers the publication period from 2017 to 2022 and includes a review of 498 articles using keywords such as financial literacy, risk tolerance, and investment decisions. VOSviewer software was employed for data analysis. The analysis reveals increased attention to topics such as risk appetite, financial markets, and performance, despite a declining trend in publications on financial literacy, risk tolerance, and investment decisions. Significant gaps in the literature are identified, particularly in areas such as financial risk tolerance, financial education, enterprise risk management, and investment horizon. Future research should focus on these underexplored areas to develop personalized investment strategies and enhance financial education. Recommendations include the creation of targeted financial education programs and tools to improve the assessment of risk tolerance. This study provides valuable insights into the evolving landscape of financial literacy and risk tolerance research. It underscores the importance of these factors in making informed investment decisions and offers a foundation for future studies to build upon.

1 Introduction

A person who wants to invest must know the financial sector. Financial literacy is an ability that individuals must have to avoid financial problems that individuals and organizations often face because they are often faced with trade-offs (Nabila and Safri, 2022). In these namely situations, individuals have to sacrifice one interest for another.

Bibliometric data collection methods allow researchers to analyze research trends, identify research gaps (Setia & Rahman, 2023), and map scientific collaborations in the areas of financial literacy, risk tolerance, and investment decisions (Judijanto et al., 2024). This approach provides in-depth insights into the development of knowledge and assists in developing future research agendas.

Good financial literacy and risk tolerance are crucial for making better investment decisions, which impact long-term financial well-being (Rizkyatul Nadhifah & Muhadjir Anwar, 2021; Janor et al., 2016). Financial literacy includes understanding financial concepts such as money management, financial planning, investing, and financial risk. High financial literacy levels enable individuals to make intelligent financial decisions and consider associated risks. Risk tolerance refers to an individual's ability to accept uncertainty and fluctuations in investment value to achieve long-term financial goals. Factors such as age, income, financial knowledge, and personal preferences influence risk tolerance and investment decisions.

Previous research highlights the significant influence of financial literacy and risk tolerance on investment decisions. Nabila & Safri (2022) found that both factors significantly affect gold savings investment decisions. Conversely, Putra et al. (2016) noted that only the experienced regret factor significantly impacts investment decisions, while high-risk tolerance and trust do not. Other studies show that financial literacy positively affects investment decisions and risk tolerance, but risk tolerance does not significantly impact investment decisions (Rizkyatul Nadhifah & Muhadjir Anwar, 2021; Saputri et al., 2023).

Bibliometric analysis has become essential in understanding developments and trends in various scientific disciplines. This research aims to conduct a bibliometric analysis of financial literacy and risk tolerance concerning investment decisions. Given the complexity of managing personal finances and investments in the modern era, this topic is highly relevant. This study seeks to provide valuable insights into the relationship between financial literacy, risk tolerance, and investment decisions, thereby contributing to the literature and guiding future research.

2 Literature Review

Investment Decisions

Investment decisions are a critical aspect of financial management, involving the allocation of resources with the expectation of generating future returns. The process is influenced by various factors, including market conditions, individual risk preferences, and the availability of financial information. Traditional financial theories, such as the Modern Portfolio Theory (Markowitz, 1952), emphasize diversification to optimize returns and minimize risk. More recent studies have explored behavioral aspects, highlighting how cognitive biases and emotional factors can impact investment choices (Kahneman &

Tversky, 1979). Understanding the factors that influence investment decisions is essential for developing strategies that can enhance financial outcomes and stability.

Financial Literacy

Financial literacy refers to the knowledge and skills necessary to make informed and effective financial decisions. It encompasses a broad range of topics, including budgeting, saving, investing, and understanding financial products and services. Numerous studies have demonstrated a positive correlation between financial literacy and financial well-being (Lusardi & Mitchell, 2014). Individuals with higher levels of financial literacy are better equipped to manage their finances, avoid debt, and plan for retirement. Financial education programs have been shown to improve financial literacy, though the effectiveness of these programs varies based on their design and implementation (Hastings, Madrian, & Skimmyhorn, 2013). Improving financial literacy is critical for empowering individuals to make sound financial decisions and achieve economic security.

Risk Tolerance

Risk tolerance is the degree to which an individual is willing to endure the uncertainty of potential losses in pursuit of potential gains. It is a fundamental component of investment decision-making and varies significantly among individuals. Factors influencing risk tolerance include demographic variables (such as age, gender, and income), psychological traits, and past experiences with risk (Grable & Lytton, 1999). Higher risk tolerance is generally associated with more aggressive investment strategies, while lower risk tolerance leads to more conservative approaches. Understanding risk tolerance is crucial for financial advisors and investors alike, as it helps in aligning investment portfolios with individual risk preferences and financial goals.

Interconnections

The interrelationship between financial literacy, risk tolerance, and investment decisions is well-documented in financial literature. Financial literacy provides individuals with the knowledge needed to understand and assess investment opportunities and risks. This understanding can influence an individual's risk tolerance, as better-informed individuals may feel more confident in their ability to manage risk and make investment decisions. Conversely, individuals with low financial literacy may have lower risk tolerance and be more hesitant to invest in riskier assets, potentially leading to lower returns over time (Guiso & Paiella, 2008).

Research indicates that improving financial literacy can lead to higher risk tolerance and more optimal investment decisions. For instance, a study by Clark, Lusardi, and Mitchell (2017) found that financial education programs not only increased financial knowledge but also positively affected participants' risk tolerance and investment behavior. This suggests that enhancing financial literacy is a viable strategy for improving investment outcomes and financial well-being.

Gaps and Future Research

While substantial progress has been made in understanding the relationships between financial literacy, risk tolerance, and investment decisions, several gaps remain. Future research should explore the long-term effects of financial education on investment behavior and risk tolerance. Additionally, there is a need to examine how technological advancements, such as fintech solutions, influence these factors. The role of cultural and socioeconomic contexts in shaping financial literacy and risk tolerance also warrants further investigation.

In conclusion, financial literacy, risk tolerance, and investment decisions are deeply interconnected. Enhancing financial literacy can positively impact risk tolerance and lead to more informed and effective investment decisions. Addressing the existing gaps through targeted research will provide deeper insights and support the development of strategies to improve financial outcomes for individuals and society as a whole.

3 Research Methode

This quantitative descriptive study examines the development of research on financial literacy, risk tolerance, and investment decisions (Kusmayadi et al., 2022). The study utilizes data from articles published internationally in the Google Scholar database (Umi Hartini, 2022). Within the publication period from 2017 to 2022, a total of 498 articles, proceedings, and books were analyzed.

Initially, literature data related to financial literacy, risk tolerance, and investment decisions were collected. The data sources included scientific journals, books, conference proceedings, and other relevant literature. Each article was identified based on the year of publication, title, authors, publishing journal, and the number of citations. The data were then analyzed using VOSviewer software to generate visualizations.

The results of the data analysis were interpreted to identify research gaps, emerging research trends, and contributions to the fields of financial literacy, risk tolerance, and investment decision-making. Subsequently, the research findings were compiled into a report that includes a summary of findings, interpretation of results, and recommendations for further research.

4 Results and Discussion

The following is part of the results and discussion regarding financial literacy, risk tolerance, and investment decisions.

4.1. Results of the Most Cited Related Articles

Based on search results on Google Scholar, which was used as a database for this research, relevant research data was obtained based on the highest number of citations. Table 1 shows the seven most cited published articles on the relationship between financial literacy and risk tolerance on investment decisions from 2017 to 2022.

Table 1. Article Publication Data Regarding the Relationship between Financial Literacy and Risk Tolerance on Investment Decisions

Cites	Author	Title	Journal	Year
1324	A Falk, A Becker, T Dohmen, B Enke, D Huffman, U Sunde	Global evidence on economic preferences	The quarterly journal of economics	2018
938	L Guiso, P Sapienza, L Zingales	Time varying risk aversion	Journal of Financial Economics	2018

851	A Lusardi, PC Michaud, OS Mitchell	Optimal financial knowledge and wealth inequality	Journal of political Economy	2017
774	A Riedl, P Smeets	Why do investors hold socially responsible mutual funds?	The Journal of Finance	2017
661	G Bernile, V Bhagwat, PR Rau	What doesn't kill you will only make you more risk-loving: Early-life disasters and CEO behavior	The Journal of Finance	2017
603	W Drover, L Busenitz, S Matusik, D Townsend, A Anglin, G Dushnitsky	A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators	Journal of management	2017
392	OA Stolper, A Walter	Financial literacy, financial advice, and financial behavior	Journal of business economics	2017

The articles listed in Table 1 are highly cited because they provide significant contributions to the fields of financial literacy, risk tolerance, and investment decisions. The study by Falk et al. (2018) makes a substantial contribution by providing comprehensive global evidence on economic preferences, which is fundamental to understanding how financial literacy influences risk tolerance and investment behavior. This research collected data from multiple countries, enabling the identification of patterns and differences in economic preferences, such as risk tolerance and patience, across different nations. By employing an experimental approach, the study offers valid and reliable data, demonstrating that economic preferences correlate with individuals' levels of financial literacy. These findings underscore the importance of financial literacy education in fostering healthier economic preferences, thereby enhancing individuals' capacity to make informed investment decisions. The implications of this study are significant for global financial education policies and programs and provide a robust theoretical foundation for future research in financial literacy and risk tolerance.

The study conducted by Guiso, Sapienza, and Zingales (2018) explores the concept of time-varying risk aversion, providing important insights into how individual risk tolerance changes over time and its impact on investment decisions. This research introduces and analyzes the concept that individual risk aversion is not static but changes based on various factors such as personal experiences, economic conditions, and changes in financial situations. Using longitudinal data, this study tracks changes in individual risk tolerance over a certain period, providing strong empirical evidence on how and why risk tolerance changes. The study identifies factors such as market experiences, macroeconomic events, and changes in personal financial situations as causes for changes in risk tolerance. The findings show that changes in risk tolerance significantly affect individual investment decisions, with individuals experiencing increased risk tolerance tending to take on higher-risk investments. The study also recommends that financial institutions and financial advisors develop tools and strategies to help individuals manage changes in their risk tolerance. Implementing these recommendations can enhance individual investment satisfaction and outcomes, as well as strengthen the relationship between financial advisors and their clients. Thus, this research underscores the importance of a dynamic and flexible approach in investment planning and management, providing a strong theoretical foundation for further research in financial literacy and risk management.

The study by Lusardi, Michaud, and Mitchell (2017) explores the role of financial knowledge in wealth inequality, underscoring the importance of financial literacy in making informed investment decisions. This research identifies financial knowledge as a crucial factor influencing wealth disparities among individuals, with those possessing higher financial literacy typically accumulating greater wealth compared to those with lower financial knowledge. The study emphasizes that financial literacy directly impacts individual investment decisions, where financially literate individuals are more likely to diversify their investments, select appropriate investment instruments, and avoid common investment errors. By employing economic models and simulations, the researchers illustrate how enhancing financial literacy can influence wealth distribution within society, providing a robust foundation for policymakers to design effective financial education programs. Furthermore, the study examines factors affecting financial literacy, such as formal education, financial experience, and access to financial information. Understanding these factors allows for the tailoring of financial education programs to reach a broader audience and enhance their effectiveness. The researchers recommend that governments and educational institutions increase investment in financial literacy programs designed to teach both fundamental financial concepts and practical financial management skills. Implementing these recommendations can help reduce wealth inequality by equipping individuals with the tools needed to make better financial decisions. The study also highlights the broader social and economic impacts of financial literacy, noting that reducing wealth inequality can contribute to greater social stability and more inclusive economic growth. Consequently, financial literacy should be a top priority in public policy agendas to achieve broader economic and social objectives.

The study by Riedl and Smeets (2017) investigates why investors choose socially responsible mutual funds, linking risk tolerance with ethical investment choices. The research, motivated by the understanding that investment decisions are influenced by both financial and ethical considerations, uses a combination of surveys and secondary data analysis to gather detailed information about investors' preferences. It finds that investors with higher risk tolerance are more likely to choose socially responsible mutual funds, as they are willing to accept the uncertainties associated with investments that consider social and environmental factors. The study also highlights that ethical and social motivations play a crucial role in investment decisions, with many investors aligning their investments with personal values to contribute positively to social and environmental outcomes. Based on these findings, Riedl and Smeets recommend that investment firms pay more attention to and promote socially responsible mutual funds, and increase transparency about how these funds manage risks and achieve social impact. This research provides valuable insights for financial advisors and investment managers to develop products and strategies that cater to the growing market segment of socially responsible investors, thereby contributing to the broader literature on financial literacy and ethical investment.

The research by Bernile, Bhagwat, and Rau (2017) examines the impact of early-life disasters on CEO behavior, offering a unique perspective on how risk experiences shape financial decision-making. The study finds that CEOs who experienced disasters in their childhood tend to have higher risk tolerance and make bolder financial decisions, which can lead to higher short-term company performance but also increase volatility and potential long-term losses. Using longitudinal data, this research provides strong empirical evidence on the relationship between early-life disaster experiences and risk-taking behavior in adulthood. These findings highlight the importance of considering personal backgrounds and childhood experiences when evaluating CEO leadership styles and risk-taking decisions. Additionally, the research suggests that boards of directors and other stakeholders should consider these factors in the selection and development process of leadership to optimize company performance through a better understanding of the factors influencing decision-making.

The research by Drover et al. (2017) provides a comprehensive review of entrepreneurial equity financing, emphasizing the importance of financial literacy for entrepreneurs seeking funding. The study examines various forms of equity financing, including venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators, offering a complete guide for entrepreneurs regarding the available funding options. The research highlights that financial literacy is crucial for entrepreneurs to successfully secure funding, encompassing an understanding of capital structure, company valuation, and financial terminology used in the funding process. Drover et al. also outline the significant role of venture capital and angel investors in providing capital and strategic support for startups and examine the emergence of crowdfunding and accelerators as innovative financing alternatives. Based on their findings, the researchers recommend enhancing financial literacy through education and training focused on entrepreneurial finance, supported by governments and educational institutions. Thus, this research provides in-depth insights that help entrepreneurs understand and utilize available funding options, as well as manage their company finances more effectively to support the growth and success of their ventures.

Finally, The research by Stolper and Walter (2017) analyzes the relationship between financial literacy, financial advice, and financial behavior, reinforcing the need for financial education to improve investment outcomes. The study found that individuals with higher financial literacy are more likely to seek and effectively utilize professional financial advice, which positively impacts their financial behavior. Additionally, financial advice has been shown to help individuals become more disciplined in financial management and make wiser investment decisions. The research also demonstrates that financial literacy has a direct impact on saving habits, debt management, and investment decisions, highlighting the importance of financial education at various levels. Based on their findings, Stolper and Walter recommend increasing efforts in financial education through integration into school curricula and training programs for the general public. Thus, this research provides important insights that support the need for improved financial literacy to enhance investment outcomes and individual financial well-being.

These highly cited articles highlight key areas of research that are essential for understanding the interplay between financial literacy, risk tolerance, and investment decisions. The insights gained from these studies can inform future research directions and practical applications in financial education and investment strategy development. By identifying research gaps and emerging trends, this study contributes to a deeper understanding of how financial literacy and risk tolerance influence investment behavior, ultimately guiding both academic inquiry and financial practice.

4.2. Development of Research on Financial Literacy, Risk Tolerance, and Investment Decisions

Research trends using the keywords "financial literacy, risk tolerance and investment decisions" are shown in Figure 1.

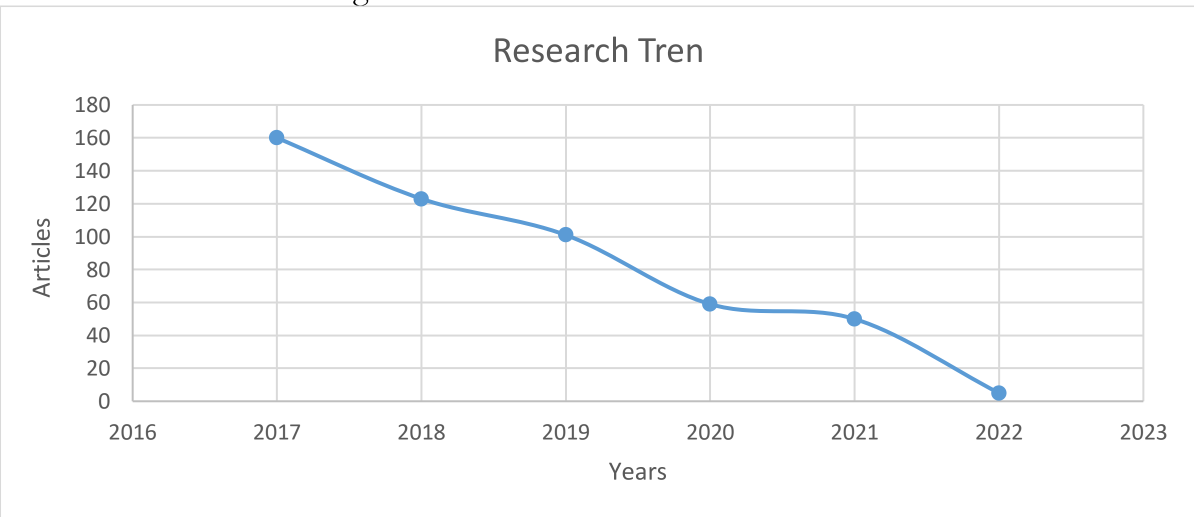


Figure 1. Research Trends

In Figure 1, it can be observed that in 2017, there were 160 articles discussing the influence of financial literacy and risk tolerance on investment decisions. However, there has been a noticeable decline in the number of publications on these topics over the years, culminating in only five articles published in 2022. This decline raises questions about the evolving focus and priorities within this research area.

Several factors might explain this downward trend. One possible reason is the shift in academic interest toward emerging financial topics such as fintech, cryptocurrency, and sustainable investing, which may have diverted attention from traditional research areas like financial literacy and risk tolerance. Additionally, funding opportunities and institutional priorities may have influenced the volume of research in this field.

The declining trend in research publications is concerning, given the increasing importance of financial literacy and risk tolerance in today's consumer-driven society. With the rise of consumer culture and the lack of adequate financial education, many individuals are at risk of financial mismanagement, leading to income wastage and financial instability. Mandagie et al. (2020) suggest that while investment is often seen as a solution to financial problems, it requires a solid foundation in financial literacy and an understanding of risk tolerance.

Furthermore, Permanasari et al. (2020) highlight that individuals with high levels of both financial literacy and risk tolerance are more likely to save for retirement compared to those with lower levels. This finding underscores the need for continued research and education in financial literacy and risk tolerance to promote better financial decision-making and long-term financial security.

To address the gap identified by the declining research trend, it is crucial for academics and researchers to renew their focus on financial literacy and risk tolerance. Future research should explore the impact of digital financial education tools, the role of financial advisors in enhancing financial literacy, and the influence of cultural and socioeconomic factors on risk tolerance and investment decisions.

By expanding the scope of research and incorporating innovative methodologies, such as longitudinal studies and mixed-methods approaches, researchers can provide deeper insights into the dynamic interplay between financial literacy, risk tolerance, and investment behavior. These efforts will not only contribute to the academic literature but also inform practical strategies for improving financial education and outcomes for individuals across various demographics.

In conclusion, while there has been a decline in research on financial literacy and risk tolerance, the continued importance of these topics necessitates a renewed academic focus. By addressing the identified gaps and leveraging new research methodologies, scholars can contribute to the development of effective financial education programs and better financial outcomes for society.

4.3. Network Visualization

The results of network visualization analysis on the development of financial literacy research and risk tolerance on investment decisions using VOSviewer software are divided into 3 clusters, which can be seen in Figure 2 below.

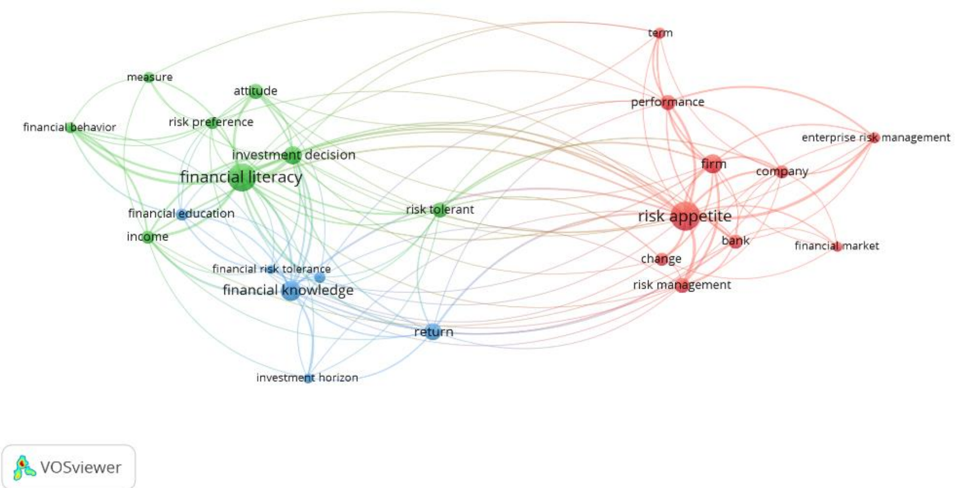


Figure 2. Network Visualization

Figure 2 illustrates the network visualization of research on financial literacy, risk tolerance, and investment decisions using VOSviewer software. The visualization is divided into three clusters: red, green, and blue. Cluster 1, shown in red, centers around the term "risk appetite," which is connected to 18 other terms such as bank, change, company, enterprise risk management, financial market, firm, performance, risk management, and term. This cluster highlights the importance of understanding and managing risk appetite in relation to risk management and company performance within financial markets. Cluster

2, depicted in green, focuses on "financial literacy," connected to 19 terms including attitude, financial behavior, financial literacy, income, investment decision, measure, risk preference, and risk tolerance.

This cluster underscores the crucial role of financial literacy in shaping financial behavior and making informed investment decisions. Improving financial literacy can lead to better financial outcomes and enhanced risk management. Cluster 3, shown in blue, revolves around "financial knowledge," connected to 15 terms such as financial education, financial knowledge, return, investment horizon, income, and risk tolerance. This cluster emphasizes the significance of financial knowledge in achieving long-term investment success, indicating that a deeper understanding of financial concepts is essential for effective financial planning and reaching investment goals. Overall, the network visualization demonstrates the interconnectedness of financial literacy, risk tolerance, and investment decisions, highlighting the need for continued research and effective financial education programs to improve investment outcomes.

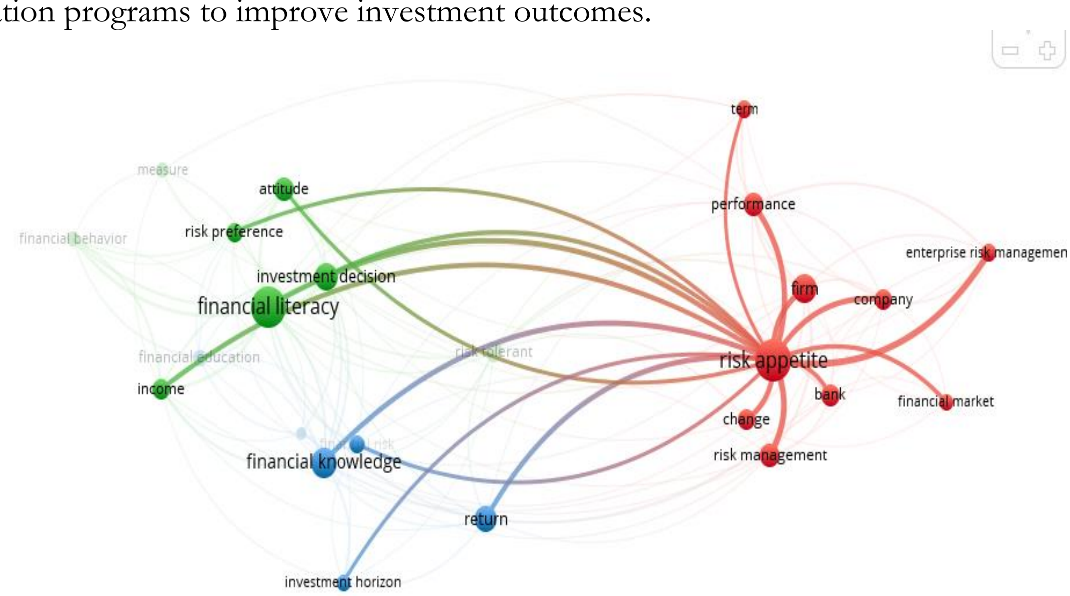


Figure 3. Cluster 1

Figure 3 displays the network visualization of Cluster 1, shown in red. The most frequently used term in this cluster is "risk appetite," which has 18 connections with other terms. Risk appetite refers to the level of risk that a company or individual is willing to accept to achieve their goals. This term is strongly connected to other terms such as risk management, performance, and enterprise risk management, highlighting the importance of understanding and managing risk appetite in the context of risk management and company performance. Risk management is the process of identifying, evaluating, and controlling risks that can affect the achievement of organizational objectives, and it is closely linked to risk appetite because understanding the acceptable level of risk is essential for designing effective risk management strategies. Performance refers to the results or outputs achieved by a company in various operational and financial aspects, often influenced by the level of risk that is willing to be accepted, making risk appetite a crucial factor in performance strategies.

Enterprise risk management (ERM) is an integrated approach to managing all types of risks faced by a company holistically, requiring a clear understanding of acceptable risk levels to manage risks effectively across the entire organization. The financial market influences and is influenced by risk appetite because the level of risk accepted by investors can affect market behavior. Change refers to any modifications or transformations within an organization or its external environment that impact operations and strategies, so risk appetite needs to be adjusted to remain relevant and effective in response to changing market conditions and business environments. Companies or business entities, including banks, play a key role in managing risk and risk appetite because they must manage credit, liquidity, and market risks effectively. In the context of risk management, the term "term" can refer to conditions that govern the acceptable level of risk in various business agreements.

Cluster 1, shown in red in Figure 3, highlights the importance of "risk appetite" in risk management and company performance. The close relationships between risk appetite and other terms indicate that understanding and managing acceptable risk levels is crucial for successful and sustainable business strategies. This cluster provides insights into how various aspects of risk management, performance, and financial markets are interconnected in the context of financial literacy and investment decisions.

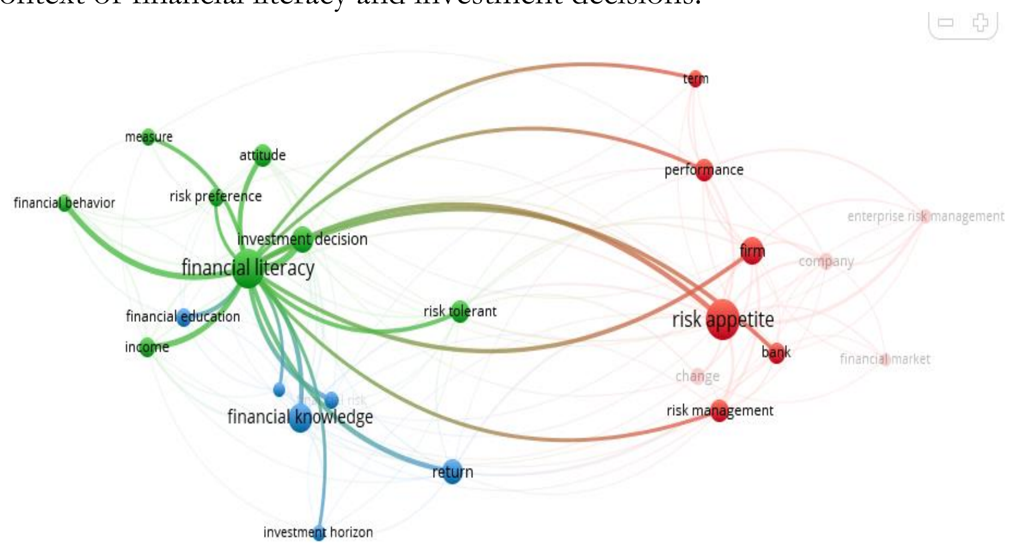


Figure 4. Cluster 2

Cluster 2, depicted in green in the visualization, centers around the term “financial literacy,” the most frequently used term in this cluster. This term has 19 connections with other terms, underscoring its pivotal role in the network. The cluster consists of eight items: attitude, financial behavior, financial literacy, income, investment decision, measure, risk preference, and risk tolerance. Financial literacy refers to the knowledge and understanding of financial concepts and risks, and the ability to make informed and effective financial decisions. It is connected to various terms such as investment decision, risk tolerance, and financial behavior, highlighting its significance in influencing how individuals manage their finances and make investment choices.

Attitude towards finance is shaped by financial literacy, which in turn affects decision-making and risk preferences. Financial behavior encompasses the actions and habits of individuals in managing their finances, including spending, saving, investing, and borrowing. Financial literacy directly impacts financial behavior, leading to more prudent financial management and better investment decisions. Income level can influence and be influenced by financial literacy, as knowledgeable individuals tend to make better financial decisions that enhance their income. Financial literacy is crucial for making informed investment decisions, as it equips individuals with the knowledge to evaluate investment options and understand associated risks. Developing measures of financial literacy helps in understanding its impact on financial behavior and decision-making.

Financial literacy affects risk preference, as more knowledgeable individuals may have a better understanding of risk and thus be more or less willing to take on risk depending on their financial goals. Financial literacy also influences risk tolerance by providing the understanding needed to assess and accept risks associated with different investments. This cluster emphasizes the central role of financial literacy in shaping various aspects of financial decision-making and behavior. The connections between financial literacy and other terms such as investment decision, risk tolerance, and financial behavior underscore the importance of educating individuals to enhance their financial knowledge. This, in turn, can lead to more informed investment choices, better risk management, and overall improved financial well-being. The cluster highlights the need for ongoing financial education to equip individuals with the necessary skills to navigate complex financial landscapes effectively.

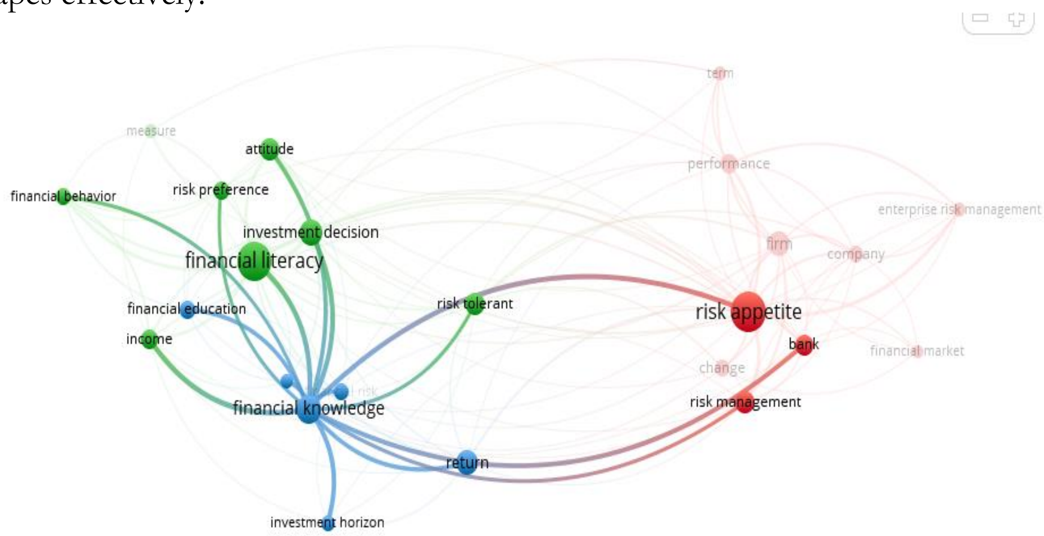


Figure 5. Cluster 3

Figure 6 illustrates that the solid or dark blue color in the overlay visualization represents the oldest research publications, while yellow indicates the most recent research publications. Based on Figure 6, research on topics such as risk appetite, risk tolerance, financial markets, performance, change, measure, and income are prominently featured in the latest studies. One of the newest topics that appear in the overlay visualization is risk tolerance. According to Putra et al. (2016), each investor has a different tolerance for risk because investment is constantly faced with profits and risks; the higher the desired profit, the higher the risk one must face. It is reasonable to expect people with varying levels of risk tolerance to behave differently when making investment decisions. Those with high-risk tolerance (low-risk aversion) tend to invest more aggressively (Grable, 2016).

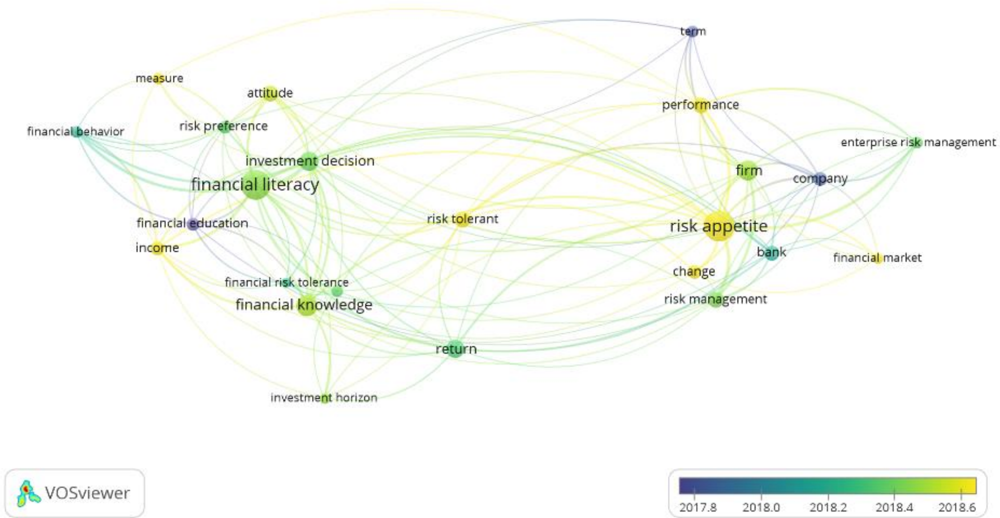
The overlay visualization reveals significant trends in the evolution of research topics. The shift from older topics in dark blue to newer topics in yellow highlights areas of growing interest and emerging importance in the field of financial studies. For instance, the increasing focus on risk tolerance suggests a heightened awareness of the diverse risk profiles among investors and the need for tailored investment strategies.

To further enhance this analysis, it is crucial to consider the implications of these findings. The prominence of recent research on risk tolerance and financial markets underscores the dynamic nature of investment environments and the necessity for continuous adaptation by financial practitioners. Moreover, the emphasis on performance and income reflects ongoing efforts to optimize investment outcomes and financial well-being.

Future research should delve deeper into these emerging topics, exploring the nuanced relationships between risk tolerance and investment decisions. Additionally, practical applications of these findings could include the development of more sophisticated financial tools and educational programs aimed at improving investor literacy and decision-making capabilities.

4.4. Overlay Visualization

Overlay Visualization is an analytical method used to examine the content, patterns, and tendencies of a collection of documents by measuring the strength of terms and counting the number of keywords that appear simultaneously in the studied articles (Pupu Fauziah, Siti: 2023). The results of the overlay visualization are depicted in Figure 6.



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4.5. Density Visualization

Density Visualization can identify which research topics are rarely conducted (Kusmayadi et al., 2022), as shown in Figure 7.

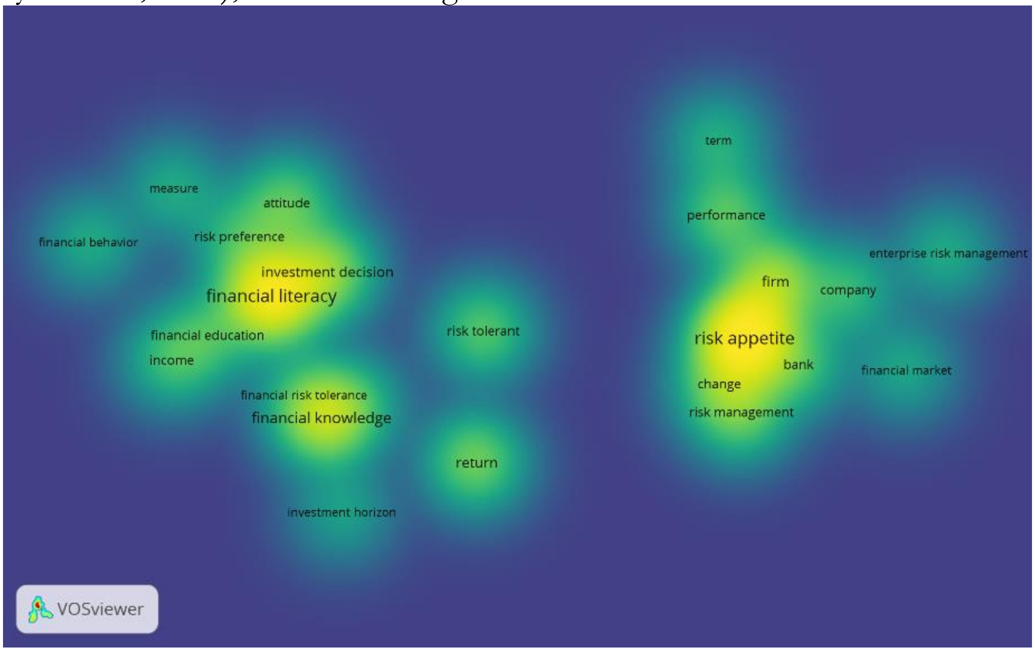

Figure 7. Density Visualization

Density Visualization illustrates the density of the keywords "Financial Literacy," "Risk Tolerance," and "Investment." The yellow color in Figure 7 indicates that the most frequently conducted research topics are financial literacy, risk appetite, and investment decisions. Conversely, the dim yellow color highlights research topics that are rarely conducted, including financial risk tolerance, financial education, enterprise risk management, and investment horizon.

Based on the results of this analysis, the fundamental aspects supporting investment decisions are return and risk. Investors expect high returns, but the amount of risk borne must also be considered. Generally, the greater the risk, the greater the expected return (Rasuma Putri & Rahyuda, 2017; León et al., 2007). The visualization reveals that while financial literacy and investment decisions are well-researched areas, there are significant gaps in the literature concerning financial risk tolerance and education, enterprise risk management, and investment horizon.

This disparity in research focus suggests potential areas for further investigation. Understanding financial risk tolerance is crucial for developing personalized investment strategies that align with individual risk preferences. Similarly, enhancing financial education can equip investors with the necessary skills to make informed decisions, ultimately leading to better financial outcomes. Enterprise risk management is another underexplored area that can provide valuable insights into how organizations manage risks across different sectors, improving overall financial stability.

Future research should aim to address these gaps by exploring the underrepresented topics identified through density visualization. Investigating these areas can contribute to a more comprehensive understanding of the factors influencing investment decisions and risk management. Additionally, practical applications of these findings could include the development of targeted financial education programs and tools designed to assess and improve risk tolerance among investors.

In conclusion, the density visualization highlights the need for a balanced research agenda that covers both well-explored and underrepresented topics. By integrating these insights with existing literature, researchers can develop a more holistic understanding of financial literacy, risk tolerance, and investment decision-making, thereby enhancing the effectiveness of financial education and risk management strategies.

5 Conclusion

Based on the analysis and discussion above, it can be concluded that there are 498 international publications in the Google Scholar database for the period 2017 – 2022 related to the keywords financial literacy, risk tolerance, and investment decisions, which were processed and analyzed using VosViewer. The overlay visualization method employed in this study highlights the shift in research focus from older topics to emerging areas. Recent research has shown increased attention to topics such as risk appetite, risk tolerance, financial markets, performance, change, measure, and income.

The findings reveal that while financial literacy and investment decisions are well-researched, there are significant gaps in the literature concerning financial risk tolerance, financial education, enterprise risk management, and investment horizon. This disparity in research focus suggests potential areas for further investigation. Understanding financial risk tolerance is crucial for developing personalized investment strategies that align with individual risk preferences. Similarly, enhancing financial education can equip investors with the necessary skills to make informed decisions, ultimately leading to better financial outcomes.

Future research should aim to address these gaps by exploring the underrepresented topics identified through density visualization. This approach can contribute to a more comprehensive understanding of the factors influencing investment decisions and risk management. Practical applications of these findings could include the development of targeted financial education programs and tools designed to assess and improve risk tolerance among investors.

In conclusion, bibliometric studies are invaluable for academics to comprehend current research trends and shifts in the literature concerning financial literacy, risk tolerance, and investment decisions. This understanding can guide researchers toward underexplored topics and create opportunities for further investigation. Given the declining trend in research on financial literacy and risk tolerance for investment decisions, it is recommended that academics and researchers renew their focus on these areas to add the latest references and insights to the field.

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