A BIBLIOMETRIC STUDY OF FINANCIAL BEHAVIOR TRENDS USING *VOSVIEWER* AND DATA FROM *GOOGLE SCHOLAR* (2014-2024)

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Abstract

This research analyzes the dynamics of individual financial behavior and the factors that influence it through bibliometric methods using VOSviewer software. Bibliometrics is a mathematical method to identify academic publications related to quotations and scientific matters and intended for use in libraries. VOSviewer is used to build a network map that depicts the relationships between keywords and identifies clusters or groups of keywords that frequently appear together. This research provides insight into research trends and effective strategies for increasing financial literacy and financial inclusion. Bibliographic data was collected from academic literature related to finance during the 2014-2024 period. The results of the analysis show that financial literacy, financial behavior, and adoption of financial technology (fintech) are topics that are often discussed in the literature; financial literacy has a strong relationship with financial decision-making, leading to better saving and investment habits and reduced debt; financial behavior mostly written in the article from the US in 2015 and highest citation in 2019 from the UK. Recommendations for future research include the use of qualitative methods, longitudinal studies, and evaluation of the impact of formal and informal financial education.

***Keywords**: bibliometrics, financial behavior, Google Scholar, VOSviewer*

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INTRODUCTION

Understanding financial behavior in the context of the global economy continues to develop. Financial behavior refers to how individuals make decisions regarding their finances, including how they manage their income, saving, investment, and allocation of their financial resources. Financial behavior includes a person's actions in managing their money in everyday life. This relates to the way a person organizes and utilizes available financial resources. Financial behavior also involves a person's financial responsibility in managing their finances effectively (Universitas Widya Mataram Yogyakarta, 2023). This phenomenon is gaining increasing attention among academics and practitioners because of its significant impact on the economic stability of individuals and society as a whole.

In recent years, research on financial behavior has shown that psychological, social, and economic factors play an important role in determining how individuals make financial decisions. For example, low financial literacy is often associated with poor financial decisions, such as taking on excessive debt and a lack of emergency funds (Lusardi & Mitchell, 2014). The importance of financial behavior is also reflected in the

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efforts of the government and financial institutions to increase financial literacy through education and training programs. These efforts aim to empower individuals with the knowledge and skills necessary to make wise financial decisions (OECD, 2016).

Richard Thaler, a Nobel Prize-winning economist, once remarked that in the future, an investor's behavior would become so essential to finance that any financial model excluding it would be inaccurate (Thaler, 1999). During the COVID-19 pandemic, two major events in the financial world—a significant surge in investor participation via the Robinhood platform and an unusual rise in the price of GameStop Corp—have been analyzed through the lens of behavioral finance (Singh, 2021). Behavioral finance studies household financial decisions to enhance overall financial well-being. It includes the involvement of the financial system and the government to facilitate easier access to financial services. Individuals use these services, such as bill payment and saving money, to improve their financial status (Wahyuni, Sukmadewi, & Setiawati, 2022). These examples and studies demonstrate that understanding financial behavior is essential for accurate financial modeling, effective policy-making, and improving individual financial well-being.

Phenomenon of fintech (financial technology) has also changed the landscape of behavioral finance significantly. This has led to a shift in how people make financial decisions, influenced by the convenience and accessibility of fintech solutions. Innovations in financial technology have provided new tools and platforms that enable individuals to manage their finances more efficiently and transparently (Gomber, Koch, & Siering, 2017). Fintech innovations, such as mobile banking apps, robo-advisors, and blockchain technology, have made financial management more efficient by automating processes and providing real-time insights. These tools enhance transparency by giving users a clear view of their financial status, transactions, and investments, which fosters more informed and prudent financial behavior. However, the adoption of these technologies also raises new challenges, such as data security and privacy, which need to be understood and addressed to ensure that their benefits can be maximized (Vives, 2019). Addressing these challenges is crucial to maintaining user trust and ensuring the long-term sustainability of fintech solutions. Users need to be aware of these risks and adopt practices to safeguard their information, while fintech companies must implement robust security measures to protect user data.

This research aims to provide deeper insight into the dynamics of financial behavior, the factors that influence it, and the implications for individual financial stability and the economy as a whole. By understanding these factors, it is hoped that effective strategies can be identified to increase financial literacy and encourage better financial behavior in society.

The benefits and contributions of this research provide a comprehensive understanding of the dynamics of financial behavior over a decade (2014-2024) through a bibliometric analysis. By utilizing *VOSviewer* software, the study maps out the key topics, trends, and influential works in the field, offering valuable insights into how financial literacy, financial behavior, and the adoption of financial technology (fintech) are interrelated. This research underscores the importance of financial literacy in making informed financial decisions, highlighting its role in increasing savings and investments while reducing debt.

LITERATURE REVIEW

Financial behavior encompasses an individual's actions in managing their money in daily life. It relates to how a person organizes and utilizes the available financial resources. Financial behavior also involves an individual's financial responsibility in effectively managing their finances (Universitas Widya Mataram Yogyakarta, 2023).

Financial literacy remains a key factor in determining healthy financial behavior. Research by Lusardi and Mitchell (2014) confirms that higher financial literacy correlates with better financial decision-making, such as increased savings and investments, as well as reduced uncontrolled debt. Subsequent studies by Kaiser and Menkhoff (2017) also support these findings, showing that financial literacy education can significantly improve individual financial behavior.

Good saving and investing habits are important indicators of healthy financial behavior. Research by Fernandes, Lynch, and Netemeyer (2014) indicates that educational interventions that enhance financial knowledge and skills can increase savings and investment levels.

RESEARCH METHOD

The research method used in this research is the bibliometric method, which involves collecting and analyzing bibliographic data from academic literature to map and visualize a network of keywords related to the topic of financial behavior from 2014 to 2024. Bibliometrics is a mathematical method or method that functions and is used to identify academic publications related to quotations and scientific matters and intended for use in libraries or other fields (Haryani et al., 2019). This method is useful for identifying research patterns, evaluating the impact of research, and revealing relationships between various topics in the literature. The steps in this research method include, (1) Data collection. Bibliographic data is collected from reliable scientific databases, via *Google Scholar* through *Publish or Perish (Windows GUI Edition)*. This data includes information about articles, books, number of citations, and terminology used in publications. The search yielded 243 articles, 68 books and 526,222 citations over a 10 year period (2014-2024) in 40 countries; (2) Data Processing. The collected data is processed using software *VOSviewer version 1.6.20*, which is a specialized tool for bibliometric analysis and network mapping. This research also uses *Google Sheet* to display tables and graphs, (a) *VOSviewer. VOSviewer* is a software tool for creating maps based on network data and for visualizing and exploring these maps. The functionalities of *VOSviewer* are creating maps based on network data, visualizing and exploring three maps - the network visualization, the overlay visualization, and the density visualization (Eck & Waltman, 2023). Data collection will be uploaded to VOSviewer, then selecting the terminology related to the research. Finally, the results will be shown as three maps; (b) *Google Sheet*, Data collection is converted to tables and graphs using this software; (3) Network Analysis. The result of the terminology network is analyzed to understand the structure and dynamics of research in the field of finance, especially regarding behavioral finance. This analysis includes identification of central terminology, relationships between terminologies, as well as clusters or groups of interconnected terminologies. This technique helps in revealing how certain topics are interconnected and develop in the literature (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021); (4) Visualization.The analysis results are visualized in the form of a density network map.

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The network map shows the relationships between terminologies, while the density map shows the frequency of appearance of the terminology in the literature. The color and size of the nodes in this visualization help identify key topics and research trends (Aria & Cuccurullo, 2017); (5) Interpretation of Results. The visualization and network analysis results are interpreted to identify research trends, widely discussed areas, and potential for further research. This interpretation helps in understanding the focus of research in the field of finance, especially behavioral finance as well as identifying emerging topics. These findings can be used to design further studies that can deepen understanding of certain topics or explore new research areas (Chen, Dubin, & Kim, 2014).

RESULTS AND DISCUSSION

The data obtained was analyzed qualitatively and quantitatively using the publish or perish application tools, MS-Excel and VOS Viewer. The results will be explained below.

Table 1. Distribution of Articles, Books and Citations (2014-2024)

Year	Articles	% of Articles	Books	% of Books	Citations	% of Citations
2014	37	15.2%	6	8.8%	86,122	16.4%
2015	43	17.7%	14	20.6%	118,299	22.5%
2016	43	17.7%	5	7.4%	57,669	11.0%
2017	27	11.1%	8	11.8%	31,854	6.1%
2018	23	9.5%	13	19.1%	37,492	7.1%
2019	21	8.6%	5	7.4%	151,906	28.9%
2020	16	6.6%	5	7.4%	13,863	2.6%
2021	18	7.4%	5	7.4%	17,891	3.4%
2022	7	2.9%	5	7.4%	7,220	1.4%
2023	2	0.8%	2	2.9%	3,611	0.7%
2024	6	2.5%	0	0.0%	295	0.1%
	243	100%	68	100%	526,222	100%

Source: POP Search Results from Google Scholar 2024

Table 1 shows the distribution of the number of articles, books and citations published from 2014 to 2024. Based on the data in the table, fluctuations in the number of publications and citations can be seen during this period.

In 2014, there were 37 articles (15.2% of the total) and 6 books (8.8% of the total), with the number of citations reaching 86,122 (16.4% of the total citations). 2015 showed an increase in both the number of articles to 43 (17.7%) and the number of books to 14 (20.6%), as well as a significant jump in the number of citations to 118,299 (22.5%). In 2016 the number of articles remained at 43 (17.7%), but the number of books decreased to 5 (7.4%), accompanied by a decrease in the number of citations to 57,669 (11.0%). In 2017, the number of articles decreased to 27 (11.1%) and books increased slightly to 8 (11.8%), with the number of citations also decreasing to 31,854 (6.1%). In 2018, there were 23 articles (9.5%) and 13 books (19.1%), with a total of 37,492 citations (7.1%). 2019 showed a decrease in the number of articles to 21 (8.6%) and the number of books

remained at 5 (7.4%), but recorded a remarkable increase in the number of citations to 151,906 (28.9%), which was the highest peak in this period.

In 2020 showed a drastic decrease in the number of articles to 16 (6.6%) and the number of citations to 13,863 (2.6%), although the number of books remained at 5 (7.4%). In 2021, the number of articles increased slightly to 18 (7.4%) and books remained 5 (7.4%), with a total of 17,891 (3.4%) citations. In 2022 there was a significant decline with only 7 articles (2.9%) and the number of citations was 7,220 (1.4%), while the number of books remained 5 (7.4%). In 2023 there were only 2 articles (0.8%) and 2 books (2.9%), with a very low number of citations of 3,611 (0.7%). In 2024, there will be 6 articles (2.5%) but no books published, with a very low number of citations of only 295 (0.1%).

The topic of financial behavior attracted a lot of attention from writers in 2015, where this topic has been written about a lot in articles and books in the last 10 years with a total of 43 articles and 14 books. Meanwhile, the highest citations occurred in the 2019 period from only 21 articles and 5 books.

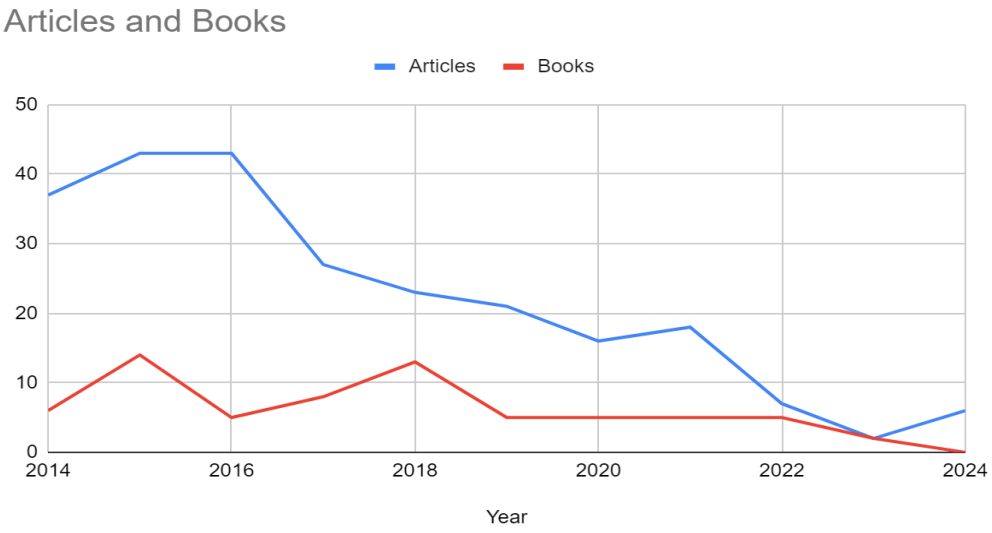

Figure 2. Number of articles and books (2014-2024)
Source: POP Search Results from Google Scholar 2024

Figure 2 shows a graph of the number of articles and books published from 2014 to 2024 related to behavioral finance. This graph provides a visualization of academic publication trends over the past decade. In 2014, the number of articles published was 37, and the number of books was 6. In 2015, there was an increase in the number of articles to 43, while the number of books also increased significantly to 14. The number of articles remained the same in 2016, namely 43, but the number of books decreased to 5. 2017 showed a sharp decline in the number of articles to 27, while the number of books showed a slight increase to 8. 2018 showed a further decline in the number of articles to 23, but the number of books increased again to 13. 2019 showed a further decrease in the number of articles to 21, while the number of books decreased again to 5. In 2020, the number of published articles decreased drastically to 16, and the number of books remained at 5. 2021 showed a slight increase in the number of articles to 18, with the number of books remaining 5.

Table 3. Distribution of Articles and Citations Per Country (2014-2024)

Country	Articles	% of Articles	Citations	% of Citations
South Africa	1	0.4%	98	0.0%
United States	104	42.8%	149,093	40.0%
Saudi Arabia	2	0.8%	938	0.3%
Australia	1	0.4%	579	0.2%
Bangladesh	1	0.4%	115	0.0%
Netherland	9	3.7%	7,481	2.0%
Belgium	2	0.8%	724	0.2%
China	20	8.2%	11,603	3.1%
Estonia	1	0.4%	15	0.0%
Ghana	1	0.4%	182	0.0%
Hongkong	1	0.4%	46	0.0%
India	3	1.2%	216	0.1%
Indonesia	6	2.5%	3,738	1.0%
United Kingdom	26	10.7%	158,625	42.6%
Israel	1	0.4%	174	0.0%
Italy	4	1.6%	2,472	0.7%
Germany	11	4.5%	11,102	3.0%
Canada	6	2.5%	3,651	1.0%
Columbia	1	0.4%	754	0.2%
South Korea	1	0.4%	179	0.0%
Kuwait	1	0.4%	771	0.2%
Lithuania	1	0.4%	619	0.2%
Malaysia	6	2.5%	2,013	0.5%
Nigeria	1	0.4%	140	0.0%
Oman	1	0.4%	81	0.0%
Pakistan	1	0.4%	679	0.2%
France	7	2.9%	4,548	1.2%
Portugal	2	0.8%	1,661	0.4%
Prague	1	0.4%	1,091	0.3%
Qatar	1	0.4%	872	0.2%
Serbia	1	0.4%	14	0.0%
Spain	6	2.5%	3,049	0.8%
Swedia	1	0.4%	619	0.2%
Switzerland	2	0.8%	2,591	0.7%
Tanzania	1	0.4%	7	0.0%
Thailand	1	0.4%	634	0.2%
Turkey	4	1.6%	1,196	0.3%

Table 3. Distribution of Articles and Citations Per Country (2014-2024) (Cont.)

Country	Articles	% of Articles	Citations	% of Citations
Ukraine	1	0.4%	86	0.0%
Uzbekistan	1	0.4%	210	0.1%
Greece	1	0.4%	17	0.0%
	243	100%	372,683	100%

Source: POP Search Results from Google Scholar 2024

A significant downward trend can be seen in 2022, where the number of articles published was only 7, while the number of books remained at 5. 2023 recorded the lowest number of articles during this period, namely only 2 articles, and the number of books also decreased to 2. In 2024, the number of articles increased slightly to 6, but no books were published.

Table 3 shows the distribution of the number of articles and citations by country from 2014 to 2024. This data provides an overview of the contribution of countries to academic publications and their impact in terms of the number of citations received. The United States dominates with the highest number of articles, namely 104 articles, representing 42.8% of the total articles published. This country also recorded a high number of citations, namely 140,093 citations, or 40.0% of the total citations. This shows that publications from the United States are not only numerous, but also very influential.

England is in second place with 28 articles (10.7% of the total) and a total of 158,625 citations (42.6% of the total citations). Even though the number of articles is smaller than in the United States, the highest number of citations shows that publications from the UK are very influential in the academic community. Another country with a significant contribution was China with 20 articles (8.2%) and 11,103 citations (3.0%). Germany also recorded an important contribution with 11 articles (4.5%) and 11,020 citations (3.0%). Indonesia, with 6 articles (2.5%) and 3,738 citations (1.0%), shows a relatively small contribution in terms of number of publications and impact. However, it remains an important contribution in a global context. Other countries such as Australia, Belgium, Netherlands, and India show smaller contributions in both the number of articles and the number of citations, with less than 10 articles and less significant citations respectively.

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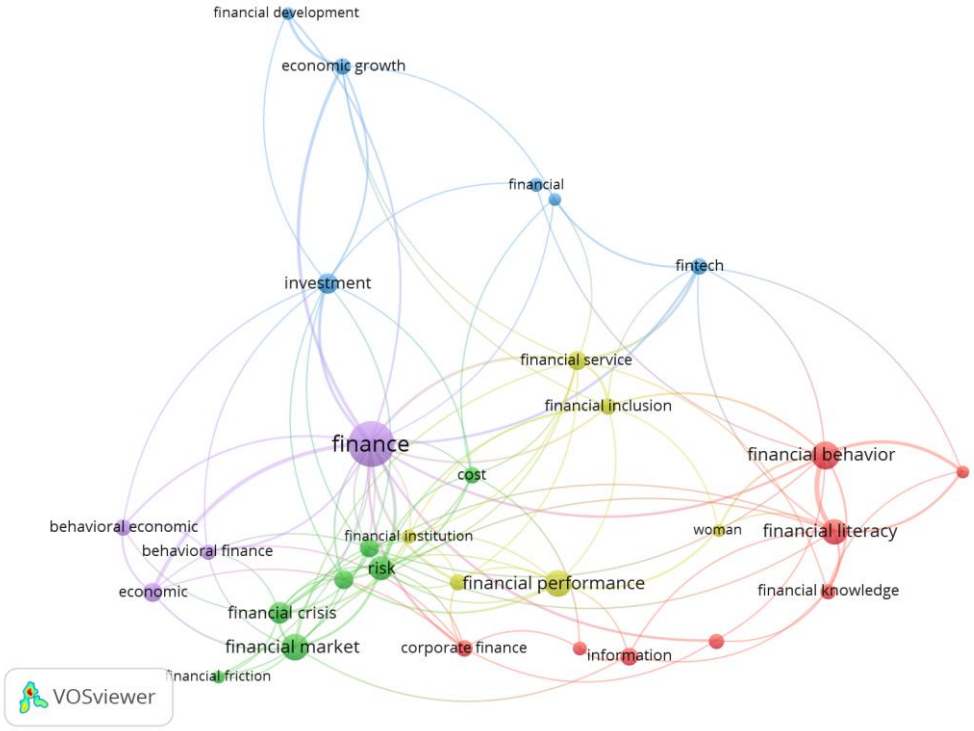

Figure 4. Visualization Map of Terminology (Items) from Articles on Financial Behavior

Figure 4 shows a network visualization based on terminology analysis carried out using VOSviewer. This figure maps the relationships between various concepts related to the field of finance, showing how various terms connect and interact in academic literature.

Finance is a central terminology that connects many other concepts, indicating its central role in this field of study. From this central keyword, we can see several groups or clusters that are formed based on the relationship between the terms. The colors are determined by default.

The Blue Cluster

Contains the following terminology: Economic Growth, Investment, Financial Development and Fintech, (a) Relationship between economic growth and investment is quite strong, indicating that investment is often associated with economic growth; (b) Fintech is also connected with financial service and financial inclusion, showing the important role of technology in financial inclusion; (c) The line connection between financial development and economic growth signifies that financial development plays a crucial role in facilitating economic growth by improving investments;

The Green Cluster

Contains the following terminology: Financial Crisis, Financial Market, Risk, Financial Institution, Financial Friction and Cost; (a) Relationship between the financial crisis and the financial market shows how a financial crisis can affect financial markets; (b) Risk is also connected to *financial institutions*, showing the importance of risk management in financial institutions; (c)

The lines between financial friction with the financial market and financial crisis illustrate that financial friction is essential for improving financial market performance and reducing the risk of future financial crises;

The Red Cluster

Contains the following terminology: Financial Literacy, Financial Behavior, Financial Knowledge and Corporate Finance; (a) Strong relationship between financial literacy and financial behavior shows how understanding of finance impacts individual behavior in financial management; (b) Financial knowledge is also connected to financial literacy, showing the importance of education in improving financial literacy; (c) The lines connected corporate finance with risk and financial performance illustrate that effective corporate finance involves assessing and managing risks to optimize the capital structure whereas corporate finance practices impact financial performance through efficient capital allocation, cost of capital optimization, strategic decisions, and cash flow management;

The Yellow Cluster

Contains terminology: Financial Performance, Financial Inclusion and Financial Service, (a) Financial inclusion connected with financial service, shows the importance of financial services in achieving financial inclusion; (b) Relationship between financial performance and cost explains that efficient cost can enhance their financial performance;

The Purple Cluster

Contains the following terminology: Behavioral Finance and Behavioral Economic. This relationship suggests a focus on how psychological and behavioral factors influence financial decisions.

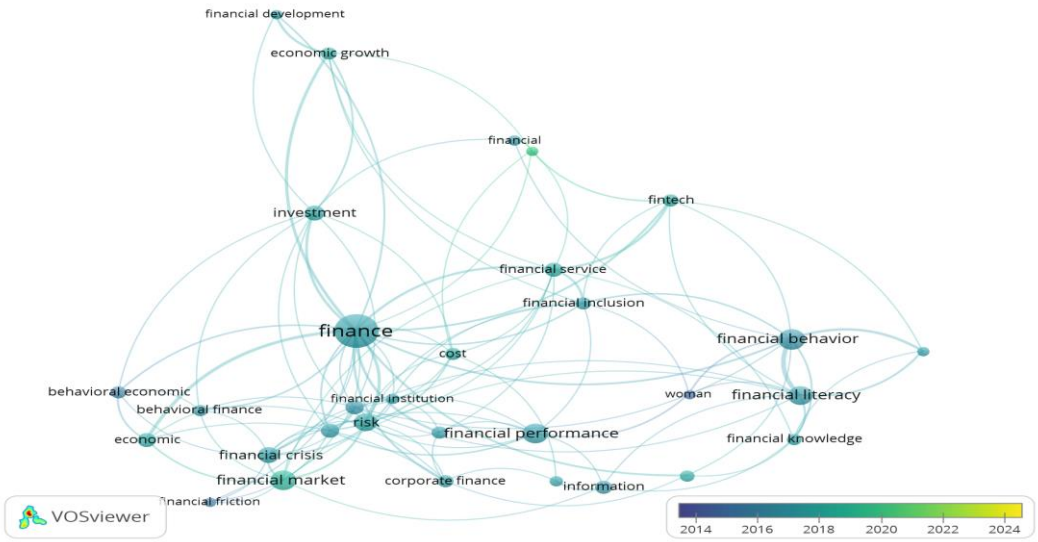

Figure 5. Yearly Publication Map Articles related to Financial Behavior (2014-2024)

Figure 5 shows a network visualization with temporal overlay based on terminology analysis carried out using *VOSviewer*. This figure not only maps the relationship between

various concepts in finance, but also shows the temporal evolution of the research from 2014 to 2024.

Finance remained the central terminology linking various other concepts, indicating the importance of this topic in academic research during the period. The color of the nodes and lines indicates the publication time of the study, with a color gradient from blue (2014) to yellow (2024).

From Table 1, we can see that the highest articles written in 2015, where new technologies and innovations emerged. The emergence of new topics, such as fintech, blockchain, and digital currencies, can lead to an increase in research activity and publications (Gomber et al., 2017). The peak citations in 2019 could be attributed to several high-impact publications reaching maturity, where they begin to be widely cited in subsequent research. The decline in publications and citations in the most recent years (2022-2024) could reflect a combination of time lag in publication processes, shifts in research priorities, and the impact of global events such as the COVID-19 pandemic.

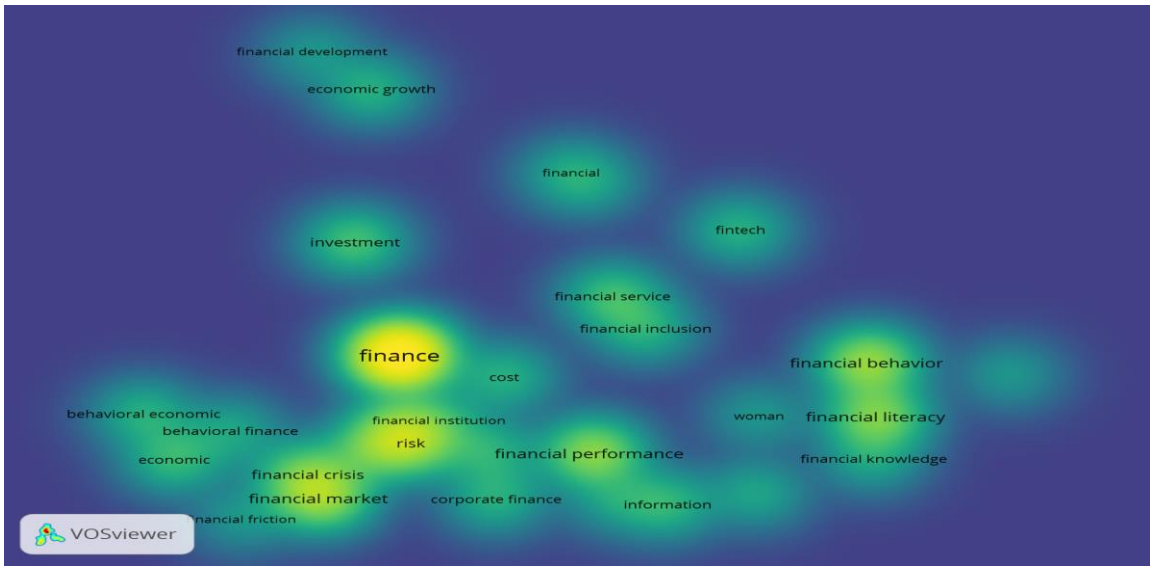

Figure 6. Behavioral Finance Article Density Map

Figure 6 shows a density visualization of the terminology generated using *VOSviewer*, providing an idea of how often certain topics are discussed in finance-related academic literature. Brighter colors indicate a higher frequency or greater density of occurrence of that keyword in the study.

Finance is the most prominent terminology in bright yellow, indicating that it is the most frequently discussed topic in the academic literature. This terminology links many other topics, indicating its central role in financial research.The insights derived from this research can be applied to financial practice and public policy in several impactful ways, (a) Understanding trends in fintech and financial inclusion can guide the development of innovative financial products tailored to the needs of underserved populations. Financial institutions can design products that leverage technology to offer more accessible and user-friendly services, such as mobile banking apps and digital lending platforms (Gomber et al., 2017); (b) Studies on financial literacy and behavior highlight the importance of educating customers about financial management. Financial institutions can implement comprehensive financial literacy programs and interactive tools to engage customers and improve their financial decision-making skills (Lusardi & Mitchell, 2014);

(c) Insights into financial inclusion highlight the barriers faced by underserved populations in accessing financial services. Public policies can be formulated to promote financial inclusion by supporting fintech innovations, providing incentives for financial institutions to serve low-income communities, and enhancing financial literacy programs (Demirguc-Kunt et al., 2020).

CONCLUSION AND SUGGESTION

The research conducted provides a thorough bibliometric analysis of financial behavior dynamics from 2014 to 2024, emphasizing the critical role of financial literacy and fintech adoption. The study highlights that financial literacy has a strong relationship with financial decision-making, leading to better saving and investment habits and reduced debt. The integration of fintech has revolutionized financial management, offering efficient tools while posing new challenges like data security and privacy. The findings illustrate the importance of continuous financial education and the need for effective strategies to enhance financial literacy and inclusion.

Insights into financial behavior trends can guide the development of innovative financial products tailored to consumer needs. For instance, fintech solutions designed to improve financial inclusion and literacy can be developed based on identified gaps and trends. These findings contribute in creating mobile banking apps that cater to the unique needs of underserved populations, thereby increasing customer base and loyalty (Gomber et al., 2017). Financial institutions can implement targeted financial literacy programs to improve customer decision-making. These programs can be designed based on the research findings on common financial behavior patterns and knowledge gaps. It contributes in offering interactive online courses and workshops on budgeting, investing, and risk management (Lusardi & Mitchell, 2014). Policies can be designed to support the development and deployment of fintech solutions aimed at improving financial inclusion. Research insights on barriers faced by underserved populations can inform these policies. It contributes in providing subsidies or tax incentives for fintech companies that develop products for low-income or rural communities (Demirguc-Kunt et al., 2020).

By mapping the research landscape, this study offers valuable insights into prevalent trends and provides a foundation for future research to further explore and address emerging issues in financial behavior. These insights are crucial for policymakers, educators, and financial institutions aiming to improve financial stability and individual financial well-being. Launch national financial literacy campaigns aimed at adults to promote lifelong learning about personal finance. Partner with financial institutions, NGOs, and community organizations to disseminate financial education materials. Offer free workshops, webinars, and online courses covering essential financial topics. Use fintech solutions to promote financial inclusion, especially for underserved and unbanked populations. Encourage the development of digital banking, mobile payment systems, and micro-financing platforms.

Comparing my research with Singh, (2021), Singh combines behavioral finance with behavioral accounting, providing a broader perspective on behavioral research in finance and accounting. It includes themes like investor sentiment, social media, and financial literacy for behavioral finance, and biases such as overconfidence and framing effects for behavioral accounting. Whereas my research primarily focuses on behavioral finance trends using bibliometric analysis with *VOSviewer*. It captures the dynamics of financial behavior from 2014 to 2024, emphasizing investor behavior, fintech

developments, and financial literacy. My research's uniqueness lies in its focused temporal scope and detailed analysis of recent trends (2014-2024), while Singh's research offers a more comprehensive view combining two fields, making it suitable for understanding cross-disciplinary impacts.

Future recommendation for the research: (a) This research relies on data from *Google Scholar*, which, while comprehensive, may not cover all relevant publications in the field. Future studies can incorporate data from multiple databases such as Web of Science, Scopus, and PubMed to ensure a more comprehensive coverage of the literature; (b) The use of *VOSviewer* for bibliometric analysis, while powerful, may have limitations in terms of capturing the full complexity of relationships between terms and concepts. Future studies can combine *VOSviewer* with other qualitative and quantitative methods, such as content analysis and machine learning techniques, and can provide a more nuanced understanding of the research landscape; (c) The focus on specific topics such as fintech, financial literacy, and financial inclusion may overlook other important areas of financial behavior research. Future studies can broaden the scope to include a wider range of topics and subfields within financial behavior can provide a more comprehensive overview of the field. Future research could also employ systematic reviews to capture a broader spectrum of research themes.

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