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# The role of behavioral bias on financial decision making: a systematic literature review and future research agenda

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***ABSTRACT***

**Purpose —** *This paper aims to analyze current research trends, identify theoretical perspectives, and identify research topics of behavioral bias in financial decision-making in the future.*

**Research method —** *To perform bibliometric analysis, this article uses a systematic literature review, as well as content analysis. This article uses a total of 51 publications between 2018 and 2022 as the sample for the literature review, directed by PRISMA. The tool used in analyzing bibliometrics is VOSviewer. Meanwhile, content analysis is conducted to build theoretical perspectives and proposed future research agendas.*

**Result —** *This systematic review explains the number of articles per year, most influential articles, leading journals, leading countries, leading authors, important keywords, and research cluster networks. Besides, this article also discovers seven behavioral biases that can be analyzed to gain a theoretical perspective on behavioral bias. The seven behavioral biases are Heuristic Bias, Self-Attribution Bias, Framing Bias, Herding Bias, Aversion Bias, Disposition Effect, and Overconfidence Bias,. In the scientific mapping analysis, important keywords are obtained, and the author's research cluster network is to discover topics that rarely researched to be offered in future research.*

**Recommendation/significance/contribution —** *In contrast to previous studies of behavioral bias, which were dominated by survey-based research, this paper provides a different reference by using a systematic literature review method that provides coverage of the main research issues and theoretical arguments about behavioral bias in financial decisions. In addition, this paper offers new ideas about potential research fields by identifying studies in developing countries that are still rarely carried out compared to developed countries.*

***Keywords:*** *behavioral bias; bibliometric analysis; content analysis; financial decision making; systematic literature review*

## BACKGROUND

In the last three decades, the discussion of behavioral finance has become an interesting topic in financial research. The behavioral aspects that are studied by many researchers grow exponentially. One of the discussions of behavioral finance is about behavioral biases. However, some experts question the role of behavioral biases and their relationship with financial decision-making, especially in investing.

In behavioral finance, prospect theory based on descriptive theory (Thaler, 1980). Thaler argues that investors can act under the influence of behavioral biases that often lead to suboptimal decisions. The theory and assumptions of standard finance and modern finance have been debated among scholars from time to time, but behavioral finance theory has also been questioned and has faced many challenges.

One of the behavioral finance topics, such as behavioral bias, is closely related to financial decision-making. A number of studies related to this have empirically proven the effect of behavioral bias on financial decision making. For example, several studies that show how behavioral biases can influence investors' decisions, among others, were carried out by (Chhapra, Kashif, Rehan, & Bai, 2018); (Zahera & Bansal, 2018); (Raheja & Dhiman, 2020); (Jain, Walia, & Gupta, 2019); (Shukla, Rushdi, & Katiyar, 2020). Research on behavioral bias has become a topic of discussion among researchers in the last few decades. Research on behavioral bias so far has been mostly done by researchers in developed countries, but little has been done by researchers in developing countries.

Based on that, to further explore the research topic, this article discusses existing research on behavioral bias and financial decision making using a systematic literature review (SLR). This SLR method is important for reviewing, identifying, interpreting, and evaluating all available research in both developed and developing countries with topics of interest, with certain relevant research questions.

This systematic literature review aims to: (1) to analyze current research trends, (2) to identify theoretical perspectives, and (3) to identify research topics of behavioral bias and financial decision in the future. In this paper the analysis bibliometrics was performed using the science mapping tool, VOSviewer. Meanwhile, content analysis is used to build a theoretical perspective and propose future research topics.

As such, this paper is different from previous studies, where this paper on behavioral bias will: (i) providing a comprehensive literature review covering the main issues and theoretical arguments; (ii) contributing methodology with a systematic literature review on behavioral bias and financial decisions; and (iii) offer new ideas about potential research areas by identifying research gaps.

This systematic review paper is divided into several sections. In section 2 discusses the theoretical underpinnings of behavioral bias in financial decision

making; in section 3 determines the research method used; in section 4 presents the results, discussing bibliometric analysis and review. Section 5 analyzes the content of the current research results and proposed research areas that can be explored in the future. The last 6 section concludes.

## LITERATURE REVIEW

Initially, financial decision making was guided only by traditional financial theory or so-called standard financial theory, which in principle includes the fact that people will choose from possible alternatives to maximize the desired profit. Likewise, in EMH where investors are considered to behave rationally in the financial market (Fama, 1970). In making a decision, an investor must choose an action from alternatives in a world of uncertainty. The theory of expected utility (EUT) proposes that an investor behaves rationally by valuing all alternatives on the basis of their utility and associated risks and in making balanced decisions (Kahneman, Daniel and Tversky, 1979).

Tversky and Kahneman in 1979 found the inconsistent results of EMH and EUT (Expected utility theory), and introduced prospect theory which is an alternative to EUT in uncertain decision making. The fundamental difference between prospect theory and traditional theory is risk perception and risk aversion (Barberis & Thaler, 2003). In theory the prospect of aversion of risk varies depending on people's views on changes in their wealth and humans are inherently averse to loss (Kahneman, Daniel and Tversky, 1979).

Prospect theory, related to behavioral finance issues, has been studied by numerous researchers since 1990 when the first scientific article was published. The results show that several studies related to overconfidence, anchoring bias, and confirmation with behavioral finance have developed over time.

In the 1980s, behavioral finance emerged as a new concept that combines behavioral and psychological aspects of financial decision making. Behavioral finance goes against the perspective of efficient markets and behavioral finance helps understand why investors behave in certain ways when investing in financial assets. Emotions and moods influence individual financial decisions.

Financial behavior is how humans behave in finance, how psychology affects financial decisions (Nofsinger, 2001). Therefore, it can be concluded that financial behavior is an approach that explains how someone who made an investment or financial decision is affected by psychological aspects. Thus, this leaves decision makers vulnerable to biased judgments.

Bias are general rules that permeate and deviate from the rational calculations they tend to produce. For example, many people are so consumed by advertising that they buy something based on the advertised brand. This phenomenon occurs as described by Kahneman and Tversky because most people rely on the rule of thumb in making decisions. In this paper, what is meant by financial decision making is limited to decisions related to investment activities, both individually and institutionally. Behavioral bias will always have an impact on

investors' valuations. While it is impossible for an investor to eliminate bias altogether, it is important to avoid behavioral bias for a certain situation.

In order to understand human behavior and its decision-making process, many biases are set by psychologists. Some of them are as in the research conducted by (Kinatta, Kaawaase, Munene, Nkote, & Nkundabanyanga, 2022) which explains that the cognitive bias of investors and intuitive attributes of investors are positive and significant effects of the quality of investment decisions in commercial real estate. In addition, the components of investor cognitive bias, namely framing and cognitive heuristics, are also determinants of the quality of investment decisions. Likewise, study by (Chhapra et al., 2018) shows that overconfidence, herding, cognitive bias, hindsight effect, and over thinking have a significant positive effect on investment decisions. The overall results conclude that many changes in investment decisions are due to bias.

So based on that, it can be explained that investment decision making is influenced by behavioral bias, which causes an investor to be irrational in making investment decisions. In general, there are four behavioral biases that can influence the investment decision-making process, namely: (1) overconfidence; (2) herding bias; (3) disposition effect; and (4) familiarity bias.

1. Overconfidence

It is a common and well-established bias that makes people overconfident about their knowledge and skills and ignores the risks associated with investing. Previous studies in this area have explained how overconfidence bias affects rational decision-making behavior.

2. Disposition effect

It is a behavioral bias of investors who are more likely to sell winning stocks and tend to hold on to losing assets.

3. Herding bias

It is a bias that refers to a situation in which a rational person begins to behave irrationally by imitating the judgments of others when making decisions. Individual investors tend to exhibit group behavior because they follow the decisions of large groups or noisy traders. Analysts may draw on their past experiences/decisions or imitate others to protect their reputation or compensation issues.

4. Familiarity bias

It is a bias that refers to a situation where individuals or institutions prefer to keep domestic securities over foreign assets in their portfolios. This bias is also known as the home equity bias conundrum because the returns realized through domestic equity portfolios imply that more potential benefits are derived from diversifying the international portfolio.

## RESEARCH METHOD

This paper employs bibliometric analysis. Bibliometric analysis is the use of mathematical and statistical tools for articles and other forms of communication (Groos & Pritchard, 1969). Many researchers have used this kind of analysis due to its objectivity and capacity to manage large amounts of data (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Performance analysis and scientific mapping are two bibliometric analyses. Software such as VOSviewer with visual representations can support bibliometric analysis (Donthu et al., 2021). The analysis that is often used in the performance analysis approach is descriptive analysis, namely from publications and citation analysis (Donthu et al., 2021). While scientific mapping is used to develop a network of article attributes based on article features (Donthu et al., 2021), the bibliometric analysis in this review paper is used to examine the following:(1) publication trajectory; (2) leading countries; (3) leading journals; (4) influential articles; (5) important keywords and (6) the author's research cluster network.

This review paper also uses a scientific methodology to summarize the research results. This review paper uses Systematic Literature Review (SLR) method, where this method is useful for reviewing, identifying, interpreting and evacuating all available research with topic areas of interest to phenomena, with certain relevant research questions. By using the journal SLR method systematically regarding behavioral bias in financial decision making. Each process follows the steps or protocols that have been set.

The development of SLRs based on research protocols, this is important because strong methodological rigor is needed to neutralize research bias, by making explicit values and hypotheses that support a review. (Tranfield, Denyer, & Smart, 2003). Thus, following the research protocol proposed by Tranfield divided into three stages: SLR planning, SLR implementation, and knowledge dissemination.

### Phase I: SLR planning

The main stages of the SLR include its planning, which entails a 'desire identity for review, preparing a proposal for review, and developing a research protocol. It was tested that there were no published SLRs regarding the phrases "behavioral bias" and "financial decisions", then a protocol was developed containing data on the issues addressed through studies, patterns, and standards for including research in SLRs, as suggested by (Tranfield et al., 2003).

### Phase II: implementation of SLR

This review paper used bibliometric and content analysis to study current research trends and research results on behavioral biases in financial decision making. In this second stage is a literature search protocol, determination of search strings, and a strategy for selecting publications that are eligible for

bibliometric analysis. So in this second step, a comprehensive and objective search for articles by using keywords in English is most appropriate to the research question, which characterizes behavioral biases and financial decisions.

Literature searches were conducted in three journal databases, namely Emerald, Science direct, and Google Scholar. Using more than one database increases the chances of getting more relevant articles, although screening them will take more time. Relevant keywords were identified and used in the search for publications, namely "behavioral biases" OR "over confidence on financial decision" OR "mental accounting on financial decision" OR "loss aversion on financial decision" AND "on financial decision".

Because the behavioral and financial subjects are broad, some limitations are imposed. Publications are only in journal form and in English, published between 2018 and April 2022, with selected subject areas in Business, Management and Accounting. In the literature search and systematic review, refer to the Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) chart. The literature search protocol consists of search and selection strategy, as well as identification, screening, and eligibility for inclusion and exclusion (Figure 1). The article search was conducted on April 16, 2022, and that initially found 3472 results in science direct, 98 results on Google scholar and 671 results on Emerald. After applying all search filters there were 262 publications in Science Direct, 65 publications on Google Scholar, and 285 publications on Emerald. There are 612 articles in total.

Figure 1 illustrates the article selection flowchart. Of the 612 articles generated by searching three databases and adding 4 articles from other databases, only 1 article was detected as duplication so that the results from excluded were 615 articles. After being screened by Title, Abstract, keywords and full text, the remaining 51 articles published in 38 journals were eligible for bibliometric analysis. The 51 selected articles were entered in the spreadsheet. As for each citation and content indicator data will be extracted. For the citation indicator, there are 5 items used: year of publication, name of journal, title of article, number of times quoted, country of author's place. The content indicator consists of keywords and abstracts.

### Phase III: Dissemination of knowledge

The third stage is the dissemination of results. This stage contains a detailed analysis of the characteristics of the paper that composes the research corpus based on data on citation indicators. This stage using a spreadsheet and VOSwiewer to: (1) verify the number of articles per year; (3) check which journals are most relevant; (2) knowing the country where the author is located; (4) conduct cocitation analysis to identify influential articles and bibliographies of authors; (5) verify the occurrence of words in the analyzed articles. And (6) knowing the author's research cluster network. These things serve as the basis for SLR (Tranfield et al., 2003).

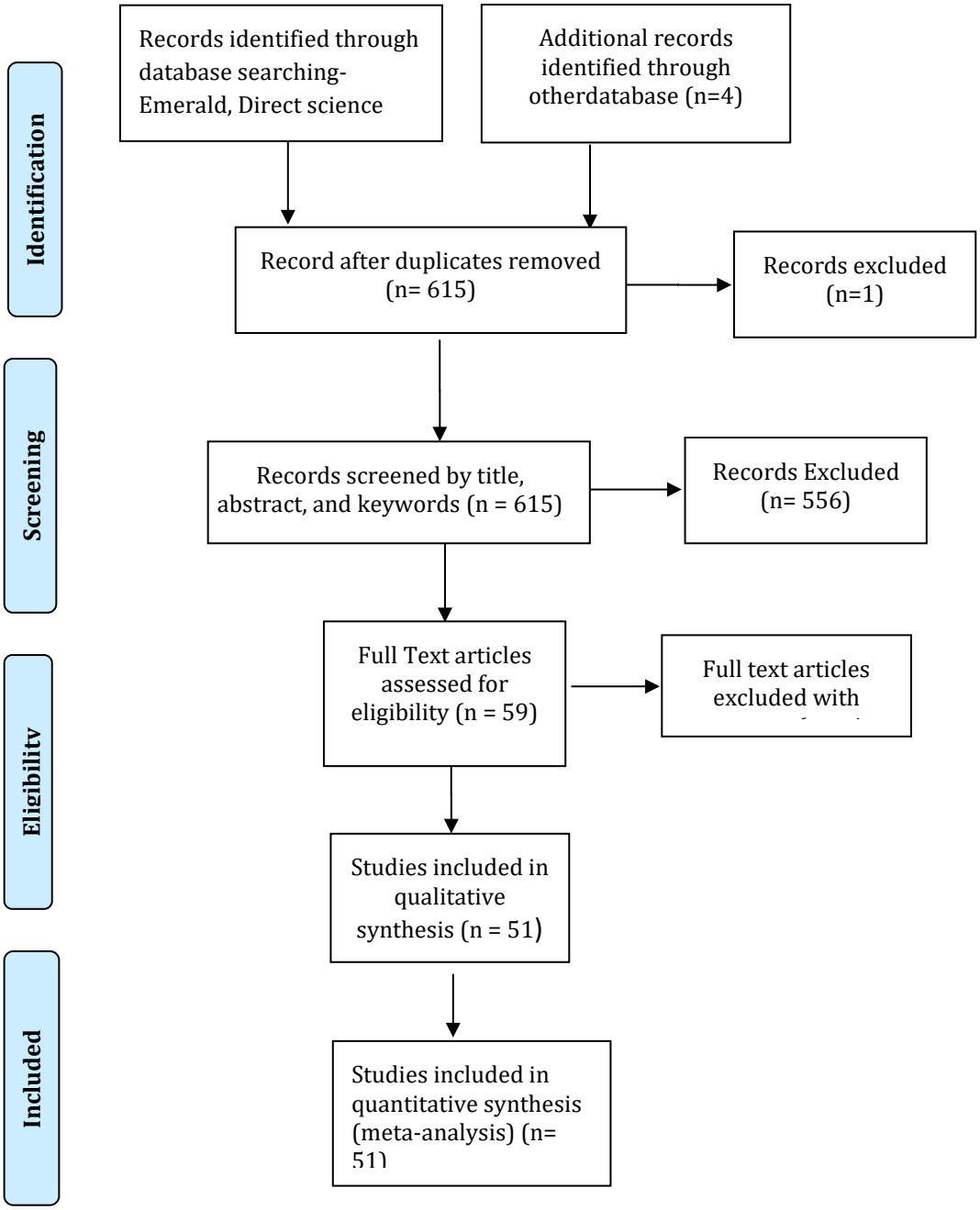


**Figure 1.** Systematic review selection
source: (Moher et al., 2009)

## RESULT AND DISCUSSION

### Performance Analysis

*Publication Trajectory*

The publication trajectory in Figure 2 shows that the discussion on behavioral biases and financial decisions was increased from 2018 to 2020, followed by a

slight decline in 2021. In 2022, however, the exact number is not known yet because the literature search was carried out in April 2022.

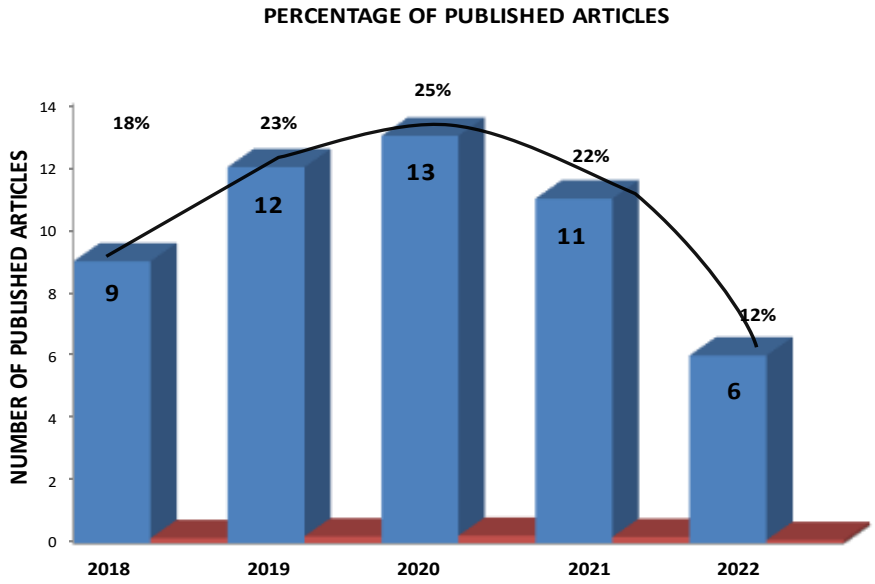


**Figure 2.** Year wise trend of publications
source: processed data (2022)

*Leading Countries*

The research on behavioral bias and financial decisions for 51 articles was contributed by affiliated authors from 17 countries. Figure 3 illustrates the contribution by country. The top 10 contributing countries are India (n = 23), Pakistan (n=9), USA (n=3), Iran (n=2) and Ghana (n=2) publications, while Portugal, Romania, Indonesia, Slovakia, UK and China have 1 publication.

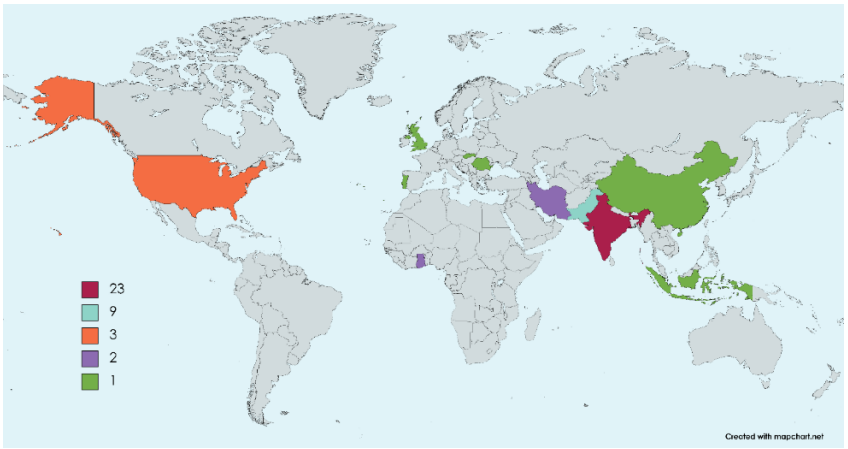


**Figure 3.** Total publications by country
source: processed data (2022)

However, with a combined bibliographic citation analysis by country using at least two citations, the most influential authors are affiliated with India (n=490) and Pakistan (n=181). However, Iranian affiliated authors had the highest average citation score of 38.5 followed by Americans who had an average citation score of 33. Despite having 23 articles and 9 articles published, the average of citations of India and Pakistan affiliated authors are lower than Iran and America.

**Table 1.** Top 10 countries

| No | Country name | Number of Articles | Number of Citation | Citation Average |
|---|---|---|---|---|
| 1 | India | 23 | 490 | 21.3 |
| 2 | Pakistan | 9 | 181 | 20.1 |
| 3 | USA | 3 | 99 | 33 |
| 4 | Iran | 2 | 77 | 38.5 |
| 5 | Portugal | 1 | 7 | 7 |
| 6 | Ghana | 2 | 5 | 2.5 |
| 7 | Romania | 1 | 5 | 5 |
| 8 | Indonesia | 1 | 5 | 5 |
| 9 | Slovakia | 1 | 3 | 3 |
| 10 | UK | 1 | 2 | 2 |
| | China | 1 | 2 | 2 |

source: processed data (2022)

*Leading Journal*

Table 2 shows the top 10 journals based on this list. The number of journals that have published research on behavioral bias and financial decision making is 38. The bibliographic analysis determined that publications had at least 23 citations, resulting in the top 10 journals with the highest number of citations. In this table the journal "Managerial Finance" (n=41.3) and “Qualitative research in Financial Markets” (n=36.2) are the top two journals based on the average citation score and which have at least two publications. But the “Qualitative research in Financial Markets” and “Review of Behavioral Finance” journal has the highest publication on this topic with six articles.

**Table 2.** Top 10 leading journals

| No | Journal Name | Number of Publications | Citation | Citation Average |
|---|---|---|---|---|
| 1 | *Qualitative Research in Financial Markets* | 6 | 217 | 36.2 |
| 2 | *Managerial Finance* | 3 | 124 | 41.3 |
| 3 | *Review of Behavioral Finance* | 6 | 103 | 17.2 |
| 4 | *International journals;of Islamic and Middle Eastern Finance and Management* | 1 | 84 | 84 |
| 5 | *Journal of Accounting and Economics* | 1 | 56 | 56 |

| | | | | |
|---|---|---|---|---|
| 6 | *Journal of Behavioral and experimental Finance* | 1 | 40 | 40 |
| 7 | *Organizacija* | 1 | 37 | 37 |
| 8 | *Asian Journal of Empirical Research* | 1 | 27 | 27 |
| 9 | *International Journal of Managerial Finance* | 1 | 27 | 27 |
| 10 | *Management Decision* | 2 | 23 | 11.5 |

source: processed data (2022)

*Influential Articles*

Table 3 shows the top 10 articles that have an influence on behavioral bias and financial decision making. Article (Baker, Kumar, Goyal, & Gaur, 2019) published in the journal *Managerial Finance"*, the second leading journal based on the number of citations above and has three articles on the list. (Baker et al., 2019) has obtained the highest number of citations in the table below with a total of 101 citations. Number two (Zahera & Bansal, 2018) received 93 citations published in the journal "*Qualitative Research in Financial Markets*", but this journal has 6 articles listed above (see Table 2). While the tenth order (Chhapra et al., 2018) and (Mushinada & Veluri, 2018) both get 27 citations.

**Table 3.** 10 influential articles

| No | Author Name | Article Title | Journal Name | Year | Number of Citation |
|---|---|---|---|---|---|
| 1. | Baker, H. Kent, Satish Kumar, Nisha Goyal, and Vidhu Gaur | How Financial Literacy And Demographic Variables Relate To Behavioral Biases | *Managerial Finance* | 2019 | 101 |
| 2. | Zahera, Syed Aliya, and Rohit Bansal | Doi nvestors Exhibit Behavioral Biases in Investment Decision Making? | *Qualitative Research in Financial Markets* | 2018 | 93 |
| 3. | Shah, Syed Zulfiqar Ali, Maqsood Ahmad, and Faisal Mahmood | Heuristic Biases in Investment Decision-Making and Perceived Market Efficiency | *Qualitative Research in Financial Markets* | 2018 | 87 |
| 4. | Metawa, Noura, M. Kabir Hassan, Saad Metawa, and M. Faisal Safa | Impact of Behavioral Factors on Investors' Financial Decisions: Case of the Egyptian Stock Market | *International Journal of Islamic and Middle Eastern Finance and Management* | 2019 | 84 |
| 5. | Campbell, Dennis, Maria Loumioti, and Regina Wittenberg-Moerman | Making Sense of Soft Information: Interpretation Bias and Loan Quality | *Journal of Accounting and Economics* | 2018 | 56 |

| | | | | | |
|---|---|---|---|---|---|
| 6. | Jains, Jinesh, Nidhi Walia, and Sanjay Gupta | Evaluation of Behavioral Biases Affecting Investment Decision | *Review of Behavioral Finance* | 2019 | 42 |
| 7. | Bhatia, Ankita, Arti Chandani, and Jagriti Chhateja | Robo Advisory and Its Potensial in Addressing the Behavioral Biases of Investors- A Qualitative Study in Indian Context | *Journal of Behavioral and Experimental Finance* | 2020 | 40 |
| 8. | Nigam, Rupali Misra, Sumita Srivastava, and Devinder. Kumar Banwet | Behavioral Mediators of Financial Decision Making – a State-of-Art Literature Review. | *Review of Behavioral Finance* | 2018 | 37 |
| 9. | Valaskova, Katarina, Viera Bartosova, and PavolKubala | Behavioral Aspects of the Financial Decision-Making | *Organizacija* | 2020 | 37 |
| 10. | Chhapra, Imran Umer, Muhammad Kashif, Raja Rehan, and Ashow Bai | An Empirical Investigation of Investor's Behavioral Biases on Financial Decision Making | *Asian Journal of Empirical Research* | 2018 | 27 |

source: processed data (2022)

## Scientific mapping

*Important keywords*

In this review paper, scientific mapping is carried out using the Vosviewer tool. Important keywords were performed using co-occurrence analysis. The author keyword is used to show the content of the article, while the semantic keyword map shows the conceptual framework of the study area (Donthu et al., 2021). When keywords appear together in articles, it is assumed that it indicates that the ideas suggested by those keywords are significantly related (Donthu et al., 2021).

In this review paper, the keywords used in the literature reviewed are currently 179 keywords. The threshold for keyword occurrence is set at 2 times, found 30 keywords. Manual keyword waiver was applied to general keywords, research analysis tools, and keywords in a defined literature search string (see stage II: CSR implementation). So that only 17 important keywords are left (see figure 4). Generally speaking, it can be grouped into five clusters (colors). In 2019, research trends focused on self-attribution bias, investor decision making and disposition effects. In 2019,5 focused on investor sentiment, financial market, availability, and representativeness. In 2019,5 – 2020, the focus is on prospect theory and investment decisions. In 2020, the research tends to be focus on behavioral finance, investment decisions, risk aversion and herding. Meanwhile, the latest research trend in 2021 focuses on heuristics, individual investors, financial literacy and personality traits.

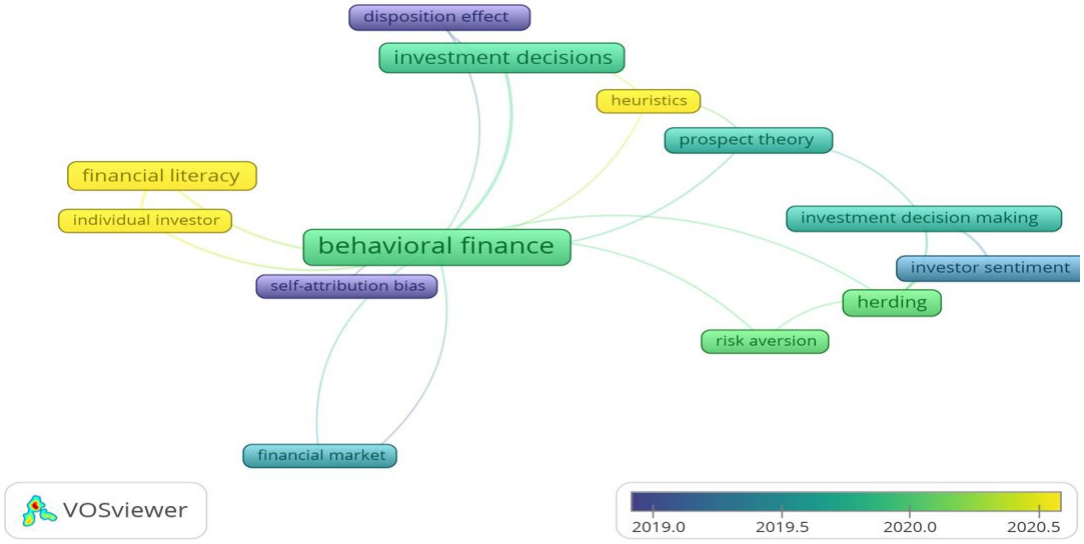


**Figure 4.** Overlay visualization keyword
source: processed data (2022)

As for the density level, it shown based on contours. Yellow color indicates high density, and green to yellow and purple indicates low density. This means that this topic is rarely used as a research topic. In Figure 5, which shows the low density is the topic of investor sentiment, individual investors, disposition effect, self-attribution bias and investor decision making.

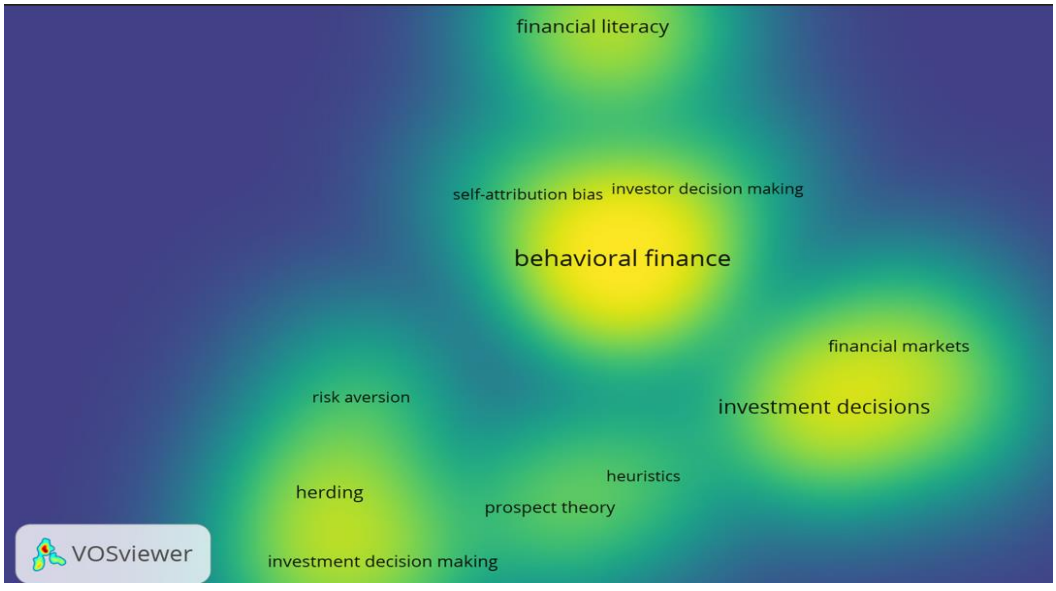


**Figure 5.** Density visualization keyword
source: processed data (2022)

*Author's research cluster network*

Figure 6 shows the research cluster network of 6 authors on behavioral bias and decision making. This research cluster was made bibliographical for authors with a threshold of at least two publication documents. Maqsood Ahmad and Syed Zulfiqar Ali Shah have 4 published documents, while Venkata Narasimha Chary Mushinada, PH. Haritha, Rashmi Uchil, and Venkata subrahmanya sarma Veluri have two published documents.

As for the author, the most influential based on the results of the cluster above, Maqsood Ahmad has 4 published articles with a total of 130 citations. In the table below are 6 authors who have at least 2 publications.

**Table 4.** Influential authors

| No | Author name | Number of articles | Total citation | Citation average |
|---|---|---|---|---|
| 1 | Maqsood Ahmad | 4 | 130 | 32.5 |
| 2 | Syed Zulfiqar Ali Shah | 4 | 118 | 29.5 |
| 3 | Venkata Narasimha Cary Mushinada | 2 | 45 | 22.5 |
| 4 | Venkata subrahmanya sarma Veluri | 2 | 45 | 22.5 |
| 5 | PH. Haritha | 2 | 16 | 8 |
| 6 | Rashmi Uchil | 2 | 16 | 8 |

source: processed data (2022)

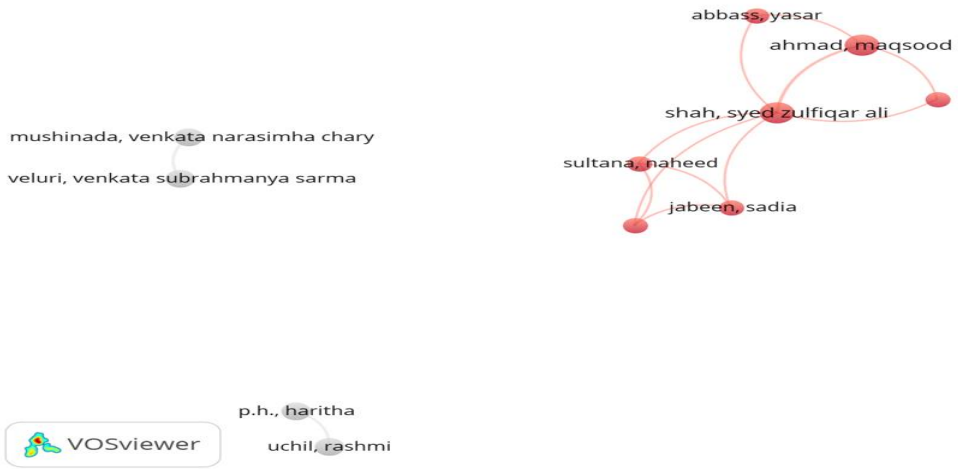


**Figure 6.** Author's research cluster network
source: processed data (2022)

*Cluster 1: heuristic bias and investment strategy*

Heuristic bias and its role in financial decision making still not much discussed, since it still in its early stages, even in developed countries. Whereas in developing countries there is still little research on this matter. Bias heuristics related closely with investment decision making. Therefore, in choosing an investment strategy, it is necessary to understand first the impact of bias.

Research of Ahmad provides information that a lack of confidence bias has a real negative impact on short-term and long-term decisions designed by investors in developing markets, this means that heuristic-driven bias can hinder the quality of investment decisions. Investors should avoid dependence on cognitive heuristics, which is a lack of confidence when making short-term and long-term investment strategies. However, overconfidence can also impair the quality of investment decisions and performance (Ahmad & Shah, 2022). The same applies to entrepreneurs operating in small and medium-sized enterprises (SMEs). Research (Ahmad et al., 2021) explains that heuristic-driven biases (retention and adjustment), representativeness, availability and overconfidence have a markedly negative effect on the strategic decisions that entrepreneurs design in emerging markets. The same effect has resulted in the testing of heuristic biases that affect individual investor decisions (Shah et al., 2018).

*Cluster 2: Behavioral bias and investor rationality*

Meir Statman, behavioral finance people are modeled as "normal" people who may behave irrationally. As a result, in making financial decisions they are vulnerable to evaluate bias behavior. To find out whether there is a self-attribution bias and overconfident behavior among investors, (Mushinada & Veluri, 2018); (Mushinada & Veluri, 2019) has shown evidence that over-confident investors overreact to private information and underreact to public information. The self-attribution bias conditioned by the right assumptions will increase overconfidence of investors and trading volume and ultimately overtrading of overconfident investors contributes to the observed overvolity. Therefore, this study suggests that investors should conduct post-investment analysis to be aware of past mistakes or minimize the negative consequences of self-attribution and overconfidence in the required utility.

*Cluster 3: Investor sentiment and decision making*

Investors depend on their sentiments when making investment decisions. Therefore, stakeholders in the stock market must focus on investor sentiment and other psychological aspects that come from individual investors as well. There is research (P.H. & Uchil, 2020) regarding the impact of unexplored antecedent investor sentiment in the context of India and individual investor investment decision making. The study findings show that herding has a significant and positive effect on investor sentiment. Furthermore, it explained that investor sentiment has a positive impact on investment decision making. The same thing was also stated in the research (P.H. & Uchil, 2019) who found that market effects and herding were the most significant factors influencing investor sentiment.

## Discussion

### Content analysis

The definition of content analysis is as a research technique to obtain an objective, quantitative, and systematic description from the content of real communication (Berelson, 1952). Content analysis provides information about the empirical findings of previous studies. Many studies in behavioral finance have shown that investors exhibit irrational behavior when making investment decisions. Investor behavior usually deviates from logic and reason, and as a result, investors exhibit various behavioral biases that influence their investment decisions.

In this section, the authors conduct a systematic content analysis on behavioral biases that are different from previous studies. There are seven behavioral biases found and can be analyzed in this section to gain a theoretical perspective on behavioral bias. The seven behavioral biases are: Overconfidence Bias, Self-Attribution Bias, Heuristic Bias, Herding Bias, Aversion Bias, Disposition Effect, And Framing Bias.

*Overconfidence bias*

Table 5 shows the empirical findings of overconfidence bias when making investment decisions. These findings can be classified into three categories, namely (1) financial literacy and individual decision variables, (2) demographic variables, and (3) institutional investors and individual investors.

**Table 5.** Empirical findings on overconfidence bias in financial decision-making

| Variable effect | Empirical findings |
|---|---|
| Financial literacy and individual decisions | (Adil et al., 2022) in his research found that men have higher financial literacy than women. Overconfidence exerts a stronger influence on investment decisions. However, for male and female investors, the interaction between overconfidence and investment decisions is significantly affected by financial literacy (Adil et al., 2022). Likewise, found that there is significant effect on the behavior of individual investors, where financial literacy has a negative relationship with behavioral bias, which means that with increasing financial literacy, the possibility of investors facing behavioral bias is reduced. |
| Demographic variables | (Adil et al., 2022) in his research found that male investors have a positive and significant effect on investment decisions, while female investors have no effect. Study (Metawa, Hassan, Metawa, & Safa, 2019) also explained that in addition to overconfidence, investor sentiment, overreaction also affects investment decisions. Furthermore, demographic aspects such as age, gender and education have a positive effect on an investor's investment decisions. Demographic aspects also impact on behavioral bias (Mushinada & Veluri, 2019). |
| Institutional investors and individual investors | For the CEO overconfidence problem, only active institutional investors, particularly mutual funds and foreign institutional investors, played their governance role in reducing the effect of CEO overconfidence on corporate risk (Ali & Tauni, 2021). Whereas (Ghalayini & Alkees, 2021) |

| | |
|---|---|
| | (Dervishaj & Xhaferi, 2020) noticed that individual investors face overconfidence and optimism and regret aversion during their decision making. |

source: author (2022)

*Self -attribution bias*

Table 6 shows empirical evidence of attribution bias when making investment decisions. This finding discusses the relationship between self-attribution and overconfidence.

**Table 6.** Empirical Findings on Self -Attribution Bias in Financial Decision-Making

| Variable effect | Empirical findings |
|---|---|
| The relationship between self-attribution and overconfidence | There was a significant positive covariance between self-attribution and overconfidence, implying that an increase/decrease in self-attribution resulted in an increase/decrease in overconfidence and vice versa (Mushinada & Veluri, 2019). So is (Mushinada & Veluri, 2018) also observed a self-attribution bias conditioned by correct forecasts, increasing investor overconfidence and trading volume so that over-trading from overconfident investors contributes to over-volatility. |

source: author (2022)

*Heuristic bias*

Table 7 shows the empirical findings of heuristic bias when making investment decisions. These findings can be classified into three themes, namely (1) variable availability and representativeness, (2) emerging markets, and (3) investment management.

**Table 7.** Empirical Findings on Heuristic Bias in Financial Decision-Making

| Variable effect | Empirical findings |
|---|---|
| Availability and representativeness | Representative bias has a significant impact on investment decisions (Dervishaj & Xhaferi, 2020). Availability and representativeness bias have a positive impact on investment decisions (Khan, Afeef, Jan, & Ihsan, 2021), and heuristic bias (overconfidence, representativeness, availability, and anchoring) have a markedly negative impact on individual investors' investment decisions and on perceived market efficiency (Shah, Ahmad, & Mahmood, 2018). For the heuristic availability (Kappal & Rastogi, 2020) explained that women entrepreneurs consider investment as a long-term instrument, are risk averse and quite conservative. The results of interviews that women entrepreneurs often imitate the investment behavior of their parents. |
| Emerging market | Heuristic-driven bias (anchoring and adjustment, overconfidence, availability and representativeness) has a significant negative influence on strategic decisions made by entrepreneurs in emerging markets. Ahmad also recommends avoiding relying on cognitive |

| | |
|---|---|
| | heuristics such as underconfidence in short-term and long-term strategies, because this heuristic bias can interfere with the quality of investment decisions (Ahmad, Shah, & Abbass, 2021). |
| Investment management | Bias heuristics in investment management can be very useful for decision makers and professionals in financial institutions (Ahmad & Shah, 2022). This study shows that although overconfident interferes with decision quality and performance, financial literacy and risk perception can improve its quality. |

source: author (2022)

*Herding bias*

Table 8 shows the empirical findings of herding bias when making investment decisions. These findings can be classified into three themes, namely (1) financial literacy, (2) Stock value, News, portfolio and firm value variables, and (3) investor sentiment, demographic aspects and individual personality.

**Table 8.** Empirical findings on herding bias in financial decision-making

| Variable effect | Empirical findings |
|---|---|
| Stock value, News, portfolio and firm value | The most influential behavioral biases are herding bias, aversion bias and overconfidence. Meanwhile, the sub-criteria that have the most influence on individual investors' investment decisions are stock values, media, and investing each element of the portfolio separately (Chhapra et al., 2018). (Quaicoe & Eleke-Aboagye, 2021) also shows that herding has a positive effect on investment decisions. But having herding behavior in the company, away from the optimal capital structure that maximizes the value of the company. Therefore, this study suggests avoiding herding and trying to act rationally when deciding the source of company funding |
| Investor sentiment, demographic aspects and individual personality | (P.H. & Uchil, 2019) explained that the most significant influence on investor sentiment are market effects, awareness and herding. They also explain that among the factors that have a significant influence, namely the media factor. This study reveals that investor sentiment has a positive impact on investment decision making. As for individual personalities such as: indifferent, individuals are afraid to face new challenges but prefer to be with friends, sympathetic, organized and easy to get along with also affect investment decisions (Raut & Kumar, 2019). Regarding the demographic aspect (HALA et al., 2020) shows that rational and irrational herding are significantly distinguished by individual investors in the decision-making process based on demographic aspects. |
| Financial literacy | Financial literacy has a negative relationship with herding bias and disposition effect, but has a positive relationship with mental accounting bias, and is not significantly related to overconfidence and emotional bias (Baker et al., 2019). This research is useful for financial advisors to more effectively understand the decision-making process of their clients |

source: author (2022)

*Aversion bias*

Table 9 shows the empirical findings of aversion bias when making investment decisions. These findings can be classified into two themes, namely (1) emotional variables and (2) project management

**Table 9.** Empirical findings on aversion bias in financial decision-making

| Variable effect | Empirical findings |
|---|---|
| Emotional | The biases of loss aversion, herding, and overconfidence fully mediate the relationship between depression, anxiety, social interactions, and investor decisions (Gupta & Bhardwaj, 2019), but anxiety has the strongest impact on investors' decisions through herding bias. |
| Project management | Behavioral factors such as risk attitude and aversion to loss should be accepted in project investment decisions. Study by (Campbell, Loumioti, & Wittenberg-Moerman, 2019) contribute to the project management domain by improving project investment decisions including project flexibility. Whereas (Quaicoe & Eleke-Aboagye, 2021) expressed reluctance, regret and error bias also greatly influence investors' decisions. |

source: author (2022)

*Disposition effect*

Table 10 shows the empirical findings of the disposition effect, which is about the risk aversion variable

**Table 10.** Empirical findings on disposition effect in financial decision-making

| Variable effect | Empirical findings |
|---|---|
| Risk avoidance | (Verma & Verma, 2018) found a disposition effect on the investment decisions of defined benefit pension funds. But in young men and less educated and overconfident, tend to be disposition. |

source: author (2022)

*Framing bias*

Table 11 shows the empirical findings of framing bias when making investment decisions. These findings can be classified into two themes, namely variable investor characteristic, and the quality of investment decisions.

**Table 11.** Empirical findings on framing bias in financial decision-making

| Variable effect | Empirical findings |
|---|---|
| Investor characteristic | Investors with higher friendliness scores to have a higher probability of having a framing bias. Yet 'integral' and 'incidental' emotions instead, it has an effect both in assisting the decision-making process and in introducing biases that can lead to losses (Sharma & Dhirwani, 2021). |

| | |
|---|---|
| Quality of investment decisions | Two components of investor cognitive bias (framing variations and cognitive heuristics) are positive and significant determinants of investment decision quality (Kinatta et al., 2022). |

source: author (2022)

## Finding and research gap

Behavioral finance has developed in the last three decades, many researchers have studied the development of behavioral finance and the direction of future research. In this section the authors will discuss the findings and identify research gaps related to behavioral bias and financial decision making. The authors have attempted to include all relevant studies and have identified issues relevant to the scope of this paper.

*Research in developing countries in Southeast Asia is very limited*

Behavioral finance is a relatively new field compared to traditional finance or standard finance. Empirical research studies have been carried out in developed countries, especially in the United States as well as in developing countries in ASIA such as India, Pakistan, Iran and China. However, they still limited for developing countries in Southeast Asia (ASEAN) such as Indonesia, Malaysia and other ASEAN countries. Since the last 5 years, researchers in developing countries in the ASEAN region who have carried out research efforts in this field include: (Widyastuti, Febrian, Sutisna, & Fitrijanti, 2022); (Susanto & Njo, 2019); (Rahman & Gan, 2020); and (Chaffai & Medhioub, 2018).

*Research is dominated by survey-based research*

Most of the articles used are based on primary data, a quantitative approach using surveys. Multiple studies using secondary data through the database (Raheja & Dhiman, 2020); (Shah et al., 2018); (Ahmad & Shah, 2022); and (Mushinada & Veluri, 2018).

*Research studies are limited on disposition effects and self-attribution bias*

Behavioral bias research is still limited to the type of bias on the disposition effect on the risk aversion variable (Verma & Verma, 2018), and self-attribution bias about the relationship between self-attribution and overconfidence (Mushinada & Veluri, 2019), and (Mushinada & Veluri, 2018).

*Study focused on overconfidence bias and heuristic bias*

Research shows most studies are based on overconfidence (Adil et al., 2022); and heuristic bias (Dervishaj & Xhaferi, 2020); (Khan et al., 2021);(Shah et al., 2018) and (Ahmad & Shah, 2022).

### Future research

One of the aims of this paper is to identify topics of future research on behavioral bias and financial decision making. The results of the VOSviewer in Figure 5 above show a low density, which means that this topic is still rarely studied, therefore it can become a novelty for future research, namely the topic of investor sentiment, individual investors, disposition effect, self-attribution bias and investor decision making. Meanwhile, the latest research trend in 2021 focuses on heuristics, individual investors, financial literacy and personality traits. This is in accordance with the findings and the research gap of the authors who stated that research that is still limited is research on disposition effect and self-attribution bias and the most research and still a trend in 2021 are heuristics and overconfidence.

Based on this, future research topics can be offered about disposition effect on individual investors, self-attribution bias on individual investor decision making, or investor sentiment in investment decision making. This topic can be related to financial literacy, which is still a trend today, to investment strategies and investor rationality.

## CONCLUSION

In a systematic literature review, bibliometric analysis generated an analysis of current research trends including the number of articles per year, 10 leading countries, top 10 leading journals, 10 leading articles, 6 leading authors. The assessment is based on the number of citations from each article.

In a content analysis that was carried out systematically on 51 articles on behavioral bias, which differed from previous studies, seven behavioral biases were found and could be analyzed to obtain a theoretical perspective on behavioral bias. The seven behavioral biases are: Overconfidence Bias, Self-Attribution Bias, Heuristic Bias, Herding Bias, Aversion Bias, Disposition Effect, And Framing Bias.

In the scientific mapping analysis, important keywords and the author's research cluster network were obtained. Important keywords are generated from the VOSViewer application, so that topics about behavioral bias are found that are still rarely researched to be offered in future research.

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