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Understanding Retail Investors' Green Investing Behavior: A Systematic Review—An Integrated Review Approach

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ABSTRACT

The need to ensure sustainable development has made the topic of green investment receive serious attention from many parties. In this context, retail investors play an important role in the rapid growth in the number of retail investors and their investment transactions. However, comprehensive bibliometric research on retail investors' green investing behavior has not yet been conducted. To fill this research gap, this study aims to review the existing publications on retail investors' green investing behavior to map the knowledge structure of the topic and identify directions for future research. Extensive bibliometric and content analyses were performed to achieve our research objectives. A total of 450 papers were retrieved from the Scopus database. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was then used to scrutinize the collected papers. The findings indicate an upward trend in publications on the subject. The top author, top country, and top paper were identified. Five clusters of country collaboration were identified. The bibliometric coupling analysis identified five research clusters. The theme map analysis revealed a lack of research themes that can be categorized as basic or niche themes. The thematic evolution analysis indicated that the research themes of retail investors' green investing behavior have shifted towards a more practical focus on sustainability, alternative energy, and environmental policies. In the context of research methods, the quantitative research method, particularly the survey approach, is the most prevalent.

1. INTRODUCTION

1.1 Research background and gaps

Green investing, a concept that involves not only financial targets but also environmental, social, governance, and ethical concerns [1], has been widely adopted. This is due to significantly increased global awareness of the importance of realizing a green economy [2]. Green investors tend to prioritize companies committed to sustainable business practices as places to invest [3]. This condition causes academics to be interested in understanding green investment behavior. By studying green investing behavior, key factors that influence investors' decisions to choose green investments can be identified, effective strategies to increase the flow of funds to green companies or projects can be designed [4], and ultimately the transition to a green economy can be accelerated [5].

Investors in the investment literature can be divided into corporate/institutional investors and retail/individual investors who invest in financial assets for personal financial purposes [6]. Currently, both the number of retail investors and their transactions are increasing rapidly [7, 8]. By 2030, it is estimated that retail investor transaction activity will achieve more than 35% of the global market trading volume [9] and for some markets in Asia, retail investor transaction activity is predicted to be more than 60% of the trading volume [10]. This demonstrates that retail investors play an important role in influencing the global economic level as well as in accelerating green economy realization. Therefore, it is

important to understand retail investors' green investing behavior.

To develop the knowledge structure of retail investors' green investing behavior, bibliometric studies on this topic are required. Unfortunately, bibliometric studies of individual behavior in the context of green investing are limited. Previous bibliometric studies have focused more on companies or institutional investors, whereas retail investors' behavior has not been widely explored. For example, Dervi et al. [5] utilized bibliometric analysis to identify the intellectual structure and determinants of green finance. However, this study did not conduct a comprehensive bibliometric analysis. They focused only on development trends and recent advances in green finance literature. Another study by Kapil et al. [11] explored institutional investors' motivation towards environmental, social, and governance (ESG) investments and their behavior. Regarding the research method, Kapil et al. [11] made greater efforts in systematic literature reviews and used only publication trends and bibliometric citation map analysis in terms of the bibliometric analysis approach. To evaluate the thematic clusters of documents, multivariate analysis, which includes factor analysis and regression analysis, and bibliographic clustering were utilized by Chalissery et al. [12]. Unfortunately, the evolution of this research theme was not further investigated in this study. Chiţimiea et al. [2] investigated the trends of the publication on green investing behavior and identified drivers that influence the behavior but from the perspective of corporate investors. In addition, although they have used two types of analysis, namely bibliometric analysis and systematic analysis, science mapping analysis has not been carried out as required by Donthu et al. [13] in the bibliometric analysis. Singhania et al. [14] and Kwilinski [15] also performed bibliometric studies on green investment. However, these studies did not specifically focus on retail investors' green investing behavior.

Based on the foregoing, in summary, it can be seen that there are methodological and focal gaps in the green investment literature. In terms of methods, no bibliometric studies related to green investment have comprehensively applied bibliometric analysis tools. In terms of focus, no bibliometric study focuses specifically on retail investors' green investment behavior.

1.2 Research objectives and motivations

To fill the research gaps in the existing green investment literature, this study conducts a comprehensive review of the existing literature on retail investors' green investing behavior. Bibliometric and content analyses were also conducted. More specifically, this study answers the following questions:

- What are the development trends, top countries, top papers, top authors, cross-country collaboration networks, theme evolution, theme maps, research clusters, and the main research methods and theories in the publications of retail investors' green investing behavior?
- What are the factors that influence the retail investors' green investing behavior?
- What are the directions of future research on retail investors' green investing behavior?

It is expected that the findings of this study can be used by various researchers. For practitioners, specifically financial institutions and investors, we address the key factors that influence retail investors' green investment behavior. This can be used to develop strategies for promoting and implementing green investments. Academics provide the state-of-the-art of the existing green literature on retail investors' green investing behavior, thus enabling further research and collaboration in this field. For policymakers, we offer valuable insights into the effectiveness of current regulations and propose improvement areas to accelerate green investment and support the implementation of a green economy. Finally, we expect that this research will contribute to a better understanding of green investment behavior that will support global efforts towards more sustainable and environmentally friendly development.

2. RESEARCH METHOD

A bibliometric analysis and content analysis will be conducted to gain a comprehensive understanding of the research trends and recent developments in green investing behavior and to evaluate the existing research results in depth. The workflow in this study adopted a popular workflow in previous bibliometric analysis studies. Our study workflow consisted of three main stages: (1) database source selection, (2) data collection and cleaning, and (3) bibliometric and content analyses. Ethical clearance process is provided in the supporting material.

2.1 Database source selection

We selected Scopus as the database source. This is because Scopus has several advantages. First, compared to other databases, Scopus has broader coverage, more data availability, and more diverse disciplinary coverage [16]. Hence, it allows for comprehensive bibliometric studies [16]. Second, the search engine and screening features make the search and screening process more optimal for achieving the study objectives [16, 17]. This characteristic is suitable for bibliometric studies that focus on specific topics, such as this study.

2.2 Data collection and cleaning

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was used to ensure that the data used were valid and reliable. According to Pandin et al. [18], the PRISMA method is widely accepted in bibliometric research. Figure 1 shows the data collection and cleaning process.

In the first stage of data collection and cleansing – identification -, we used the query of TITLE-ABS-KEY (‘socially responsible invest*’ OR ‘green invest*’ OR ‘sustainable invest*’ OR ‘eco-investm*’ OR ‘eco-investing’ OR ‘environmental invest*’ AND behavior OR behavior) in the Scopus database search. The search was conducted in early July 2024 with search coverage of titles, abstracts, and keywords, resulting in a search of 590 documents. We did not limit the search years to obtain complete data. Then, we performed data filtering by utilizing the Scopus search and screening features. The following inclusion criteria were used: source type, journal, language, English, document type, article, and publication stage. A total of 450 papers were identified. We then conducted a duplication review using the Mendeley application. We found no duplication in the collected papers. Finally, we checked the content of the papers manually to ensure that the papers discarded retail investors'

green investing behavior. Papers that do not discuss retail investors' green investing behavior are excluded. To minimize bias, the paper selection and data collection process is divided into 2 stages. In the initial stage, three researchers conducted selection using eligibility criteria, then other researchers cross-checked and reviewed the selected papers. We obtained 157 papers for the final analysis.

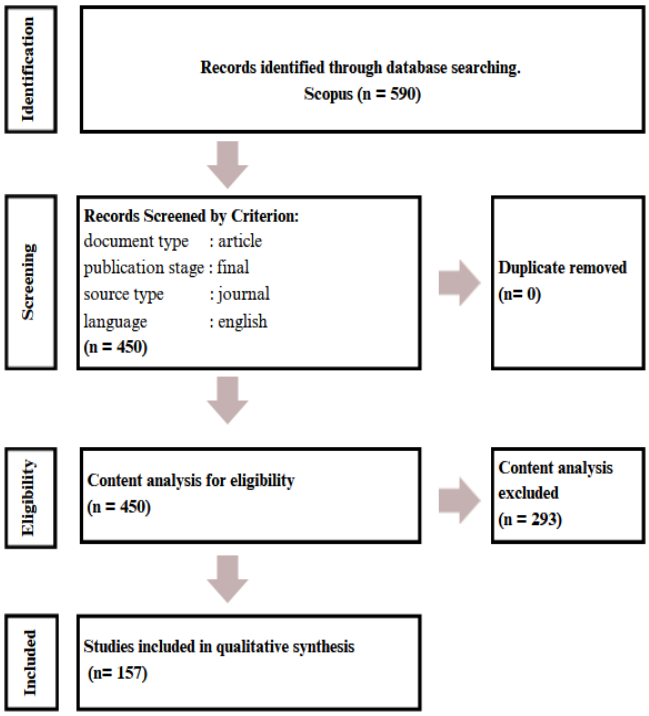

Figure 1. Data collection and cleaning stages

2.3 Bibliometric analysis and content analysis

Bibliometric and content analyses were performed. In general, bibliometric analysis involves science mapping analysis (i.e., thematic maps, country collaboration network analysis, thematic evolution, and bibliographic coupling) as well as performance analysis (i.e., trends, top country, top authors, and top papers). Content analysis focuses on the main methods and theories used to research retail investors' green investment behavior. In addition, the content analysis synthesizes the main factors that influence retail investors' green investing behavior.

3. BIBLIOMETRIC ANALYSIS RESULTS

3.1 Performance analysis

3.1.1 Publication trends

Figure 2 describes the publication trends in retail investors' green investing behavior from 1991 to June 2024. This trend illustrates the growing interest in retail investors' green investment behavior. The figure shows that the first publication on retail investors' green investing behavior appeared in 1991. In the early period, scholarly publications related to this topic were very limited, even approaching zero in some years, indicating that the initial interest in the topic was very low. After 2006, although there were considerable annual fluctuations, the number of publications significantly increased until it peaked at 38 publications in 2023. This suggests that the study of retail investors' green investing behavior has become an increasingly important issue of concern for many parties. The 2024 data were not considered for trend analysis because they only show data until June.

Figure 3 shows the average annual citation data for scholarly publications on retail investors' green investment behavior. Figure 3 reveals a dynamic, yet interesting trend. Retail investors' green investing behavior, characterized by an increase in citations, began to receive serious attention in 2007. The peak of attention to this issue occurred in 2016, and then decreased and fluctuated in the following years. This indicates a shift in the literature in understanding retail investors' green investing behavior. Furthermore, this indicates that studies are starting to shift towards referencing papers that do not specifically address the topic.

3.1.2 Top authors

Figure 4 shows the most productive authors in producing scholarly publications on retail investors' green investment behavior. From the data, it can be seen that Mengyao Wang, Falko Paetzold, and Gunnar Gutsche had the highest number of publications, producing three papers each. Based on Figure 5, the three authors produced publications not only at one time. This shows that the three authors strive to consistently and continuously understand retail investors' green investing behavior.

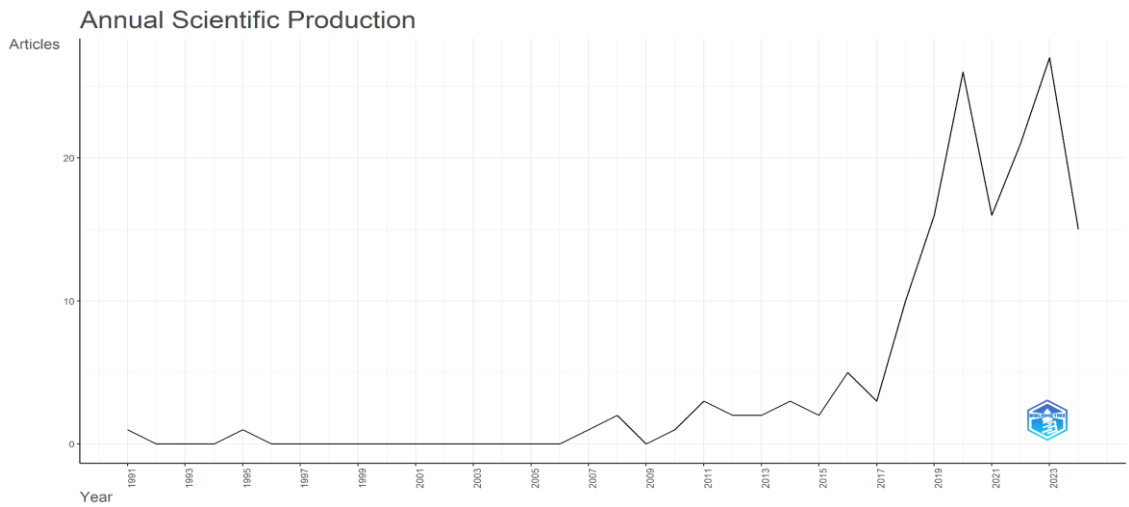

Figure 2. Publications trends

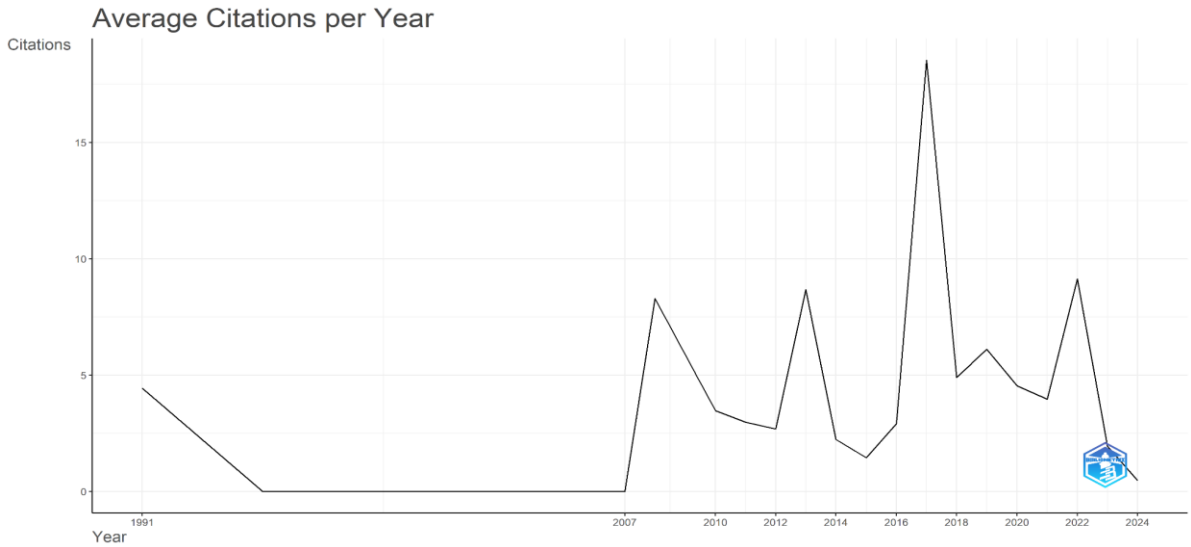

Figure 3. Citations trends

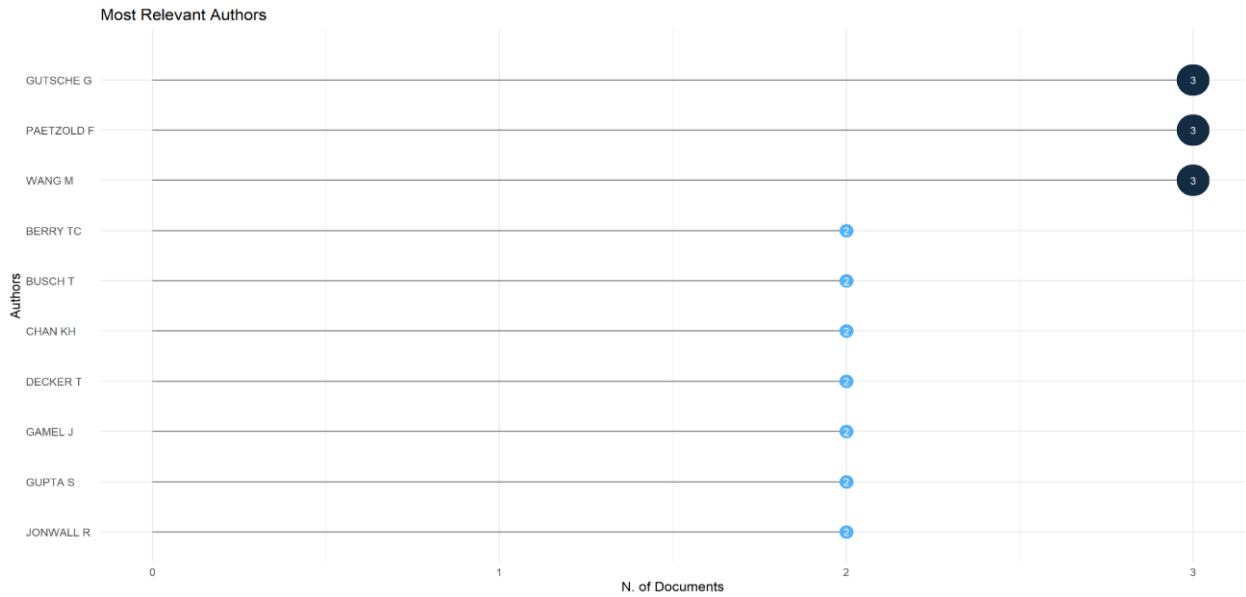

Figure 4. Most productive authors

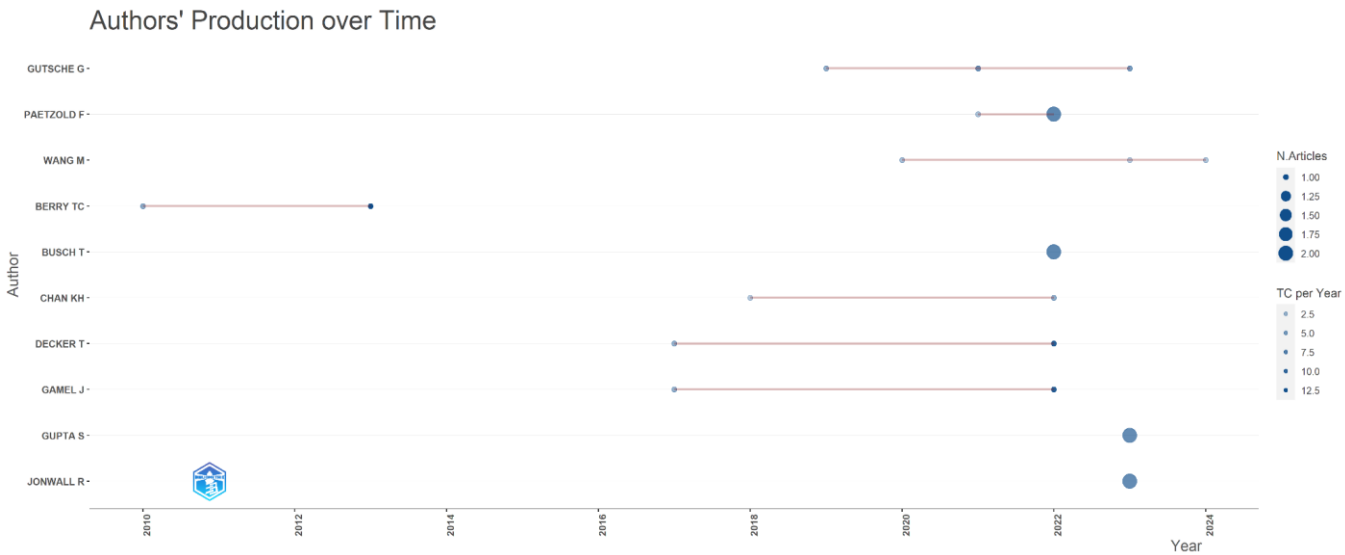

Figure 5. Temporal evolution of publication output among the most productive authors

3.1.3 Top countries

The number of studies on retail investors' green investing behavior by country of origin is listed in Table 1. From these data, it can be seen that China occupies the top position with 100 publications, far surpassing other countries. China's dominance in the number of publications reflects its commitment and investment in research related to the environment and green investment.

Table 1. The top ten countries

Country	Number of Publications
China	100
Germany	47
India	34
Malaysia	31
USA	31
Spain	23
Italy	22
UK	20
France	13
Netherlands	12

3.1.4 Top papers

Table 2 shows the most frequently cited publications on retail investors' green investing behavior, measured by the total number of citations and citations per year. The most influential article was by Riedl and Smeets [19], with a total of 418 citations and 52.25 citations per year, published in the Journal of Finance in 2017. The research results from Reidl and Smeets [19] show that investors' decisions to invest in socially responsible investing are driven by rational calculations, as well as investors' personal values and beliefs.

Table 2. The top ten most cited publications

Refs.	Total Citations	TC per Year
[19]	418	52.25
[20]	212	12.47
[21]	151	12.58
[22]	151	4.44
[23]	149	24.83
[24]	135	22.50
[25]	122	40.67
[26]	110	18.33
[27]	105	35.00
[28]	104	34.67

3.2 Science mapping analysis

3.2.1 Country collaboration network analysis

The results of the country collaboration network analysis on retail investors' green investing behavior are shown in Figure 6. As shown in Figure 6, there are five main country collaboration clusters based on the intensity level of collaboration. The members of this cluster are listed in Table 3. The results of this analysis show that this is a global issue that has received serious attention from many countries, and there is an understanding that the issue requires joint steps between countries.

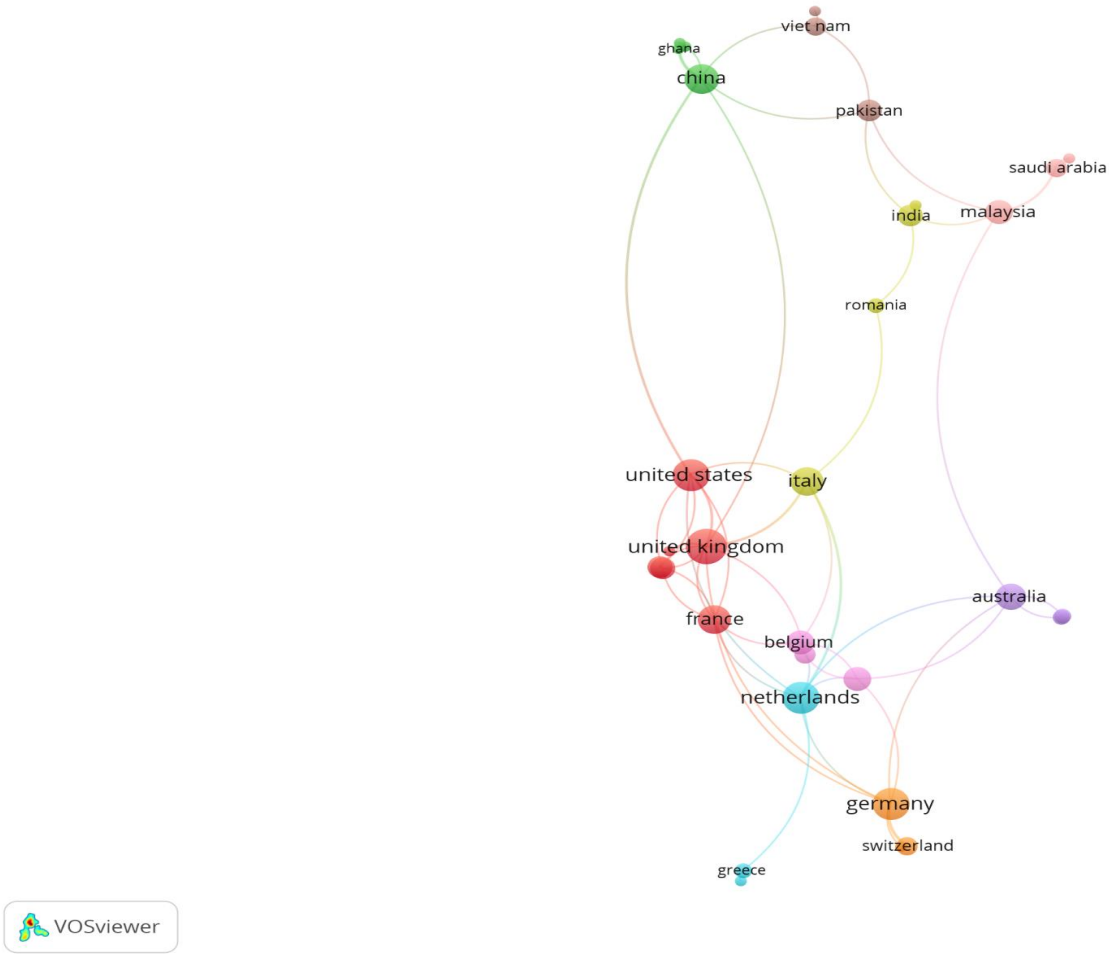

Figure 6. Country collaboration network

Table 3. Members of the country collaboration cluster

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
United Kingdom	China	Denmark	Australia	Germany
United States	Ghana	Greece	Canada	Japan
Libya	Hong Kong	Netherlands	Chile	Switzerland
United Arab Emirates	New Zealand			
France				
Algeria				

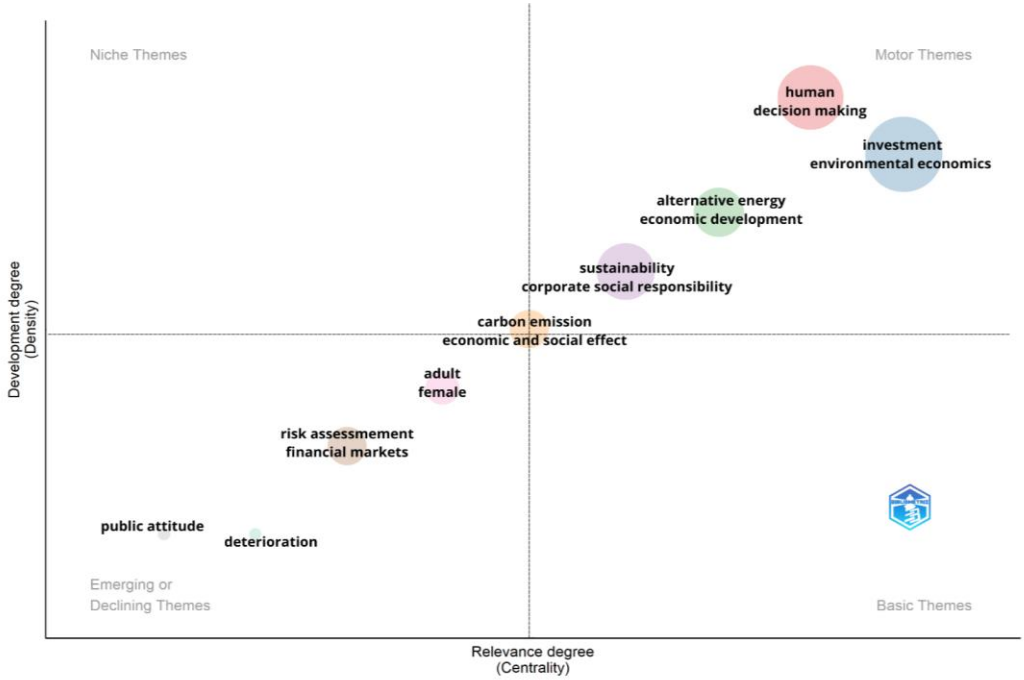

Figure 7. Thematic map

3.2.2 Thematic map analysis

The results of thematic map analysis are shown in Figure 7. We divided the thematic map into four quadrants based on the density and centrality of each theme: emerging/declining, basic, motor, and niche themes [13]. In the upper right quadrant, labelled "Motor Themes," are the well-established and essential themes driving the study field [13]. The motor themes quadrant features prominent themes, namely "sustainability," "corporate social responsibility," "alternative energy," "economic development," "investment," "environmental economics," "decision making," and "human." These themes represent the broad themes of investment decision-making and environmental considerations. This indicates the highly developed and central themes that drive research on retail investors' green investing behavior regarding the relationship between green investing behavior and factors related to investors' environmental considerations. In other words, the motor themes of research on retail investors' green investing behavior are related to the activation of investors' environmentally related personal norms.

The bottom right quadrant, labelled as the “Basic Themes,” doesn’t contain any theme. Basic themes represent central themes that are not fully developed [13]. The lack of a basic theme indicates that all the central themes in the study on retail investors' green investing behavior have been sufficiently developed and have been included in the quadrant of Motor Themes. Another explanation for this finding is that current research on retail investors' green investing behavior tends to focus on emerging topics. Therefore, no basic theme is currently dominant.

The top left quadrant, called “Niche Themes,” also does not contain any themes. This finding shows that there is a lack of well-developed and less centrally specific themes in research on this topic [13]. This indicates that the current study on retail investors' green investing behavior tends not to explore more specific and in-depth subfields of the topic. They focus only on the core aspects of the topic.

“Emerging or Declining Themes,” which are positioned in the bottom left quadrant, involve themes with low development and low centrality [13]. This quadrant includes several keywords: “public attitude deterioration,” “risk assessment, financial markets,” “females,” “adults,” and “economic and social effects.” In the context of our bibliometric study, themes are more likely to be grouped as emerging themes, which repress new areas of interest. For example, deterioration of public attitude represents a research theme that has received attention because of concerns about changing public perceptions of green investment. Meanwhile, “risk assessment” represents themes that are still under-explored but could be essential to understanding more detailed aspects of retail investors' green investing behavior. “Female” and “adult” represents demographic factors. The existence of demographic factors indicates an increasing interest in how different retail investor groups select green investments based on their demographic factors.

3.2.3 Themes evolution analysis

Figure 8 displays the thematic evolution of research on retail

investors' green investing behavior from 1991 to June 2024. We divided the periods into two main periods: the initial emergence of the COVID-19 pandemic (1991−2021) and after the COVID-19 pandemic (2022 to June 2024). In the second period, new themes emerged that were more specific and practical: “alternative energy", "sustainability", and "environmental policy". This thematic evolution shows that research on retail investors' green investing behavior has changed from a basic analysis of the relationship between green investing behavior, economic factors, and environmental factors to a more specific and practical focus on sustainability practices and environmental policies. In other words, this finding indicates an evolution in research priorities from a broader and more theoretical to a more specific and practical focus.

3.2.4 Bibliographic Coupling Analysis (BCA)

The BCA produced five main research clusters, as shown in Figure 9. We identified each cluster based on the central paper, which was represented by the central node or largest total link strength [29]. The central papers for each cluster were Barreda-Tarrazona et al. [30], Adam and Shauki [31], Apostolakis et al. [32], Nilsson [20], and Diouf et al. [33].

As shown in Table 4, the central study of the first cluster was Barreda-Tarrazona et al. [30]. They focus on retail investors' green investing behavior in the context of mutual funds. Their study revealed that clear information regarding the green investment status of an investment can affect investment preferences in addition to the diversification of the investment portfolio and rate of return. Furthermore, they find that even though the rate of return on green investment is lower, investors will still invest in it if they care about environmental issues. This finding suggests that, for certain investors, personal norm considerations can replace financial considerations in decision-making.

A research group with Adam and Shauki [31] as the central node formed the second cluster. Adam and Shauki [31] attempted to understand green investing decisions by integrating moral norms into the Theory of Planned Behavior (TPB). Their research revealed that moral norms’ attitudes and subjective norms influence intentions, which then influence green investment behavior. This finding suggests that green investment decision-making comes not only from a person's personal standards but also from the social environment around the investor. Unlike the first cluster, this cluster emphasizes the importance of encouraging the emergence of social pressure, in addition to increasing investors' personal norms, in forming green investing decisions.

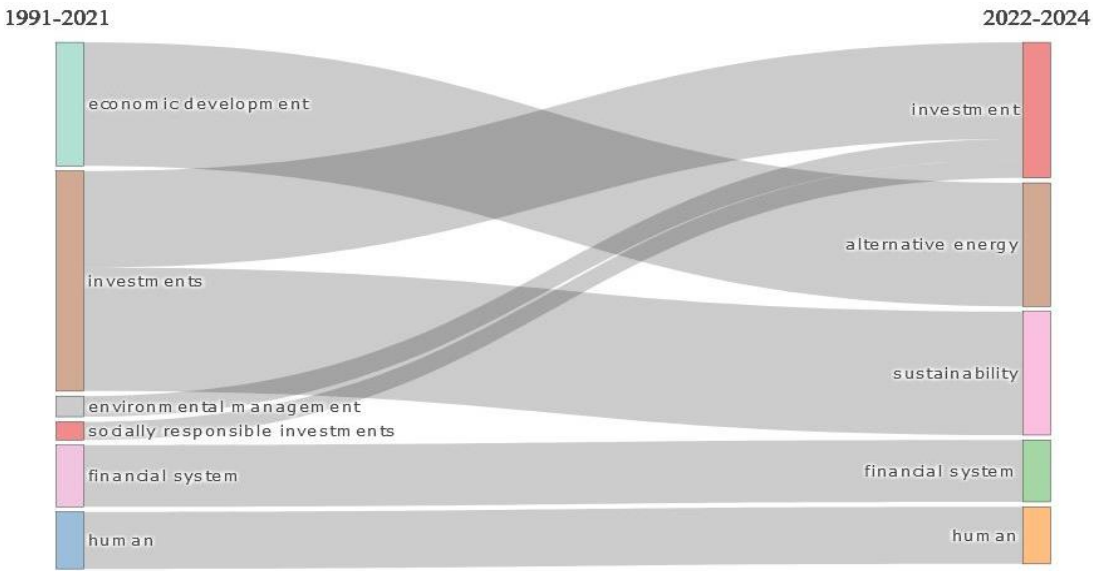

Figure 8. Themes evolution

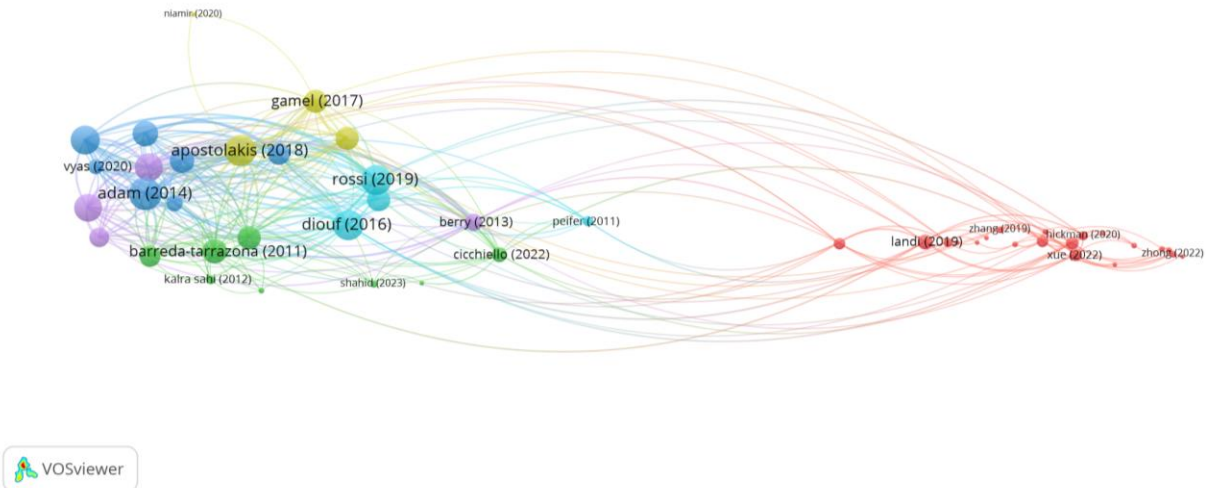

Figure 9. Results of the bibliographic coupling analysis

Table 4. Bibliographic coupling analysis based research cluster members

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Barreda-T. (2011)	**Adam (2014)**	**Apostolakis (2018)**	Berry (2013)	**Diouf (2016)**
Cicchiello (2022)	Brunen (2022)	Gamel (2017)	Junkus (2010)	Peifer (2011)
Doskeland (2016)	Gutsche (2021)	Gamel (2022)	Krause (2019)	Riedl (2017)
Hofmann (2008)	Nga (2013)	Niamir (2020)	**Nilsson (2008)**	Rossi (2019)
Kalra sahi (2012)	Palacios-G. (2018)			
Shahid (2023)	Raut (2020)			
Tahir (2011)	Vyas (2020)			
Yaya (2022)				

The third cluster was a research group led by Apostolakis et al. [32]. They study pensioner investors' intentions to adopt a green investment portfolio. Similar to the second cluster, they revealed that two factors from TPB–attitudes and social norms–play an important role in shaping individuals' intentions to invest in this portfolio. The difference from the second cluster is that this study includes investors' assessments of consumers' perspectives of environmental issues. More specifically, this cluster emphasizes that the intention to invest green is also influenced by investors' assessments of two consumer-related factors: perceived consumer effectiveness and consumer confidence.

In the next cluster (Cluster 4), Nilsson's [20] research is the center of attention. Unlike the previous cluster, Nilsson [20] involved socio-demographic factors in studying green investing behavior, in addition to perceived financial performance and pro-social attitudes. The cluster emphasizes that green investing behavior could be driven by non-altruistic motives (perceived financial returns) or altruistic motives (pro-social attitudes). From a socio-demographic perspective, female investors and those with better education tend to invest more in green. In other words, this cluster emphasizes the socio-demographic segmentation of investors to encourage green investments.

In the last cluster, Cluster 5 focuses on Diouf et al. [33]. This cluster comprehensively understands green investment behavior using a multidimensional approach involving the role of institutions beyond the personal and social factors that have been mentioned in other clusters. In addition to emphasizing investor demographic issues, personal factors related to the environment, and financial performance like other clusters, this cluster also emphasizes that green investment behavior is influenced by institutional factors.

4. CONTENT ANALYSIS

In the context of research method, quantitative research methods dominate the existing study on retail investors' green investing behavior survey is the main research design used this research topic. The survey method utilized questionnaires that relied on online distribution [1, 34] or physical distribution [35]. Another quantitative research design used is the experimental approach [36]. Few studies have used qualitative research methods [37] or mixed methods [33].

Previous studies of retail investors' green investing behavior have attempted to develop various behavioral models. TPB is a behavioral model that is widely utilized to understand retail investors' green investing behavior. The model was combined with factors from other models/theories. TPB posits that behavior is affected by three main determinants: perceived behavioral control, attitudes towards behavior, and subjective norms [38]. Existing studies on retail investors' green investing behavior tend to prove that behavior is significantly affected by perceived behavioral control [34, 39, 40], attitudes towards the behavior [31, 32, 34, 39, 40] and subjective norms [31, 32, 34, 39, 40].

Studies on retail investors' green investing behavior also tend to identify factors related to financial gain and factors related to the activation of a person's personal environmental norms as determinants of the behavior. The existence of factors related to the activation of personal environmental norms rooted from Schwartz [41]'s Norm Activation Theory (NAT). The NAT proposes that the activation of personal norms, which occurs due to one's level of awareness of the consequences of actions and sense of responsibility, triggers prosocial behavior [41]. Empirically, retail investors' green investing behavior is significantly affected by factors that can be viewed as the activation of environment-related personal norms, such as prosocial influence [20], environmentalism [42], relationship-oriented social aspects [43], environmental orientation [44], moral norms [31, 40], and environmental values [45].

Financial benefit-related factors, especially the investment return rate, are widely identified as antecedents of green investing behavior. This is because profit gain is the nature of investment [30]. Studies on retail investors' green investing behavior show that they are still affected by the financial benefits that can be obtained [20, 29, 30, 33, 46]. In addition, if investors have non-green investment alternatives that provide more benefits, green investing behavior will not always occur [22]. This finding is related to investor group clustering [47]. The environmentalist investor group still chooses to invest in green investments, although it earns less profit [42]. On the other hand, conventional investor groups abandon green investments if their profits are lower than those of alternative investments [1, 48, 49].

5. FUTURE RESEARCH DIRECTIONS

The results of bibliometric and content analyses trigger further research opportunities to deepen the understanding of retail investors' green investing behavior. In short, the direction for future research can be divided into three aspects: context, method, and topic.

In terms of context, many studies have been conducted in various countries. However, research related to this topic has mostly been conducted in developed countries. Developed countries tend to care more about green economic issues. Therefore, to increase the understanding of green investing behavior in the context of retail investors in developing countries, future research needs to be conducted in the context of developing countries, especially those that are not yet known to have massive policies and regulations to encourage a green economy.

Collaborative research has been conducted among researchers from various countries. However, the studies they conducted generally focused on one country. Future research should conduct comparative studies between countries. This is intended to reveal the influence of differences in contextual factors tied to the country's context, such as culture, regulations, and government policies, on the formation of retail investors' green investing behavior. This understanding will be useful for compiling global guidelines related to efforts to encourage green investment.

This study shows that socio-demographic factors influence retail investors' green investment behavior. However, existing studies have not explored green investment behavior from a cohort perspective. Each generation of investors can have a different philosophy of investing, considering the differences in their characteristics and experiences they have [50]. Therefore, in-depth research is needed to explore retail investors' green investment behavior in certain cohorts. Generation Z investors require serious attention, considering that this generation will soon become the generation with the largest productive age in the world.

In terms of method, this study reveals that the study of retail investors' green investing behavior is dominated by a quantitative approach with a cross-sectional survey as the research design. Although this research method has a strong scientific tradition, the literature has identified that it may not address all issues. One issue that needs serious attention is the stability of the determinants of retail investors' green investing behavior. The results of the content analysis show that financial returns and factors related to the activation of environmental norms influence green investing behavior. However, cross-sectional studies find it difficult to see for how long the influence of factors related to the activation of environmental norms can drive green investment behavior if the investor's financial condition worsens. In this context, future research should conduct longitudinal studies. Knowing the stability of the influence of determinants of green investment behavior of retail investors will deepen the understanding of green investing behavior.

This study reveals that TPB is the most dominant model used in research on retail investors' green investing behavior. The model is combined with factors related to financial returns and factors related to the activation of environmental norms. Although most studies show a positive and significant influence of TPB factors, financial returns, and factors related to the activation of environmental norms on retail investors' green investing behavior, there are also studies that reveal the absence of such influence. A quantitative approach using a cross-sectional survey makes it difficult to explain the reasons behind the absence of such an influence. Given this, future research needs to consider conducting qualitative research, especially to understand in depth whether there are factors that do not significantly influence retail investors' green investing behavior.

With the development of information and communication technology, the Internet has become a channel for investors to gather. They exchange ideas and express their investment interests in online forums. The results of this study indicate that no study has attempted to understand retail investors' green investing behavior from the perspective of social interaction in the online world. To fill this gap, future research needs to consider using big data-based research methods to understand retail investors' green investing behavior.

In terms of topics, this study reveals that research on retail investors' green investing behavior tends to be driven by the development and testing of models. In this case, the combination of TPB with factors related to financial returns and those related to the activation of environmental norms dominates the research landscape on this topic. However, these studies can be extended in several ways. First, TPB and the theory combined in research on retail investors' green investing behavior view investors as rational economic humans. In reality, investors do not always act rationally [33]. Investors may make decisions based on a heuristic information processing pattern. In this regard, one of the information processing models, namely the Heuristic-Systematic Model (HSM), can be considered to explain retail investors' green investing behavior. HSM proposes that individuals use two main pathways in information processing: systematic (slower and analytical) and heuristic (fast and intuitive) [51]. Future research can build a model of the green investment behavior of retail investors that can represent both pathways proposed by HSM.

Investor behavior is a response to a stimulus received by investors. This study reveals that previous studies have focused on factors related to the psychological process of an investor after receiving a stimulus, or factors related to the individual characteristics of the investor. Meanwhile, factors that represent the stimuli received by investors have not been widely studied in terms of their influence on retail investors' green investing behavior. In this context, the three main issues that need attention are the advancement of digital technology that makes the investment process easier, government support in green investment, and the increasingly diverse choice of green investment products. Future research should study the effects of both and combine them in a model of retail investors' green investing behavior.

6. DISCUSSION

6.1 Theoretical implication

This study fills this gap in the literature by conducting a bibliometric study focusing on retail investors' green investment behavior. This study uses a comprehensive bibliometric analysis technique, including performance analysis, science mapping, and content analysis. This study mapped the intellectual and social structure of retail investors' green investing behavior research. In the context of intellectual structure, this study mapped the state-of-the-art of the topic and identified the direction of the research needed. We mapped not only progress, but also future research opportunities from the mapped topic, method, and research context aspects. Meanwhile, in the context of social structure, this study mapped the main actors for this topic, both at the researcher and country levels. Researchers can use the results of this study to strengthen the knowledge structure of retail investor green investment behavior by conducting further research.

This study synthesizes research findings on retail investors' green investing behavior and reveals that the behavior is a complex behavior influenced by various factors. Although TPB, factors related to financial returns, and factors related to environmental norm activation dominate the research, retail investors' green investing behavior is contextual and requires a combination of various theories to explain it. The findings of this study provide evidence of the important role of general

behavioral theories, such as TPB and NAT, and their integration in explaining investment behavior. The findings also encourage further research to explore other theories relevant to retail investors' green investing behavior.

6.2 Practical implications

This study identifies the main determinants of retail investors' green investment behavior. This information can be used by investment advisors/managers and policymakers to design investment products, programs, and policies that can encourage green investment and accelerate the green economy.

Specifically, this study reveals that TPB factors, factors related to financial returns, and factors related to environmental norm activation are the main determinants of retail investors' green investing behavior. In addition, this study reveals that investor characteristics influence retail investors' green investment behavior. The practical implication of this finding is that to encourage investors to invest their money in green investments, the design of green investment products must consider investor characteristics. For investors with conventional characteristics, and not environmentalists, green investment products must be designed with competitive financial returns. If investment products target environmentalist investors, green investment products are designed by emphasizing clear green characteristics.

The important role of TPB factors in shaping retail investors' green investing behavior shows that to encourage green investment, social pressure and ease of investment need to be guaranteed. Social pressure can be increased by involving people considered important in the investment field to promote green investment products. Meanwhile, investment managers can realize ease of investment by utilizing increasingly sophisticated information and communication technology.

From the policymakers' perspective, the findings of this study also provide several important implications for encouraging green investment and accelerating the green economy. First, policymakers need to create policies that allow green investments to gain additional financial benefits compared to conventional investments. Second, the government must ensure ease of green investment. Regulatory aspects must support green investments. Third, the government needs to encourage the growth of a green investment ecosystem and invest in green investment promotion programs by involving parties that are considered important in the investment world.

This study revealed publications and key actors in green investment behavior research from retail investors. These findings provide practical benefits to practitioners, investors, investment advisors/managers, and policymakers. More specifically, practitioners and policymakers can utilize these findings to develop evidence-based policies or decision making. Furthermore, they can also use them to obtain expert information for consultation, if needed.

6.3 Limitations

Despite the comprehensive findings of our bibliometric research, we acknowledge its limitations. This study focuses on English-language academic literature in Scopus. Thus, important findings from other languages, academic literature, and other databases may not be captured by our study. However, our study establishes a strong basis for comprehending retail investors' green investing behavior and emphasizes significant areas for further investigation and intervention.

7. CONCLUSION

The main findings of our research include several important aspects that provide in-depth insights into retail investors' green investment behavior. Based on our analysis, the number of publications on this topic continues to increase. However, citation dynamics fluctuate. Falko Paetzold, Mengyao Wang, and Gunnar Gutsche were the top authors on this topic. At the country level, China is the top country in this topic. The top paper is the work of Riedl and Smeets, published in The Journal of Finance in 2017.

In terms of collaboration between countries, there are five main clusters of collaboration between countries. The bibliographic coupling analysis also identified five main clusters of research on green investing behavior. From the thematic map, the theme of retail investors' green investing behavior related to the relationship between green investing behavior and factors related to investors' environmental considerations emerged as "motor themes." On the other hand, the theme of retail investors' green investing behavior related to public assessment, risk, and demographic factors is included in the category of "Emerging or Declining Themes." The thematic evolution of research on retail investors' green investing behavior shows a significant shift from theoretical topics to a more practical focus on environmental policy, alternative energy, and sustainability.

The majority of research on the green investing behavior of retail investors uses a quantitative approach, mainly through surveys. TPB is a behavioral model widely used by researchers on retail investors' green investing behavior. The model is combined with various factors from other theories, especially factors related to the activation of personal norms related to the environment in which a person lives and factors related to financial benefits. Furthermore, this study identifies future research directions in terms of the context, methods, and topics.

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AUTHOR CONTRIBUTIONS

- **Dian Primanita Oktasari:** Conceptualization, Methodology, Writing - Original Draft Preparation, Supervision.
- **Winda Widyanty:** Data Collection, Formal Analysis, Writing - Review & Editing.
- **Devy Mawarnie Puspitasari:** Validation, Writing - Review & Editing, Visualization.
- **Nurfadlih Syahlani:** Investigation, Data Curation, Writing - Review & Editing.
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