



Bibliometric Analysis of Pro-Environmental Tourist Behavior in Rural Tourism Studies

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Abstract

Purpose- This research aims to provide a comprehensive and systematic review of the knowledge structure and dominant trends in the literature concerning pro-environmental tourist behavior within rural tourism studies. The study seeks to identify research gaps and map the intellectual landscape of the field for future researchers.

Methodology- This study employs a scientometric approach, combining systematic review and bibliometric analysis. A total of 1,020 eligible articles published between 1985 and 2024 were identified through the Scopus database and analyzed using VOSviewer software. Co-authorship, co-citation, and keyword co-occurrence networks were used to analyze the knowledge structure.

Findings- The results reveal that China, the United States, Australia, the United Kingdom, and South Korea have the highest publication output in this field. Linnaeus University (Sweden), Sejong University (South Korea), and Lund University (Sweden) are among the most influential institutions. Keyword analysis identified three primary clusters: ecotourism, ecosystem and environmental protection, and tourism economy and market. According to the Theory of Planned Behavior, factors such as attitude, subjective and social norms, perceived behavioral control, and environmental awareness are the most significant predictors of tourists' pro-environmental behavior.

Practical Implications- The findings provide valuable insights for destination managers and policymakers in developing effective strategies for sustainable tourism management. The results can serve as a basis for designing behavioral interventions and formulating evidence-based policies to promote responsible behaviors among tourists in rural destinations.

Originality/Value- This study contributes to the existing body of knowledge by providing a comprehensive and dynamic map of the knowledge structure and prevailing trends in pro-environmental behavior in rural tourism. By filling the gaps of previous studies, this research identifies novel research opportunities for future scholars.

Keywords- Pro-environmental tourist behavior, Rural tourism, Scientometrics, Sustainability, Theory of planned behavior, Environmental.

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1. Introduction

Rural tourism is recognized as one of rural areas' most crucial pillars of sustainable development. This form of tourism, with an emphasis on leveraging the cultural and natural attractions of rural regions, plays a vital role in creating employment and income opportunities for local communities while also preserving rural heritage and enhancing the quality of life for residents (Torabi, Khavarian-Garmsir, et al., 2023). However, unsustainable and unplanned tourism development in these areas can lead to adverse environmental consequences and the degradation of valuable natural resources (Ghaderi & Henderson, 2012). Therefore, gaining a deeper understanding of tourists' environmental behaviors and identifying the factors influencing the formation of their responsible behaviors towards the environment has been proposed as a fundamental prerequisite for the planning and sustainable management of rural tourism destinations (Gao et al., 2017; Torabi et al., 2024). In this regard, recent decades have witnessed a remarkable growth in the volume of scientific research on the topic of environmentally responsible behavior of tourists in the context of rural areas. By employing diverse theoretical approaches and methodologies, researchers have delved into various dimensions of this complex and multifaceted concept, and have identified a wide range of antecedents and consequences of these behaviors (Torabi, Rezvani, et al., 2022). Nevertheless, the vastness and dispersion of studies in this field have made it challenging to integrate and systematically summarize the findings of these investigations, and to attain a comprehensive understanding of the current state of knowledge in this domain (Juvan & Dolnicar, 2016). Moreover, the diversity and lack of consensus in the use of key concepts and terminologies among the studies in this field have further compounded the complexity of conducting a thorough literature review (Badri et al., 2015; Torabi, Rezvani, et al., 2022). In response to these challenges, in recent years, numerous bibliometric studies have been conducted to map the knowledge structure and unveil the focal points and research trends in various domains of tourism knowledge (Fu et al., 2020; Z. Xu et al., 2023). By employing quantitative indicators and analyzing citation networks, co-authorship, and keyword co-occurrence, these studies have been able to provide

comprehensive and objective maps of the main knowledge flows, thematic clusters, and interactions among key players in different areas of tourism research (Badri et al., 2015).

However, despite the growing importance of research on environmentally responsible behavior of tourists in rural areas, thus far, few studies have systematically and bibliometrically investigated the structure and dynamics of knowledge in this specific domain (Qiu et al., 2022; S. Xu & Hu, 2024; Zhao et al., 2020). In one of the rare attempts, by analyzing 759 articles published during the period from 1990 to 2019, identified the most important themes and research trends in the field of environmentally responsible behavior of tourists in natural destinations. Based on the findings of this study, topics such as environmental norms and values, destination attachment, service quality, and tourist experience have been at the center of attention of researchers in this field. Nonetheless, the focus of the aforementioned study solely on nature-based destinations and the lack of full coverage of the wide range of research related to rural areas have limited the possibility of obtaining a comprehensive and complete picture of the knowledge structure in this specific domain. A cursory glance at other related bibliometric studies also reveals that researchers have primarily focused on examining the general status of sustainable tourism research and have paid little attention to more specialized areas such as the environmentally responsible behavior of rural tourists (D'Arco et al., 2023; Steg & Vlek, 2009). Most of these studies have also confined themselves to using general performance metrics such as the number of publications and citations and identifying top authors and journals, and have addressed the content and conceptual aspects of knowledge less. Furthermore, these studies have predominantly focused on a specific database, which makes it difficult to fully cover the diverse range of publications in this field (Cooper & Hall, 2024; Ghaderi et al., 2022).

The main concern of the present study is to address the significant knowledge gaps and methodological shortcomings identified in previous analyses of the research on pro-environmental tourist behavior in rural areas. Despite a considerable volume of publications, the field lacks a comprehensive and systematic understanding of its thematic focus areas, the network of relationships among key

concepts, patterns of scientific collaboration, and the evolutionary trends of knowledge within this specific domain. Prior bibliometric studies have often been limited in scope, focusing on broader categories like sustainable or nature-based tourism, or have confined themselves to general performance metrics without delving into the conceptual structure of the literature. To overcome these limitations, this study adopts a comprehensive scientometric approach to deeply analyze the field's intellectual structure and create a detailed knowledge map. Spanning a wide timeframe from 1985 to 2024, this research moves beyond simple rankings of authors and journals to provide a dynamic and multi-layered map of knowledge clusters and the interaction patterns among concepts and thinkers. This will be achieved by analyzing co-authorship, co-citation, and keyword co-occurrence networks, supplemented by a content analysis of keywords from titles, abstracts, and author-selected keywords to ensure a precise identification of thematic priorities and emerging research trends. Ultimately, it is anticipated that the findings will not only fill the existing knowledge gaps but also significantly assist future researchers in identifying new capacities and novel research opportunities, while providing tourism policymakers and planners with the evidence-based insights needed to design effective behavioral interventions and promote sustainable practices in rural destinations.

2. Research Theoretical Literature

Since few researchers have discussed the environmentally responsible behavior (ERB) of tourists in tourism destinations, more research is needed to address the impact of the interaction between tourists and residents on tourists' environmentally responsible behavior (Han et al., 2023a; Oh & Ki, 2023), as the influence of residents' behavior has been overlooked in the tourism literature. Previous research has analyzed how tourism facilities, perceived destination image, and perceived destination attachment impact tourists' environmentally responsible behavior (Aziz & Niazi, 2023; S. Xu & Hu, 2024). Studies have also explored the influence of residents' attitudes, culture, and religion on tourists' revisit intention, destination attachment, post-visit behavior, and perceived destination image. Nonetheless, the socio-emotional dimensions of

the interaction between residents and tourists have not been thoroughly studied in the context of rural tourism (Z. Xu et al., 2023). The socio-emotional dimensions of interaction refer to the tourist's emotional bond and contact with residents (Oh & Ki, 2023). Earlier literature has failed to consider the emotional attachment of tourists to residents and the impact of residents' environmentally-related behaviors on tourists' environmentally responsible behavior (Oh & Ki, 2023; Souza-Neto et al., 2023).

An individual's perspective and attitude towards a behavior determines whether they will engage in it. If a person holds a positive attitude towards a behavior, they are more likely to act upon it. Conversely, if they hold a negative attitude, they will not engage in it (Nowacki et al., 2023; Torabi, Pourtaheri, et al., 2023). The theory of planned behavior states that an individual's attitude is a predictive factor of behavioral intention. This means that it can predict and explain the occurrence of a behavior. According to the TPB, behavioral intention is influenced by three factors: attitude, subjective norms, and perceived behavioral control (Ajzen, 1991). Attitude towards environmentally responsible behavior refers to a positive or negative evaluation of an individual performing a specific action. This evaluation can support or oppose the action (Han et al., 2023a; Powell & Ham, 2008). If an individual has a positive attitude towards a behavior, they are more likely to have a strong intention to perform that behavior (Han et al., 2023b). On the other hand, if an individual has a negative attitude towards that behavior, they are more likely to have a strong intention not to perform that behavior. Based on the theoretical framework of the TPB, attitude towards environmentally responsible behavior is an effective predictive variable of behavioral intention that can explain and predict intention (Ajzen, 1991; Panwanitdumrong & Chen, 2021).

At least one factor must be present for responsible behavior to occur in individuals. Among these, social psychological theory has focused on finding factors that lead to individuals' participation in environmental behaviors. Ajuhari et al. (2016), in an article titled "Promoting Pro-environmental Behavior in Ecotourism Destination," examined the socio-psychological structures effective in environmental behavior. They divided these

structures into two categories. The first category focused on social motivations and used the norm activation model and the value-belief-norm theory. The second category included personal benefit motivations and used the TPB (Ajuhari et al., 2016; S. S. Lee et al., 2023). Therefore, the description of the formation of tourists' environmentally responsible behavior aligns with the TPB, which evaluates the factors affecting individuals' behavioral intentions.

Subjective norms are the social pressures exerted on an individual to perform or not perform a behavior (Ajzen, 1991). These social pressures are often imposed on the individual through important people such as parents, teachers, friends, colleagues, and other influential close individuals referred to as referents. Subjective norms positively affect individuals' behavioral intentions in various contexts (Panwanitdumrong & Chen, 2021). These norms suggest that if a tourist assesses what behavior a referent expects from them when encountering natural areas and the environment, they are likely to exhibit that behavior.

Perceived behavioral control is an individuals' perception of the ease or difficulty of performing a desired action, according to Ajzen (1991). The presence of control factors, such as skills and abilities, the availability of time and money, and cooperation with others, are related to PBC (Ajzen, 1991). If an individual feels they lack the resources or opportunity to perform an action, even if they hold a positive attitude towards it and believe another important person is willing to perform it, they will not have strong intentions to engage in that behavior. PBC can also directly predict environmental behavior, as studies have shown that tourists' PBC predicts their behavioral intentions and actual behavior (Panwanitdumrong & Chen, 2021; C. Wang et al., 2019). Some studies have even suggested that PBC is the most important predictor of behavior, followed by subjective norms (Mejías et al., 2021). Environmental behavior is influenced by an individual's environmental activities, such as their perception of the severity of pollution, which is in turn influenced by environmental awareness (Z. Xu et al., 2023). However, while environmental awareness is a key factor in improving environmental behavior, it may not directly stimulate individuals to engage in environmental

behaviors (Fu et al., 2020), and instead may lead to environmental behavior through its impact on other factors.

In the development of the Theory of Planned Behavior model, many researchers have considered environmental background factors to be effective in the occurrence of environmental behaviors (Ajuhari et al., 2016; Panwanitdumrong & Chen, 2021). Environmental background refers to an individual's perception of the physical characteristics of a destination, such as natural scenery, cleanliness of main streets, and cleanliness of public places (C. Wang et al., 2019). In the context of tourism, when tourists are in a good environment, they appreciate their surroundings, leading them to exhibit appropriate behavior. In this regard, Wang et al. (2019), in a study conducted in mountainous areas, confirmed that the environmental background of mountainous regions is a positive moderating factor in the occurrence of responsible behavior among tourists. On the other hand, moral norms strongly predict the effects of perceived behavioral control and subjective norms, where social pressures and positive self-perception are still largely influenced by moral values. Therefore, accepting positive moral feelings such as empathy and gratitude can be widely used in creating environmental conservation behavior (De Groot & Steg, 2009). Social norms are often seen as a significant influence on pro-environmental behavior in pro-environmental behavior research (Han HeeSup, 2015). Nonetheless, some studies have revealed that social norms alone do not directly impact tourists' pro-environmental behaviors (Farrow et al., 2017). Tourists may prioritize emotional satisfaction, mental peace, and physical pleasure during their travels, which could be why social norms do not significantly affect their pro-environmental behavior (Han HeeSup, 2015). When traveling, tourists tend to break free from the social norms they adhere to in their daily lives, completely liberate themselves, and enjoy their time (Alcock et al., 2017). They are more likely to value the pleasure and peace they obtain during travel and underestimate the importance of social norms (Miao & Wei, 2013). Personal norms play a central role in predicting environmentally responsible behavior and are an individual's sense of moral obligation to take specific actions for environmentally responsible tourism (D'Arco et al.,

2023). Personal norms are a crucial concept in both the Norm Activation Theory and the Value-Belief-Norm Theory, both of which posit that personal norms are activated when an individual becomes aware of the negative consequences for others or the environment (Gao et al., 2017). It is believed that tourists engage in environmentally responsible behaviors due to a sense of moral responsibility to reduce negative environmental impacts.

While the body of literature on pro-environmental tourist behavior is extensive, bibliometric analyses that systematically map this specific field remain scarce. Previous scientometric studies have typically focused on broader themes, such as sustainable tourism in general or ecotourism, without a dedicated focus on the unique context of rural areas. Furthermore, many existing reviews have been confined to general performance metrics, such as publication and citation counts, while paying less attention to the underlying conceptual structure and thematic evolution of the field. This study distinguishes itself by addressing these gaps. It is similar to previous works in its use of quantitative scientometric methods, but it differs fundamentally in its specific focus on pro-environmental behavior within the rural tourism context over an extended period (1985-2024). Therefore, the roadmap for the current research is as follows: first, to systematically collect and screen the relevant literature from the Scopus database; second, to apply a multi-faceted bibliometric analysis including co-authorship, keyword co-occurrence, and co-citation networks to identify the key contributors, primary research clusters, and foundational intellectual pillars of the field; and finally, to synthesize these findings to provide a comprehensive map of the knowledge structure, thereby revealing critical insights and clear directions for future research.

3. Research Methodology

This research employs a combined approach based on systematic review and scientometric analysis to comprehensively analyze the knowledge structure and research trends in the field of environmentally responsible behavior in rural tourism. In the first step, using the systematic review technique, a systematic process for searching, screening, and selecting articles related to the research topic was designed and implemented in the Scopus database. Scopus was chosen as the primary data source,

considering its extensive coverage, high comprehensiveness in indexing reputable international scientific journals, and powerful citation analysis tools. The inclusion criteria for articles in the study encompassed publication within the timeframe of 1985 to 2024, thematic focus on factors affecting environmentally responsible behavior in the context of rural tourism, and access to the full text of the article. Conversely, other types of publications apart from research articles, such as editorials, conference papers, and notes, were excluded from the review process. The search for articles was conducted using a comprehensive strategy based on the intelligent combination of the main research keywords in the form of Boolean operators in the title, abstract, and keyword fields. After removing duplicates and carefully screening titles and abstracts, a final set of 1020 eligible articles was selected for the final analysis.

In the second step, relying on the scientometric analysis approach, quantitative indicators and network analyses were applied to map the knowledge structure and identify focal points and emerging thematic trends in the selected body of literature. Based on advanced mathematical, statistical, and visualization techniques, Scientometric analysis enables mapping concepts, thematic clusters, and patterns of hidden interactions within vast scientific information). For this purpose, utilizing the specialized network analysis software VOSviewer, co-authorship, co-citation, and keyword co-occurrence networks were constructed and analyzed in the studied dataset. The advanced capabilities of VOSviewer software in the field of cluster analysis and knowledge mapping allowed the researcher to identify the main knowledge clusters and central research topics by automatically grouping the nodes present in the conceptual networks. Moreover, by relying on the visualization capabilities of this tool, the structure of relationships among concepts, thematic clusters, and key players was intuitively and comprehensibly depicted. Additionally, by conducting content analysis of keywords at different layers of texts, including titles, abstracts, and author-selected keywords, and monitoring their frequency and co-occurrence, the possibility of more precise identification of emerging trends

and focal points in more specialized areas was provided. Thus, by creatively combining systematic review techniques and scientometric analysis based on the most advanced network analysis and knowledge visualization tools, the present study has provided the opportunity to offer a comprehensive and dynamic map of the knowledge structure and dynamics in the field of environmentally responsible behavior in rural tourism. The findings derived from these big data-driven analyses are expected to not only fill existing knowledge gaps but also lead to the identification of novel research opportunities and challenges facing researchers and policymakers in this arena¹

In summary, the research was executed through a structured, multi-stage workflow to ensure methodological rigor and replicability. The first stage involved data identification and retrieval, where a systematic search was conducted within the Scopus database, chosen for its extensive coverage of peer-reviewed literature. The search query was meticulously constructed using Boolean operators to combine keywords related to the core concepts. The search strategy targeted terms such as (for instance, "*pro-environmental behavior*," "*environmentally responsible behavior*," "*sustainable behavior*") in conjunction with context-specific terms like (for instance, "*rural tourism*," "*agritourism*," "*countryside tourism*") within the title, abstract, and keyword fields of the documents. In the second stage, the retrieved results underwent a rigorous screening process. They were filtered based on pre-defined inclusion criteria, such as publication type (research articles only) and timeframe (1985-2024), while excluding non-relevant documents like editorials and notes. After removing duplicates, this process yielded the final dataset of 1,020 articles for analysis. The third and final stage involved the scientometric analysis. The full bibliographic data from the final article set was imported into VOSviewer software, which was used to construct and visualize various networks.

Specifically, co-authorship analysis was performed to map scientific collaborations ; keyword co-occurrence analysis was used to identify dominant thematic clusters and research trends ; and co-citation analysis was applied to sources, authors, and journals to uncover the intellectual cornerstones of the field. This systematic, step-by-step procedure provides a transparent and verifiable foundation for the comprehensive knowledge map presented in the results.

4. Research Findings

4.1. Co-authorship Network

Collaborative research networks can be uncovered using co-authorship networks. Scientists establish social networks and relationships with co-authors over time, forming the basis of the co-authorship network among researchers. Therefore, the analysis of co-authorship networks is the most effective way to identify connections among researchers who have a significant impact in a particular field (Biscaro & Giupponi, 2014).

Figure 1 illustrates the collaboration network among authors, which was constructed using the VOSviewer software. In this analysis, the minimum number of documents per author was set to 1, and a total of 1020 documents met this criterion. The lines present in the network represent the collaborative links established between co-authors over time, with the thickness of each line indicating the strength of the collaboration relationship between the two authors. In this network, 23 prominent authors are categorized into eight distinct clusters. The yellow cluster consists of 5 authors, the red cluster has 7 authors, the dark blue cluster contains 5 authors, the light purple cluster has 2 authors, the orange cluster includes 3 authors, the dark purple cluster comprises 5 authors, the light blue cluster has 3 authors, and the green cluster includes 6 authors. Notably, the yellow cluster with 5 authors is positioned at the center of the network and acts as the main hub of connections with other researchers (Figure 1).

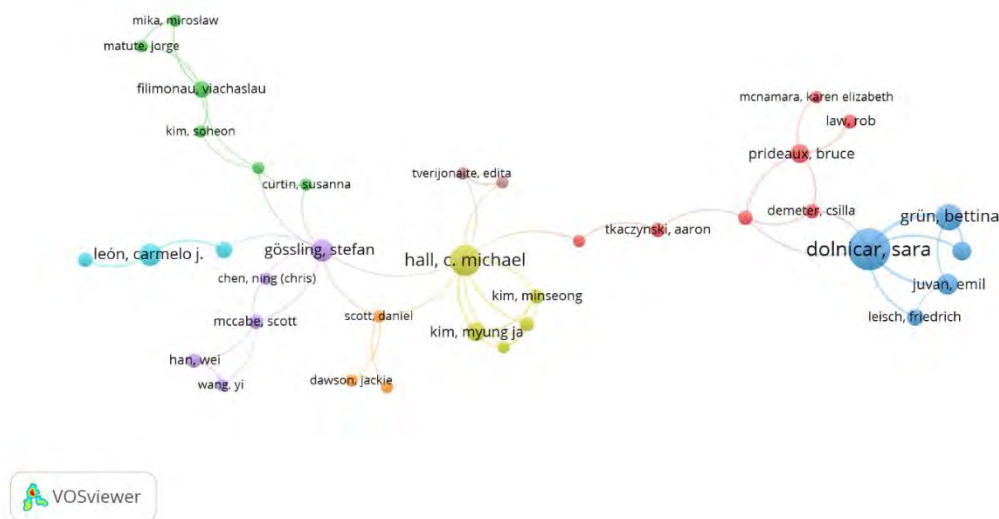


Figure 1. Co-authorship Network

4.2. Analysis of Leading Research Countries

The total number of articles published from a particular country indicates that country's influence. The top five countries examined were China, the United States, the United Kingdom, Australia, and South Korea.

In terms of total publications, 89 countries were identified, of which 49 countries had a minimum of 5 citations. These 49 countries can be categorized into 9 clusters. China ranked first among all

countries with a total of 193 publications and ranked fourth in total citations (3916). The United States ranked second with a total of 156 published articles and ranked second based on the total number of citations with 7464 articles. In terms of average citations per article, Australia reached the highest position with 8939, while China ranked fourth among the top 5 countries. Articles from Australia demonstrate high scientific prowess in this research field.

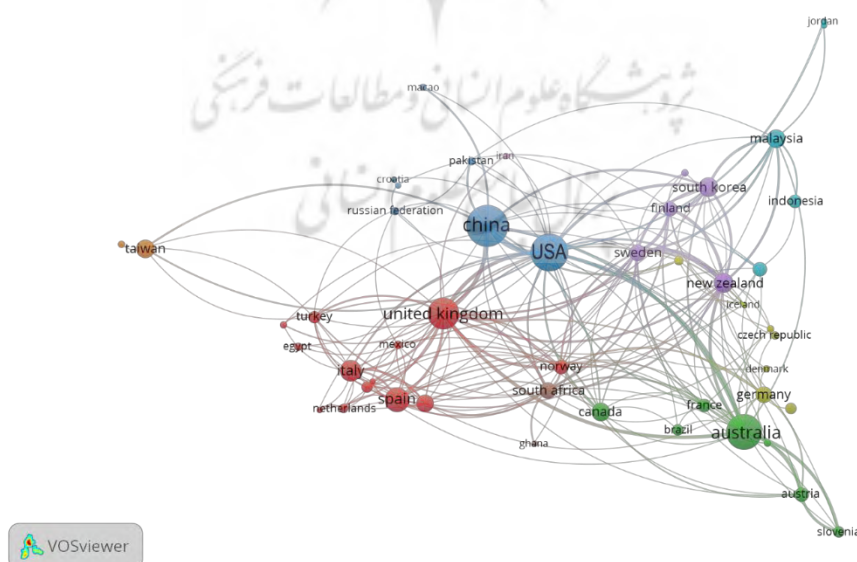


Figure 2. Leading countries (from developed and developing countries) in terms of total publications

Using VOSviewer, we created a collaboration map for the top countries, as shown in [Figure 2](#). A minimum of 5 documents per country was required to qualify, and 49 out of 89 countries met this threshold. The map displays the connection status between two countries through a connecting line, with the circle size representing the number of publications. The thickness of the line indicates the level of collaboration within countries. However, the degree of collaboration varies across countries. There are four clusters with strong connections in total, with the United Kingdom, the United States, Australia, China, and New Zealand showing high levels of collaboration and interaction in the field of environmental behavior in rural tourism. These countries also received relatively high citation counts. Developed countries dominated this research field in terms of scientific publications, citations, and collaborations.

Developed countries focus more on examining the influential factors in shaping environmental conservation behavior in rural tourism on a larger scale. Factors affecting the environmental behavior of rural tourists, such as social responsibility, sense of belonging to the destination, social interaction, and neighborhood satisfaction, have the highest priority level in developed countries, but this is not the case in developing countries. On the other hand, developing countries have high economic growth rates but do not strongly emphasize responsible environmental conservation behavior in rural tourism.

4.3. Analysis of Research Institutions

To analyze the performance of scientific institutions in the field of rural tourism environmental behavior studies, a research study examined 2240 institutions from the years 1985 to 2024. The institutions were ranked based on the number of publications they produced with a threshold of at least 3 published articles. As a result, the study identified and ranked 27 top institutions, which are listed in [Table 1](#). The top institution in the ranking was the School of Business and Economics at Linnaeus University in Sweden, which had the highest number of publications. Sejong University's College of Hospitality and Tourism Management in South Korea ranked second with 6 articles and 138

citations, but it had relatively weak performance in terms of scientific collaboration links. Finally, the Department of Service Management and Service Studies at Lund University in Sweden ranked third by publishing 6 articles and achieving a score of 23 in the strength of scientific collaborations index ([Figure 3](#) and [Table 1](#)).

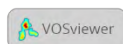
An overview of the findings in this section reveals that the majority of influential institutions in this field are affiliated with developed countries, and the share of institutions from developing countries in advancing the frontiers of knowledge related to the environmental behavior of rural tourists has been very limited. This finding aligns with the results of other bibliometric studies in the field of sustainable tourism and the environment and confirms the deep knowledge and research gap between developed and developing countries in this area.

The higher concentration of leading institutions in developed countries can be explained in light of various factors, such as having stronger institutional and financial infrastructures, substantial investments in research and innovation, and deeper concerns about environmental and tourism sustainability. On the other hand, the requirements of economic development and livelihood provision have placed strategic attention to the tourism sector at the top of the macro-policy priorities of many developing countries. This issue, alongside limitations in financial and human resources, can justify the minimal share of institutions from these countries in research related to the environmental behavior of tourists.

This research gap, considering the growing trend of tourism in rural areas of developing countries and the environmental sensitivity of these regions, can be a serious alarm for the long-term sustainability of tourism destinations. Accordingly, strengthening the research capacity of universities and scientific centers in developing countries in this field and encouraging their scientific collaborations with influential international institutions are among the essential necessities for bridging the knowledge gap and providing more favorable responses to the needs of sustainable rural tourism development in these regions.

Table 1. Top research institutes in the field of environmental behavior in rural tourism

total link strength	Number of referrals	Related documents	Institute	rank
22	680	11	school of business and economics, linnaeus university, kalmar, sweden	1
0	138	6	college of hospitality and tourism management, sejong university, seoul, south korea	2
23	28	6	department of service management and service studies, lund university, helsingborg, sweden	3
23	28	6	geography research unit, university of oulu, oulu, finland	4
7	235	5	department of geography, university of oulu, oulu, finland	5
4	214	5	institute of geographic sciences and natural resources research, chinese academy of sciences, beijing, 100101, china	6
4	215	5	university of chinese academy of sciences, beijing, 100049, china	7
12	85	4	college of hotel & tourism management, kyung hee university, seoul, south korea	8
0	31	4	college of tourism and service management, nankai university, tianjin, china	9
8	128	4	department of management, marketing and entrepreneurship, university of canterbury, christchurch, new zealand	10

**Figure 3. Top research institutions in the field of environmental behavior in rural tourism**

4.4. Keyword analysis

In order to determine the main areas of research and current trends, it is crucial to identify the keywords used in articles. Various types of keywords, such as author keywords, abstract keywords, and keywords, can help researchers in conducting bibliographic research. Each type of keyword provides researchers with a general understanding of the study and highlights a

particular field of study. The keywords related to environmentally responsible behavior in rural tourism were assessed and ranked over a period of 38 years (1985-2024) based on the title, abstract keywords, author keywords, and other keywords. [Table 2](#) displays the most commonly used words in the title, author keywords, additional keywords, abstract keywords, and all keywords related to the

study of environmentally responsible behavior in rural tourism.

Table 2. The most extracted keywords related to environmentally responsible behavior in rural tourism

total link strength	total link strength	occurrences	keyword	id	total link strength	total link strength	occurrences	keyword	id
17	148	17	carbon emission	13	22	260	16	adult	1
0	89	17	climate change	14	0	199	17	animal	2
0	609	97	coastal zone	15	23	187	26	anthropogenic effect	3
6	298	54	coastal zone management	16	23	304	25	attitude	4
6	110	16	cognition	17	7	164	24	attitudinal survey	5
0	131	18	comparative study	18	4	807	68	australia	6
0	93	18	conservation	19	4	179	16	aves	7
6	121	21	conservation management	20	12	111	17	beaches	8
0	266	33	conservation of natural resources	21	0	276	46	behavior	9
0	241	34	consumption behavior	22	8	145	15	behavioral research	10
6	474	33	contingent valuation	23	0	138	17	behavioral response	11
					17	306	27	biodiversity	12

In this study, the frequency analysis of keywords used in research related to environmentally responsible behavior in rural tourism provides valuable insights into the dominant topics and trends in this field. According to the table presented, 23 high-frequency keywords have been identified that can indicate the importance and thematic priority of the research. Among these, the keywords extracted from article titles and authors' selected keywords have particular significance in representing the main content of the studies due to their prominent position. Among the title keywords, concepts such as "adult," "animal," "anthropogenic effect," "attitude," "behavior," and "conservation" had the highest frequency, indicating researchers' attention to the role of individual and attitudinal factors alongside the consequences of human behaviors on the natural environment. This finding aligns with the perspective of the theory of planned behavior

(Ajzen, 1991) and similar studies that emphasize the role of attitudes and individual characteristics in environmental behavior (Han HeeSup, 2015). However, in the authors' selected keywords, concepts such as "sustainable tourism," "ecotourism," "nature-based tourism," "environmentally responsible behavior," and "climate change" have been the focus of attention. These keywords demonstrate the close link between responsible behaviors and the concept of sustainability and the protection of natural ecosystems in tourism destinations. Similar findings are also observed in the keywords extracted from article abstracts, indicating consistency and coherence among different elements of the articles. In an overall view of the set of keywords, it can be discerned that "tourism behavior," "ecotourism," "tourism destination", "tourism development,"

and "tourism management" have been among the most frequent cases. These findings confirm that environmentally responsible behavior of tourists is a central and prominent topic in rural tourism research and has a close relationship with managerial issues of sustainable tourism development in rural destinations. The emergence of keywords such as "performance," "framework," "model," "indicators," and "evaluation" alongside these concepts also signifies researchers' efforts to conceptualize, model, and measure the dimensions of environmentally responsible

behavior in connection with sustainable tourism development (S. Lee et al., 2023). The keyword analysis reveals that the study of environmentally responsible behaviors of rural tourists is one of the main active streams in the literature of sustainable tourism development, closely linked with axes such as ecotourism, environmental conservation, destination management, and tourist behavior modeling. These findings can contribute to a better understanding of research lines and the identification of research opportunities in this field.

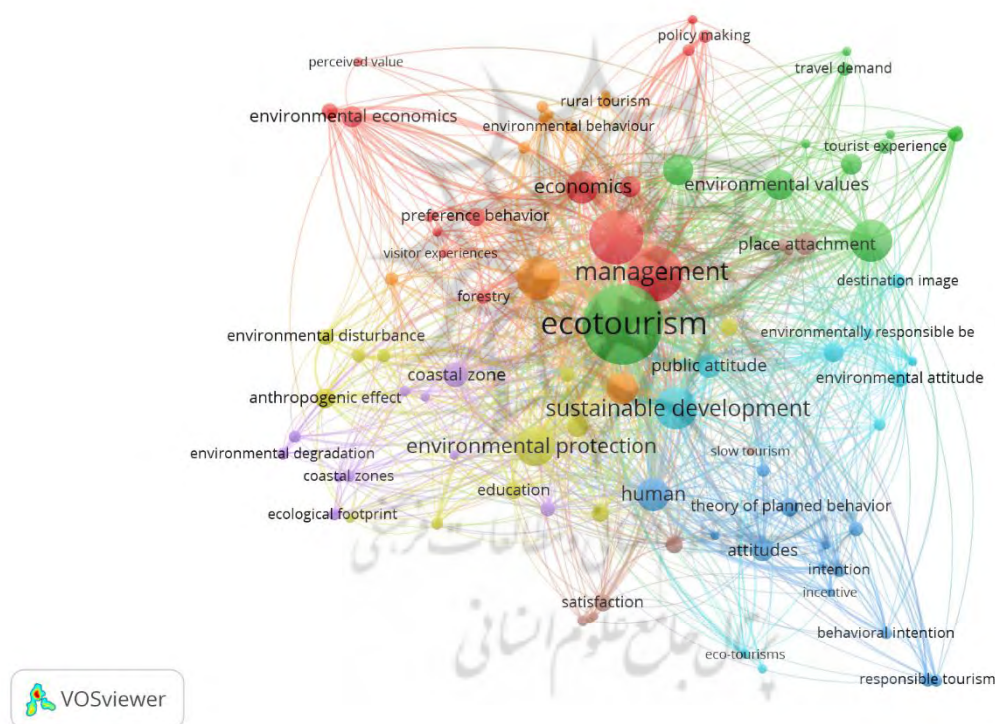


Figure 4. Authors' keyword network authors Keyword Network

Regarding the network of keywords related to environmentally responsible behavior in rural tourism, it can be said that this network itself consists of a series of sub-networks or clusters, each focusing on a specific research domain related to the research title.

Red Cluster (Ecotourism)- The red cluster in Figure 4 primarily focuses on research related to the field of ecotourism. These studies emphasize key aspects such as environmental values, the

theory of planned behavior, pro-environmental behaviors, environmentally responsible behaviors, and attitudes. The common thread among the research in this cluster is the elucidation of the relationships and reciprocal influences among these constructs in shaping tourists' environmentally responsible behavior.

The research conducted by Zhang and Sun (2022) suggests that individuals' environmental values, such as altruistic, egoistic, and biospheric values,

significantly impact their general attitudes toward the environment. These attitudes then subsequently lead to pro-environmental behaviors. This finding is consistent with the value-belief-norm theory, which highlights the crucial role of personal values in shaping environmental beliefs and norms. In addition, earlier studies in the field of ecotourism (Chiu & Wang, 2023) have also supported this relationship between environmental values, attitudes, and tourist behavior.

On the other hand, the theory of planned behavior (Ajzen, 1991) and the norm activation theory (Schwartz, 1977) provide widely used theoretical frameworks for explaining the mechanisms of formation of environmentally responsible intentions and behaviors among tourists. These theories emphasize the role of factors such as attitudes, subjective norms, perceived behavioral control, awareness of consequences, and a sense of moral responsibility in predicting behavior (Batool et al., 2024). The extensive application of these theories in the research within this cluster demonstrates researchers' reliance on well-established theoretical foundations in the field of social psychology.

However, alongside these individual factors, the role of contextual variables such as social interactions, participation, and characteristics of the tourism destination is also of importance. Based on the findings of Hansen et al. (2024), behavioral, social, value, and cognitive constructs related to sustainability, alongside contextual factors, jointly shape tourists' attitudes and behavioral intentions towards supporting the environment. In fact, tourists' perceptions of the environmental responsibility of the destination and local residents also play a role in stimulating and reinforcing their responsible behaviors (Y. Wang et al., 2023). This comprehensive approach to the multifaceted influences of individual and environmental factors distinguishes the research in this cluster.

Overall, the red cluster, by drawing on the fundamental concepts of environmental values, attitudes, and norms and integrating them with cognitive-social theories of behavior, seeks to explain the motivating mechanisms of environmentally responsible behaviors of tourists in the context of ecotourism. The findings of this section, while enriching the subject literature, can

pave the way for designing effective behavioral interventions in ecotourism destinations.

Green Cluster (Ecosystem and Environmental Conservation)- The green cluster in Figure 4 primarily consists of keywords related to ecosystems and environmental conservation. The central concepts in this cluster include "ecosystems," "nature conservation," and "protected areas." The main focus of the research in this cluster is on elucidating the complex and multifaceted relationships among nature conservation, ecosystem functioning, and the role of protected areas in sustainable tourism development.

In most of these studies, which have focused on specific types of tourism in protected areas, the main objective of tourism has been stated as providing unique nature-based experiences for visitors while promoting the principles of environmental conservation. This approach aligns with the concept of conservation-based tourism (Bushell & McCool, 2007), which emphasizes the establishment of a constructive link between the tourism industry and nature conservation management objectives. Accordingly, tourism in protected areas can serve as a tool for increasing environmental awareness, attracting public support, and providing financial resources for effective conservation of biodiversity and ecosystems (Poudyal & Joshi, 2022).

However, some research findings in this cluster indicate potential conflicts between protected areas' recreational and conservation functions. For example, in their study, Zhang et al. (2022) found that increased recreational use of natural resources in these areas can impose significant pressures on ecosystem health and wildlife. This challenge highlights the necessity of adopting integrated management approaches based on ecological carrying capacity in developing tourism in protected areas (Poudyal & Joshi, 2022).

Despite these challenges, the common thread among most of the research in this cluster is the importance of protected areas, such as national parks and biosphere reserves, in safeguarding natural and cultural heritage for present and future generations. According to Hopke's (2024) perspective, by providing diverse ecosystem services, these areas contribute to biodiversity conservation and create opportunities for sustainable socio-economic development of local

communities by attracting nature-oriented tourists. In the same vein, Kropf et al. (2019) emphasize the importance of transboundary protected areas in strengthening international cooperation and integrated management of ecosystems at the landscape scale.

Overall, the green cluster, focusing on the concepts of ecosystems, nature conservation, and protected areas, emphasizes the need for comprehensive and interdisciplinary approaches in sustainable and conservation-oriented tourism development. The findings of this section can contribute to the richness of the literature on adaptive management of tourism and environmental conservation and pave the way for formulating effective policies and programs for achieving sustainable development goals in protected areas.

Blue Cluster (Tourism Economics and Market)-

The blue cluster in Figure 4 primarily focuses on the concepts of tourism economics and market alongside tourist behavior. Despite sharing an attention to tourist behavior with the red cluster, the main distinguishing feature of this cluster is its emphasis on the relationship between economic variables and tourist behavior, rather than solely focusing on individual motivations and attitudes. In fact, the research in this section, drawing on economic theories and approaches, seeks to explain the complex interaction mechanisms among market structures, the performance of tourism enterprises, and consumer behavior in the tourism industry.

From the perspective of industrial economics, the diverse structures of the tourism market, including perfect competition, monopoly, and monopolistic competition, create different environments for the strategic behavior of firms as well as the dynamics of tourism demand (Candela et al., 2012). The analysis of these structures and their impacts on the tourism sector's efficiency, productivity, and competitiveness has been one of the main axes of economic research in this field (Fu et al., 2020). In this regard, applying microeconomic and industrial organization theories assists researchers in understanding the complex mechanisms of economic actors' behavior in tourism markets and its consequences at the national and international levels.

On the other hand, by linking psychological and economic foundations, the behavioral economics

perspective provides a comprehensive framework for analyzing consumer decisions and behavior in the tourism market (Torabi, Shalbafian, et al., 2022). By departing from the assumption of perfect rationality in classical economic theory, the behavioral economics approach pays attention to the role of cognitive biases, emotions, social norms, and other non-economic factors in shaping the preferences and behavior of tourists (Avineri, 2012). Therefore, integrating insights from behavioral economics with tourism marketing knowledge assists businesses in this field in gaining a deeper understanding of demand patterns, market segmentation, and designing effective strategies (Dobroskok et al., 2022).

By linking the concepts and theories of tourism economics, industrial economics, and behavioral economics, the blue cluster offers a comprehensive view of the interaction among market structures, firms, and consumers in the tourism industry. The findings of this field can serve as a basis for macro and micro policymaking aimed at enhancing efficiency, improving the tourist experience, and achieving sustainability goals in the tourism industry. At the same time, the growing richness of the tourism economics literature heralds the expansion of interdisciplinary and applied research in the future of this field.

4.5. Co-citation Analysis

In 1973, Small introduced the concept of co-citation analysis, which identifies a relationship between two documents that appear simultaneously in the reference list of a third document (Tang et al., 2022). Co-citation analysis can be divided into three types: reference co-citation analysis, source co-citation analysis, and author co-citation analysis. The goal of this section is to analyze these three types of co-citation analysis and determine the frequency of similar documents in scientific literature.

Reference Co-citation Network- The co-citation network of publications on environmental behavior in rural tourism from 1985 to 2024 is presented in Figure 5. VOSviewer was used to develop the network, with a minimum threshold of 80 references to a document. A total of 129 documents were evaluated in pairs, with thicker nodes between two documents indicating a stronger link and higher frequency.

The research conducted by [Ajzen et al. \(1991\)](#) holds the first rank with 65 citations. They provided a comprehensive definition of rural tourism environmental behavior and explained responsible behavior as an essential dimension of sustainable development. [Kollmuss and Agyeman \(2002\)](#) secured the second rank by clarifying the

concept of responsible rural tourism behavior and its significance for sustainable tourism management. [Steg and Vlek's \(2009\)](#) article holds the third rank, which evaluates the indicators and framework of rural tourist behavior in the conservation and sustainability of heritage sites.

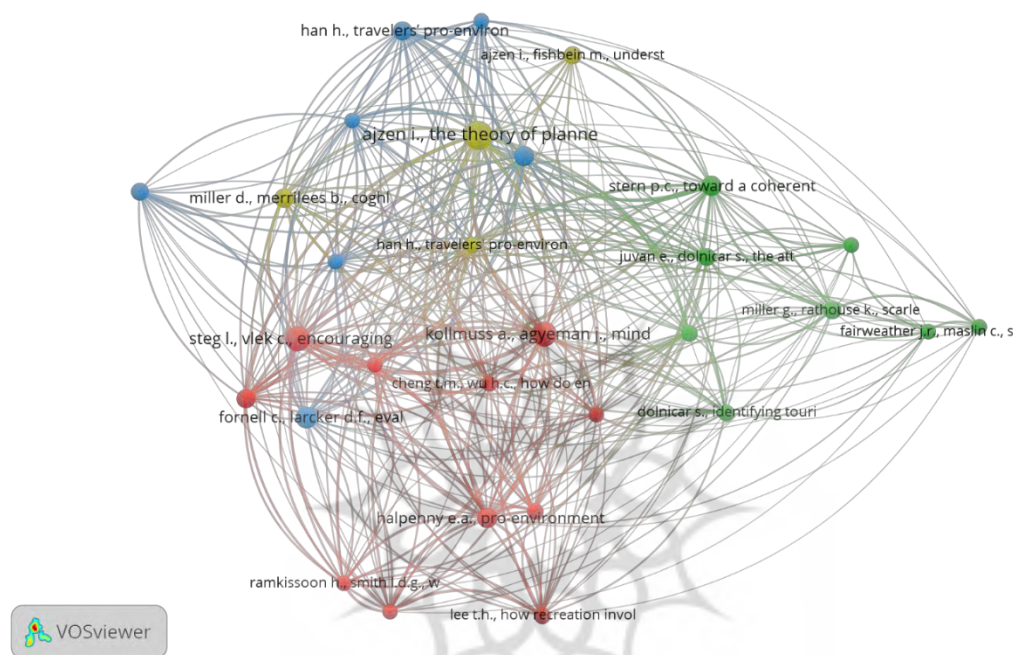


Figure 5. Common citation network of cited references

Journal Co-citation Network The findings from the journal co-citation analysis are presented in [Figure 6](#). Using the VOSviewer software and applying a threshold of 68, the co-citation network of the top 150 journals was mapped in four distinct clusters. In this network, the thickness of the links between two journals indicates the number of times they have been simultaneously cited in other sources, which is considered a measure of the scientific and thematic relationship strength between them ([Van Eck & Waltman, 2014](#)).

The analysis performed identified the most influential journals with the highest co-citation links to be *Journal of Cleaner Production*, *Energy Policy*, *International Journal of Production Economics*, *Journal of Business Ethics*, *Energy Economics*, *European Journal of Operational Research*, and *Sustainability-Basel*, along with other journals in the fields of operations management, energy, and ecological economics.

The fact that reputable journals from various fields such as management, energy, sustainability, business ethics, and operations management ranked among the most cited sources indicates that research related to environmentally responsible behavior in rural tourism is interdisciplinary in nature. These results align with similar bibliometric studies in the field of sustainable tourism and the environment ([Della Corte et al., 2019](#); [Niñerola et al., 2019](#)). Moreover, the prominent presence of economics and management journals among the main co-citation clusters signifies the growing importance of economic and business studies in advancing the frontiers of knowledge related to environmental sustainability in rural tourism destinations. In fact, a precise understanding of the economic mechanisms and effective managerial strategies influencing the environmentally responsible behavior of tourism stakeholders is considered a fundamental

prerequisite for formulating sustainable policies and business models in this field (Font et al., 2021). The co-citation analysis of journals, while revealing the intellectual structure and thematic links among the most influential scientific sources, emphasizes the need for a comprehensive and integrative view from the perspective of various disciplines on the topic of environmentally responsible behavior in the context of rural

tourism. The continuation of future research in this arena requires constructive interaction among researchers and specialized journals from diverse fields such as tourism, environment, economics, management, psychology, and sociology to obtain a comprehensive and practical understanding of the different dimensions of tourists' environmentally responsible behavior.

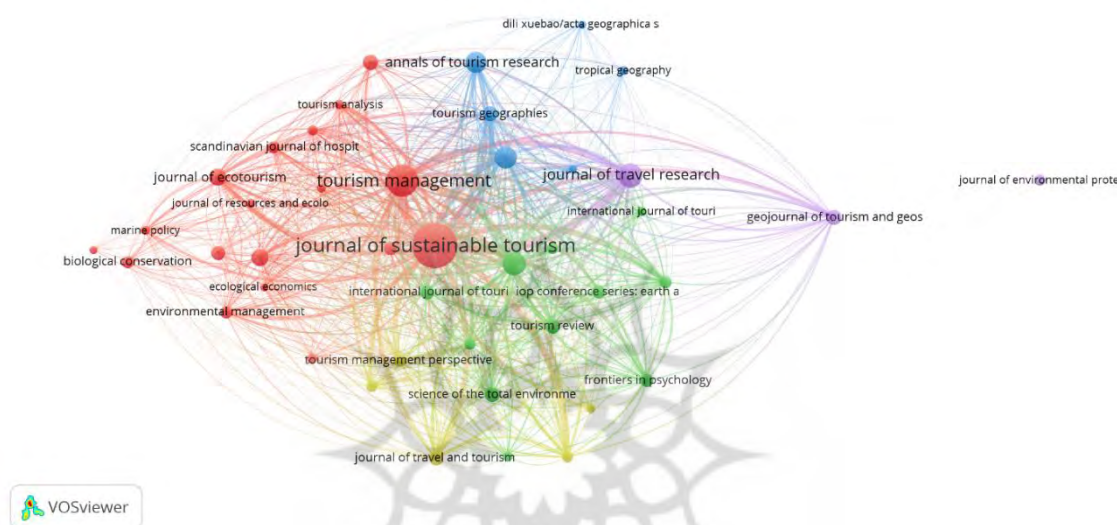


Figure 6. Journal co-citation network

Author Co-citation Network- The figure below (Figure 7) presents an analysis of the co-citation network of authors. The publications on environmentally responsible behavior in rural tourism have simultaneously mentioned 60,024 authors. For analysis using VOSviewer, a threshold of 20 was set. As a result, 852 authors met the threshold conditions. Each node in the graph represents a link between two authors who have

been mentioned together in a document. The thickness of the node indicates the frequency of co-citations among authors. Among the 852 authors are the ten most influential ones: Han, Dolincar, Gosling, Hall, Ajzen, Stegn, Scott, Lee, and Welir. This finding suggests that these authors have established strong connections in this research field.

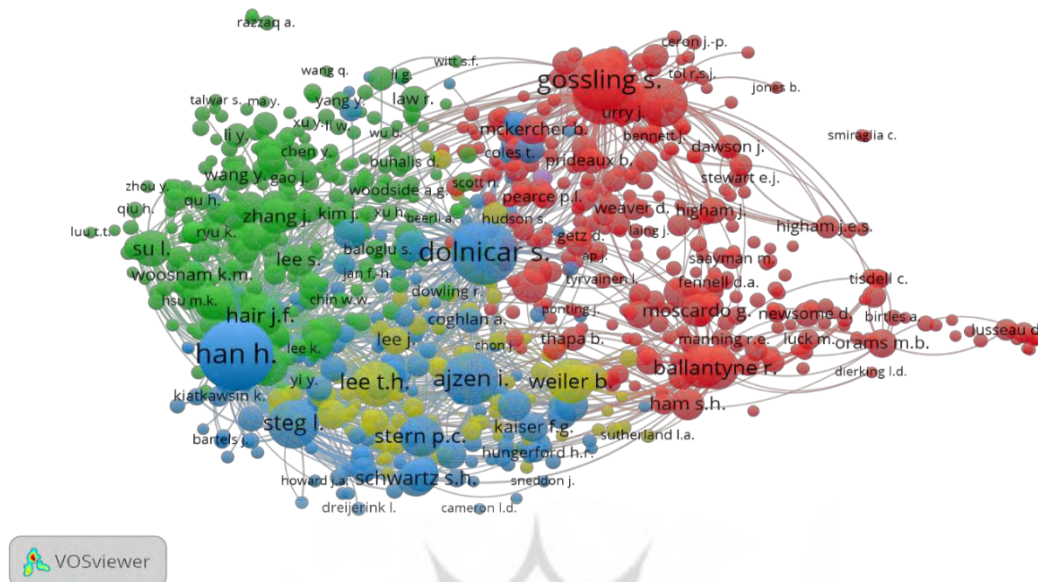


Figure 7. Author co-citation network

the co-citation analysis of cited sources, journals, and authors demonstrated strong scientific networks in academia. The identified networks signify the importance of this research field for fostering environmental behavior in rural tourism.

5. Discussion and Conclusion

The concept of environmentally responsible behavior, particularly in the field of rural tourism, has garnered increasing attention in the realm of scientific research in recent years. This study aimed to provide a comprehensive view of the knowledge structure and research trends prevailing in this domain by employing scientometric methods and bibliometric analysis. The findings of this research, in line with answering the main research questions, contain notable points and implications. First, the analysis of leading countries and institutions in the field of environmentally responsible behavior studies of rural tourists reveals the prominent share and role of developed countries and their renowned research institutions in advancing the frontiers of knowledge in this domain. The presence of China, the United States, Australia, the United Kingdom, and South Korea among the leading countries, as well as the presence of Linnaeus University in Sweden, Sejong University in South Korea, Lund University in Sweden, and the University of Oulu in Finland among the most influential institutions,

confirms the high scientific capability and strategic focus of these countries and institutions on the topic of environmental sustainability in tourism development. The alignment of these findings with the global Environmental Performance Index, which affirms the superior position of these countries over the past decade (Wolf et al., 2022), indicates a close relationship between research efforts and actual environmental achievements in these countries. Second, the high citation of seminal works such as the theory of planned behavior by Ajzen et al. (1991), the conceptualization of responsible rural tourism behavior by Kollmuss & Agyeman (2002), and the framework for measuring the conservation behavior of cultural heritage tourists proposed by Steg and Vlek (2009) signifies the pivotal role of these studies in shaping the mainstream research in this field. In fact, the theory of planned behavior, by explaining the cognitive-social mechanisms affecting human decision-making and behavior, has provided a broad theoretical foundation for analyzing the environmentally responsible behavior of tourists. The application of this theory alongside other conceptual frameworks such as the norm activation theory and the value-belief-norm theory has significantly assisted researchers in better understanding the antecedents and

consequences of these behaviors in the context of rural tourism.

Moreover, an examination of the findings from recent studies indicates the prominent role of variables such as attitudes, personal and social norms, environmental concerns, and perceived behavioral control in predicting and explaining tourists' environmentally responsible behavior. For example, Wang et al. (2023) and D'Arco et al. (2023) have emphasized the importance of personal norms and environmental concerns in moderating and mediating the relationship between tourists' demographic characteristics and their responsible behaviors. Similarly, the results of Salinero et al.'s (2022) study demonstrate the significant capability of personal norms in predicting the pro-environmental behavior of Generation Z tourists. On the other hand, the findings of Tsai & Tan (2022) highlight the pivotal role of moral norms in strengthening perceived behavioral control and subjective norms influencing the behavioral intention to protect the environment. In other words, internalizing environmental ethical values can increase an individual's sense of empowerment in performing responsible behaviors and increase the normative pressure to adhere to these behaviors. These findings reveal the necessity of considering the

complex interaction among individual, social, and contextual factors in explaining tourist behavior.

The results of this research, while providing a systematic view of the knowledge structure and trends in the field of environmentally responsible behavior in rural tourism, emphasize the need for creative integration of diverse theories and approaches in analyzing this phenomenon. Expanding interdisciplinary studies, developing comprehensive theoretical frameworks, and paying greater attention to the role of cultural-contextual factors in explaining tourist behavior are among the promising areas for future research in this field. Furthermore, utilizing research findings in designing effective behavioral interventions and formulating pro-environmental policies can contribute to achieving sustainability goals in rural tourism destinations.

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Authors' contributions

The authors equally contributed to the preparation of this article.

Conflict of interest

The authors declare no conflict of interest.

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تحلیل کتاب‌سنجی رفتار گردشگران طرفدار محیط زیست در مطالعات گردشگری روستایی

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چکیده مبسوط

۱. مقدمه

نگرانی اصلی مطالعه حاضر، پرداختن به شکاف‌های دانش قابل توجه و کاستی‌های روش‌شناختی شناسایی‌شده در تحلیل‌های پیشین پژوهش‌های مربوط به رفتار گردشگران طرفدار محیط زیست در مناطق روستایی است. با وجود حجم قابل توجهی از انتشارات، این حوزه فاقد درک جامع و سیستماتیک از حوزه‌های تمرکز موضوعی، شبکه روابط میان مفاهیم کلیدی، الگوهای همکاری علمی و روندهای تکاملی دانش در این حوزه خاص است. مطالعات کتاب‌سنجی قبلی اغلب محدود بوده و بر دسته‌های گسترده‌تری مانند گردشگری پایدار یا طبیعت‌محور تمرکز داشته‌اند، یا خود را به معیارهای عملکرد عمومی محدود کرده‌اند بدون اینکه به ساختار مفهومی ادبیات بپردازند. در نهایت، پیش‌بینی می‌شود که یافته‌ها نه تنها شکاف‌های دانش موجود را پر کنند، بلکه به طور قابل توجهی به پژوهشگران آینده در شناسایی ظرفیت‌های جدید و فرصت‌های پژوهشی نوآورانه کمک کنند، در حالی که بینش‌های مبتنی بر شواهد لازم را برای سیاست‌گذاران و برنامه‌ریزان گردشگری برای طراحی مداخلات رفتاری مؤثر و ترویج شیوه‌های پایدار در مقاصد روستایی فراهم می‌آورند.

۲. مبانی نظری تحقیق

رفتار زیست‌محیطی گردشگران در مقاصد گردشگری روستایی به عنوان یکی از حوزه‌های پژوهشی مهم در مطالعات معاصر گردشگری مطرح شده است. این پدیده، به‌ویژه با توجه به افزایش فشارهای وارده بر اکوسیستم‌های روستایی و ضرورت توسعه گردشگری پایدار، توجه قابل توجهی از محققان را به خود جلب کرده است. پژوهش حاضر با

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بهره‌گیری از رویکرد علم‌سنجی، به تحلیل و ترکیب نظام‌مند ساختار دانش و روندهای غالب در ادبیات رفتار زیست‌محیطی گردشگران در بستر گردشگری روستایی می‌پردازد. مبنای نظری این پژوهش عمدتاً بر نظریه رفتار برنامه‌ریزی شده (TPB) که توسط آجزن و همکاران (۱۹۹۱) مفهوم‌سازی شده، استوار است. این نظریه به عنوان چارچوبی بنیادین در درک قصد رفتاری زیست‌محیطی ظهور یافته است. این لنز نظری با چارچوب‌های مفهومی تکمیلی، از جمله نظریه فعال‌سازی هنجار و نظریه ارزش-باور-هنجار تکمیل شده است که چارچوب تحلیلی جامعی را برای بررسی مکانیسم‌های شناختی-اجتماعی مؤثر بر تصمیم‌گیری‌های زیست‌محیطی گردشگران فراهم می‌آورد.

۳. روش تحقیق

روش‌شناختی پژوهش حاضر بر پایه رویکرد علم‌سنجی جامع استوار است که از ترکیب پروتکل‌های مرور نظام‌مند و تکنیک‌های تحلیل کتاب‌سنجی بهره می‌گیرد. فرآیند پژوهش با جستجوی نظام‌مند در پایگاه داده Scopus برای بازه زمانی ۱۹۸۵-۲۰۲۴ آغاز شد که منجر به شناسایی و غربالگری ۱۰۲۰ مقاله واجد شرایط گردید. در مرحله بعد، با استفاده از نرم‌افزار تخصصی VOSviewer، تحلیل‌های کتاب‌سنجی پیشرفته شامل تجسم شبکه‌های علمی، تحلیل خوشه‌ای، و تحلیل استنادی انجام شد که امکان نگاشت ساختار دانش و شناسایی الگوهای غالب در این حوزه مطالعاتی را فراهم آورد. این رویکرد روش‌شناختی چندوجهی، زمینه را برای درک عمیق‌تر روندهای پژوهشی و ساختار دانش در حوزه رفتار زیست‌محیطی گردشگران در بستر گردشگری روستایی فراهم نمود. این مطالعه علم‌سنجی در حوزه رفتار زیست‌محیطی گردشگران روستایی، ضمن

رویکردهای متنوع در تحلیل این پدیده تأکید می‌کند. گسترش مطالعات میان‌رشته‌ای، توسعه چارچوب‌های نظری جامع، و توجه بیشتر به نقش عوامل فرهنگی-زمینه‌ای در تبیین رفتار گردشگران، از جمله حوزه‌های امیدبخش برای تحقیقات آتی در این زمینه است. علاوه بر این، به‌کارگیری یافته‌های پژوهشی در طراحی مداخلات رفتاری مؤثر و تدوین سیاست‌های حامی محیط زیست می‌تواند به دستیابی به اهداف پایداری در مقاصد گردشگری روستایی کمک کند. این مطالعه با ارائه یک نقشه جامع و پویا از ساختار دانش و روندهای غالب در رفتار دوستدار محیط زیست در گردشگری روستایی، به بدنه دانش موجود کمک می‌کند. این تحقیق با پر کردن شکاف‌های مطالعات قبلی، فرصت‌های تحقیقاتی جدیدی را برای پژوهشگران آینده شناسایی می‌کند.

کلیدواژه‌ها: رفتار گردشگران، گردشگری روستایی، علم‌سنجی، پایداری، نظریه رفتار برنامه‌ریزی‌شده، محیط زیست

تشکر و قدرانی

پژوهش حاضر حامی مالی نداشته و حاصل فعالیت علمی نویسندگان است.

آشکارسازی ساختار دانش و روندهای پژوهشی غالب، بینش‌های ارزشمندی را برای توسعه نظری و کاربردی این حوزه فراهم می‌آورد.

۴. یافته‌های تحقیق

یافته‌های پژوهش نشان می‌دهد که پیشگامی کشورهای توسعه‌یافته و مؤسسات پژوهشی برجسته در این حوزه، همراه با غنای نظری حاصل از کاربرد چارچوب‌های متنوع نظری مانند نظریه رفتار برنامه‌ریزی‌شده، زمینه را برای درک عمیق‌تر عوامل مؤثر بر رفتار زیست‌محیطی گردشگران فراهم کرده است. تحلیل خوشه‌ای کلیدواژه‌ها و الگوهای استنادی، نشان‌دهنده سه جریان اصلی پژوهشی شامل اکوتوریسم، حفاظت از اکوسیستم و اقتصاد گردشگری است که مسیرهای آتی پژوهش را مشخص می‌سازد. این یافته‌ها ضرورت توسعه رویکردهای بین‌رشته‌ای، توجه به عوامل فرهنگی-زمینه‌ای، و طراحی مداخلات رفتاری مؤثر برای ارتقای پایداری در مقاصد گردشگری روستایی را برجسته می‌سازد و می‌تواند به عنوان راهنمایی برای پژوهشگران، مدیران مقاصد گردشگری و سیاست‌گذاران در جهت توسعه گردشگری پایدار روستایی عمل کند.

۴. بحث و نتیجه‌گیری

نتایج این تحقیق، ضمن ارائه دیدگاهی نظام‌مند از ساختار دانش و روندهای موجود در حوزه رفتار مسئولانه زیست‌محیطی در گردشگری روستایی، بر لزوم ادغام خلاقانه نظریه‌ها و

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