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Citation Structures in Thermal Tourism Research: A Bibliometric Analysis Using Vosviewer

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Abstract

Aim: This study analyzes academic trends in thermal tourism literature, evaluating key themes, author collaborations, and scientific contributions among countries.

Methods: Bibliometric analysis was conducted using data from the Web of Science database, and the results were visualized with VOSviewer software. Bibliometric analysis quantifies academic works based on key characteristics. The themes and authors prominent in thermal tourism studies were identified, and the nature of scientific collaborations between countries and institutions was assessed.

Results: The findings reveal that countries such as Turkey, Spain, and Italy have made significant contributions to the thermal tourism literature. In recent years, there has been an increase in

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publications originating from Portugal, indicating a shift in research focus within this field. Keyword analysis shows that the strongest phrases in terms of total link strength are 'thermal tourism,' 'health tourism,' and 'tourism.' This result is consistent with the thematic focus of the analyzed studies, indicating that these concepts are central to the field of thermal tourism research. These keywords were found to have a strong relationship with concepts such as wellness, health tourist behavior, facilities, and environmental impacts. In recent years, the publications of research centers that will enable researchers to obtain more meaningful information on the subject have found more place in the literature.

Conclusion: Unlike previous studies that primarily focus on wellness tourism, this study specifically examines the bibliometric structure of thermal tourism research, highlighting emerging trends, citation patterns, and the role of research institutions, thereby offering a more data-driven perspective on the field. This study includes articles that address thermal tourism from individual, economic, and cultural perspectives, offering a multidisciplinary approach. It provides a useful framework for future research and serves as a valuable reference for researchers and industry stakeholders in exploring strategies related to thermal tourism.

Keywords: Health tourism, thermal tourism, tourism, health and wellness tourism, wellness

INTRODUCTION

In recent years, health tourism has accelerated worldwide and has become an important sector. People travelling to different countries for health improvement, treatment, or recuperation are the basis of health tourism. Health tourism is defined as a multifaceted type of tourism in which individuals travel to a country other than their country of residence to benefit from various health services such as diagnosis, treatment, rehabilitation, health protection, and promotion (Connell, 2011). Modern health tourism offers a wide range of services such as aesthetic surgery, dental treatment, and physiotherapy and is not limited to medical treatment but also includes wellness and fitness services to improve the quality of life of individuals (Liberato and Cerqueira, 2021). The increase in health tourism trips has led to an increase in the number of facilities and destinations in the sector, which has led to variations, especially in terms of regulations and laws to be followed. Health tourism is divided into three categories according to the individual's needs and the purpose of the trip. The main classifications are medical, thermal, and tourism for the elderly and disabled.

Medical tourism involves individuals travelling domestically or internationally to receive health services such as diagnosis and treatment (Bookman and Bookman, 2007). Medical tourism

is about access to quality health services at low cost, especially in countries with more affordable healthcare, e.g., organ transplants, plastic surgery, oncological treatments, dental and eye care, and heart surgery. When examining the behaviors of medical tourists, there is a two-stage process for selecting a medical tourism product. The evaluation of a foreign country and selection of a health facility are two stages. Country characteristics, such as economy, politics, and policy, influence country preference. Facility choice depends on factors like cost, accreditation, and care quality (Forgione and Smith, 2007). Documentation of service quality is important in the health tourism sector. Singapore, South Korea, Thailand, Türkiye, and India stand out as exemplary countries (Turner, 2007).

Thermal tourism has attracted great interest, especially with the understanding of the positive effects of natural resources and mineral water on health. Thermal water resources have been used for thousands of years to treat various health problems. Thermal tourism aims to enable people to get cured by travelling to where these resources are located. Thermal water therapies have an important place in the treatment of many health problems such as rheumatism, stress, and skin diseases. Despite the increasing interest in thermal tourism, academic literature remains fragmented, lacking a comprehensive understanding of research trends, key contributors, and thematic evolution. A bibliometric approach allows for an objective and systematic evaluation of the intellectual structure of this field, highlighting research gaps and emerging directions.

Tourism for the elderly and people with disabilities aims to enable elderly and disabled individuals to benefit from health and tourism services designed to meet their needs (Blichfeldt and Nicolaisen, 2011). Rehabilitation, recreation, and social participation are the main elements of this type of tourism. It provides activities that support the participation of older people in social life and special arrangements for disabled people to have easy access to health services. Accessible tourism, also referred to as disabled tourism, is a specialized sector that ensures travel opportunities for individuals with disabilities by providing tailored services and facilities. This sector includes medical care, rehabilitation, and daily assistance for travelers in specialized accommodation such as clinic guesthouses, geriatric treatment centers, and nursing homes. The goal is to offer barrier-free travel experiences where trained and certified professionals assist with the care and rehabilitation needs of elderly and disabled tourists. Countries with favorable climates and advanced healthcare infrastructure, such as Türkiye, have significant potential in this growing industry, attracting travelers from warmer Middle Eastern regions as well as colder European

countries seeking a comfortable and accessible environment (Health Tourism Report, 2010). The most prominent countries are Japan, Germany, and the Scandinavian countries.

Health tourism, with its comprehensive services aimed at improving individuals' health and quality of life, contributes to the well-being of both individuals and countries. The types of health tourism provide tailored solutions to health needs, offering economic and social benefits on both national and international levels. Among these, Türkiye stands out as a leading country in thermal tourism, with its rich natural resources and advanced infrastructure. However, its exact position in the global academic landscape has not been systematically examined.

The primary motivation for this study is to fill this gap by identifying research trends, key contributors, and thematic patterns in the thermal tourism literature. The bibliometric approach was chosen as it provides a quantitative and objective assessment of the intellectual structure of the field, allowing for the identification of dominant themes, influential researchers, and international collaborations. Furthermore, by evaluating citation networks, this study assesses Türkiye's academic influence in thermal tourism research compared to other countries.

In this regard, the aim of this study was to identify trends in the thermal tourism literature and highlight research gaps, while also evaluating Türkiye's position. The study employed bibliometric analysis to examine the key themes of literature and academic collaborations. By doing so, it contributes to a more structured understanding of thermal tourism research and provides a reference point for future studies in this field.

Literature Review

Thermal tourism is a subfield of health tourism that provides both physical and mental health services by utilizing natural thermal water resources. It emphasizes that thermal tourism is an important tool for individuals to cope with stress, gain vitality, and benefit from preventive health services. Throughout history, this type of tourism has aimed to enhance the quality of life of individuals by offering both therapeutic and wellness services together (Erfurt-Cooper and Cooper, 2009; Liberato and Cerqueira, 2021).

Thermal tourism, a key segment of health tourism, enhances physical and mental well-being through natural thermal and mineral water treatments. This sector has gained global significance, particularly in Asia and Europe, where countries invest in spa facilities, wellness resorts, and holistic health services to attract visitors. According to the European Spas Association (2022), Europe has over 1,400 developed thermal tourism sites, generating an annual revenue of

€45 billion and employing approximately 750,000 people. Europe has a deep-rooted tradition of balneotherapy, thalassotherapy, and natural water-based therapies, with mineral spas and sanatorium-style health centers continuously evolving through privatization, renovation, and diversification (Shokri Garjan et al., 2023). The industry is expanding by integrating fitness, nutrition, and alternative therapies, catering to the increasing demand for comprehensive wellness experiences. In addition to mineral-rich hot spring sources, thermal tourism is primarily composed of elements such as mud baths, steam rooms, and other natural features. In medical thermal tourism, it plays a crucial role in the treatment of chronic health issues, such as rheumatic diseases, skin problems, respiratory diseases, and musculoskeletal disorders. Many of the thermal spas and facilities in Türkiye specialize in these areas (Erfurt-Cooper and Cooper, 2006). In wellness-oriented thermal tourism, services focused on stress management, mental and physical recovery, detoxification, and healthy living fall under this category of thermal tourism. Modern thermal facilities offer tourists a comprehensive experience through spa services and personal care programs (Smith and Puczko, 2014). Thermal tourism holds significant importance in the economies of many countries. The Global Wellness Institute (2023) states that wellness tourism, which includes thermal tourism, was valued at $651 billion in 2022 and is expected to reach approximately $1.4 trillion by 2027, growing at an annual rate of 9.9%. Countries like Türkiye, Japan, and Hungary, where thermal tourism constitutes a large part of health tourism, also recognized it as a cultural heritage (Kozak, 2002). Türkiye ranks among the leading thermal tourism destinations in Europe due to its rich geothermal resources and government-backed incentives. The Turkish Statistical Institute (TÜİK) reports that the number of foreign tourists visiting Türkiye for health tourism, including thermal tourism, exceeded 1.2 million in 2023, generating over $2 billion in revenue (USAŞ, 2024). With over 1,400 thermal springs, the country leverages its natural assets to enhance health tourism revenues and promote sustainable development (Demir and Dağ, 2024). Investments focus on modernizing spa facilities, improving service quality, and integrating wellness tourism trends to remain competitive in the global market. As the demand for personalized and holistic wellness experiences continues to rise, Türkiye aims to strengthen its position by offering diverse and high-quality thermal tourism services that align with evolving global health and wellness trends.

Thermal tourism, as an important subfield of health tourism, has been addressed from various perspectives in different geographical regions and has been the subject of numerous

academic studies in terms of its historical development as well as its economic, social, and environmental impacts. Additionally, studies have analyzed thermal hotel location factors, socio-economic impacts, SWOT analyses, and consumer perceptions:

Liberto and Brandão (2021) focused on the importance of thermal resources and thermal tourists in terms of the image, positioning, and development of tourist destinations. They aimed to identify the specific motivations that attract these tourists to thermal tourism practices, understand how the benefits sought by thermal tourists and their socio-demographic profiles influence their motivations, and explore how these motivations determine the characteristics of their travel. In their study, Sayılı et al. (2007) present a case study on the treatment of psoriasis using doctor fish at the Kangal Fish Spa, a prominent health tourism destination in Türkiye. The study explores the Kangal Fish Spa as a health tourism site and examines the socio-economic and visitor profiles of those who visit the spa. Duman and Kozak (2010) analyze tourism cities in Türkiye, revealing that, although Türkiye is renowned for its summer destinations, many Turkish cities also promote diverse tourism resources, including history, culture, thermal (spa) tourism, nature, and urban experiences.

Esiyok, Kurtulmuşoğlu, and Özdemir (2018) measure thermal tourism demand by the length of stay and analyze the determinants that affect the length of stay for elderly thermal tourists. Gonzalez et al., (2009) analyzed the thermal water sources of Ourense city to determine the presence of various chemically soluble organic compound classes responsible for biological activities. Alvarez (2012) examined the historical development of thermal tourism in Spain and explained the transformation processes in this field. In the review by Nikoli and Lazakidou (2019) an overview of thermal tourism services offered in Europe and Greece is provided, emphasizing their importance for the tourism economy. Kurtulmuşoğlu and Esiyok (2017) studied the target selection of international thalassotherapy (a subfield of thermal tourism) tourists by dividing them into two age groups, 54 and under, and 55 and over, based on their motivations. The panel data analysis revealed that the 55 and over group was less sensitive to income levels, but more sensitive to distance and education compared to the younger group. According to the AHP (Analytic Hierarchy Process) analysis by Emir and Saraçli (2014), environmental factors were found to be the most important in determining the location of thermal hotels. Other important factors, in order of significance, included the characteristics of the construction, investment costs, location of the construction, competition factors, and demographic characteristics. Emir and Arslanturk (2015),

in their study, evaluated the strengths, weaknesses, opportunities, and threats (SWOT analysis) of thermal tourism based on the opinions of tourism students. The findings revealed that students perceive the presence of a university as a strength, the lack of an airport as a weakness, year-round sustainable thermal tourism as an opportunity, and the negative impact of construction problems on tourism as a threat.

Bertan (2019) analyzed residents' perceptions of thermal tourism impacts in Karahayıt. The study combined secondary data analysis with field research using face-to-face surveys. Factor analysis categorized perceptions into social benefit, living benefit, living cost, and social cost, while regression analysis examined their influence on residents' support for thermal tourism development. Findings showed that social benefit was the strongest determinant, followed by living benefit, living cost, and social cost. Stavroula and Vasiliki (2020) examined thermal tourism as a specialized sector utilizing natural thermal resources, with Europe-led by Germany-being a key player. Europe hosts 1,400 developed bathing sites, attracting millions of visitors and generating an annual turnover of 45 billion euros, employing around 750,000 people. In Greece, despite having high-quality thermal resources, thermal tourism has been declining. The study explores the reasons behind this decline and provides recommendations for improving and sustaining thermal tourism in the country.

In a study conducted in Italy, Cinti (2021) highlighted that SPA tourism represents an important social and economic resource for the sustainable development of local economies with specific resources. Barros, Sousa, and Fernandes (2021) explored the role of innovation in thermal tourism in the Peninsular Northwest, highlighting its contribution to sustainable development and complementary sectors like healthcare. The study aimed to systematize key aspects of the innovation process and entrepreneurship in tourism, particularly in the context of relationship marketing and consumer behavior. A conceptual model was proposed to examine the impact of innovation on trust, commitment, service quality, satisfaction, and loyalty in thermal tourism. The authors emphasized the need for future research on emotional factors and the evolving dynamics between tourists and host communities. Demir and Dağ (2024) examined the relationship between healthy lifestyle awareness, health perception, and mental well-being among thermal tourism service recipients in Türkiye. The study found that thermal treatments positively impacted health perception and mental well-being. A strong positive correlation was identified between healthy living awareness and mental well-being, with regression analysis confirming that higher health

perception and awareness predict better mental well-being. Additionally, older individuals and those with chronic illnesses had lower levels of health perception and mental well-being.

Despite numerous studies in the field, a comprehensive bibliometric analysis of thermal tourism has not been conducted. Existing systematic reviews focus on specific aspects, such as consumer behavior, economic impacts, or destination analysis, but lack a quantitative, citation-based assessment of the academic landscape. In this study, a bibliometric analysis approach is employed to systematically explore the evolution of thermal tourism literature. The analysis focuses on identifying major research trends, mapping citation networks, and examining patterns of author collaboration. Additionally, the study aims to highlight influential scholars and institutions while evaluating Türkiye's academic contribution to the field from a comparative perspective. By systematically analyzing publication patterns, co-authorship networks, and thematic trends, this study provides a structured and data-driven perspective on thermal tourism research, filling a gap in literature.

1. RESEARCH METHODOLOGY

The research aims to examine the status of the concept of thermal tourism in literature using bibliometric analysis and to identify the general trends in academic studies in this field. In social sciences, bibliometric analysis, which is frequently used as a quantitative technique, is defined as the examination of academic works such as books, articles, and theses through numerical analyses and statistics based on characteristics such as keywords, topics, and methods used. This method is particularly useful for mapping the intellectual structure of a research field and identifying influential studies, authors, and institutions (Zhang et al., 2019). Bibliometric analysis provides information on trends in the field for future studies and encourages researchers to explore new and unexplored topics. By utilizing bibliometric techniques, this study offers a systematic and objective approach to understanding research patterns in thermal tourism.

Bibliometric analysis is a method that focuses on the statistical evaluation of citations received by articles and other publications. Typically, the goal of bibliometric studies is to summarize research trends and academic networks (Zhang et al., 2019).

WoS as the Chosen Database:

Web of Science (WoS) is considered one of the foremost databases worldwide, featuring journals with high impact and quality (Mavric et al., 2021). The selection of WoS is based on its

comprehensive coverage of peer-reviewed academic publications and its indexing of high-impact journals, ensuring access to rigorously reviewed and influential studies. Unlike other databases, WoS allows for detailed citation analysis and author network evaluations, which are essential for bibliometric research. Additionally, WoS provides structured and standardized metadata, allowing for more accurate and reliable bibliometric analyses.

Data Collection Process:

In November 2024, a search was performed for publications indexed in the SCI-EXPANDED, SSCI, HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, and ESCI indexes, using the keyword "Thermal tourism" across all years. The keyword was enclosed with quotation marks to minimize the risk of retrieving research with varying titles and to specifically target this subfield of health tourism. This keyword selection ensures that the dataset accurately represents the thermal tourism research domain, preventing the inclusion of unrelated studies. A total of 82 publications were identified, comprising 2 book reviews, 3 book chapters, 3 reviews, 15 conference papers, and 62 articles. The earliest publication dates to 2005, while the most recent was published in 2024. This dataset reflects the evolution of academic interest in thermal tourism, providing valuable insights into its historical and recent developments.

Analysis Techniques:

The data collected were analyzed through author, citation, journal, country, institution, keyword, and abstract analyses. These analytical categories allow for a comprehensive understanding of the research landscape, highlighting key contributors, publication patterns, and thematic trends.

Use of VOSviewer for Bibliometric Mapping:

VOSviewer is a software tool designed for creating and visualizing bibliometric maps, and it is widely used for both generating and visualizing bibliometric data (Van Eck and Waltman, 2010). This tool facilitates the identification of co-citation networks, keyword co-occurrence patterns, and institutional collaborations, providing a visual representation of the structure of thermal tourism research. By utilizing VOSviewer, this study effectively maps the academic network within thermal tourism literature, offering insights into influential research themes and academic collaborations.

2. ANALYSIS

This section presents the findings obtained from the bibliometric analysis conducted in the study. Various analyses were performed to examine the structure of scientific collaborations, citation relationships, keyword usage, and bibliographic connections in the field of thermal tourism. Co-authorship analysis was conducted to identify the most collaborative authors, mapping their connections and contributions to the field. Citation analysis was applied at different levels, including individual authors, countries, and organizations, to determine the most influential contributors and their impact. Keyword analysis revealed the most frequently used terms and their interconnections, highlighting dominant research themes. Additionally, bibliographic coupling was analyzed at both document and author levels to explore the extent of shared references among different studies. Finally, co-citation analysis was used to determine which authors are frequently cited together, reflecting intellectual relationships in the literature. All analyses were visualized through network maps, providing a comprehensive overview of the research landscape in thermal tourism. This section presents the findings obtained in the study.

2.1.Co-authorship Analysis

A network map was developed to identify the most connected and collaborative authors, based on the criteria of having at least one publication and one citation. The six most connected authors in the cluster each have a total of 7 connections. Raquel Pereira, located at the center, has co-authored a total of 7 works. These works have received 2 citations, and the number of documents is recorded as 2. Similarly, Vania Costa and Helena Gomes have also contributed as co-authors to a total of 7 works, received 2 citations, and produced 2 documents. These authors are central figures in the network, strengthening the collaboration structure in the field. Alcina Nune, Sabel Sofia Loureina, and Fernanda Ferreria have co-authored five works and play a key role in maintaining collaboration, despite their peripheral position in the network.

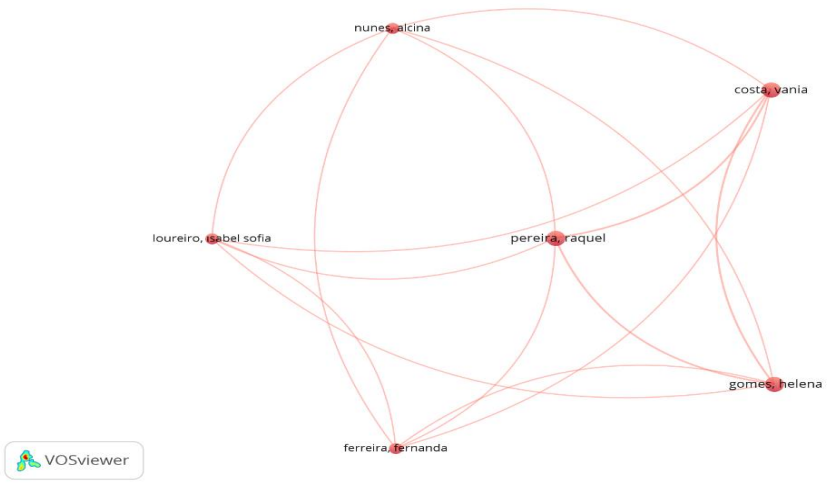

Figure 1: Co-authorship links showing author collaborations

2.2.Citation of Authors

Figure 2 displays the citation network map, generated using the criteria of at least one publication and one citation. The analysis conducted on 14 connected units identified a total of 3 clusters and 23 connections. The most cited authors were Bülent Esiyok with 20 citations and Alonso-Alvarez Luis with 16 citations. İsmail Kervankıran stands out with 8 connection strength, while Bülent Esiyok is notable for having 5 connection strength. Citation analysis demonstrated that Türkiye, Spain, and Italy are among the most influential countries in thermal tourism research, with Türkiye leading in the number of publications.

Figure 2: Citation links of authors

2.3.Citation of Countries

To create a network map of citations based on the countries of the publications, an analysis was conducted using the criteria that at least one publication was published by a country and at least

one citation was received. The analysis was performed on 8 connected units, and the results are presented in Figure 3. A total of 4 clusters, 14 connections, and 16 total connection strengths were identified. The countries with the most citations were Türkiye (60 citations), Spain (21 citations), Italy (16 citations), Poland (15 citations), and Portugal (14 citations). In terms of total connection strength, Italy stands out with 7 connection strength, followed by Spain and Poland with 6, and Portugal with 5. In terms of the number of publications, the ranking is as follows: Türkiye (16 publications) and Spain (11 publications).

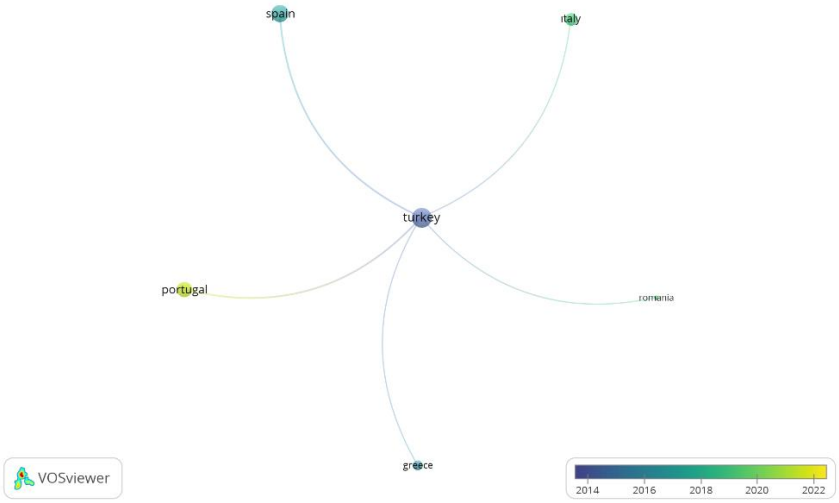

Figure 3: Citation analysis of countries

2.4.Citation of Organizations

To create a network map of citations between organizations, an analysis was conducted using the criteria that at least one publication was published by an organization and at least one citation was received. The analysis was performed on 10 connected units. Cintur (4 publications), Polytech Inst Porto, and Unıag (3 publications each) are represented, while the organizations with the most cited publications were Bakent University (20 citations), Ben Gurion Univ Negev (14 citations), and Polytech Inst Porto (11 citations). A total of four clusters, 22 connections, and an overall connection strength of 23 were identified. Institutional contributions were found to be concentrated in a few key universities and research centers, indicating potential for expanding institutional networks.

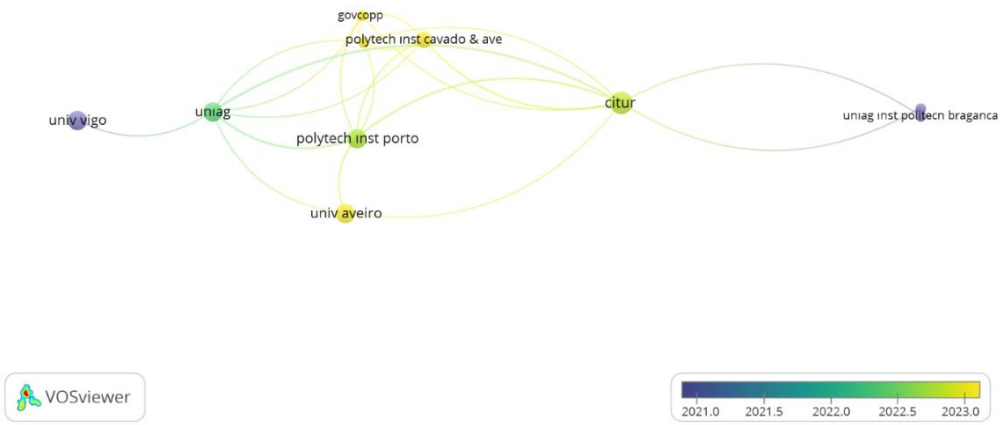

Figure 4: Citation analysis of organizations

2.5.Co-occurrence of All Keywords

When examining the most frequently used keywords in publications related to thermal tourism, the following terms emerged: "thermal tourism" with 27 occurrences, "health tourism" with 7 occurrences, "tourism" with 6 occurrences, "health and wellness tourism" with 4 occurrences, and "wellness" with 3 occurrences. In terms of total connection strength, the most powerful expressions were "thermal tourism," "health tourism," and "tourism."

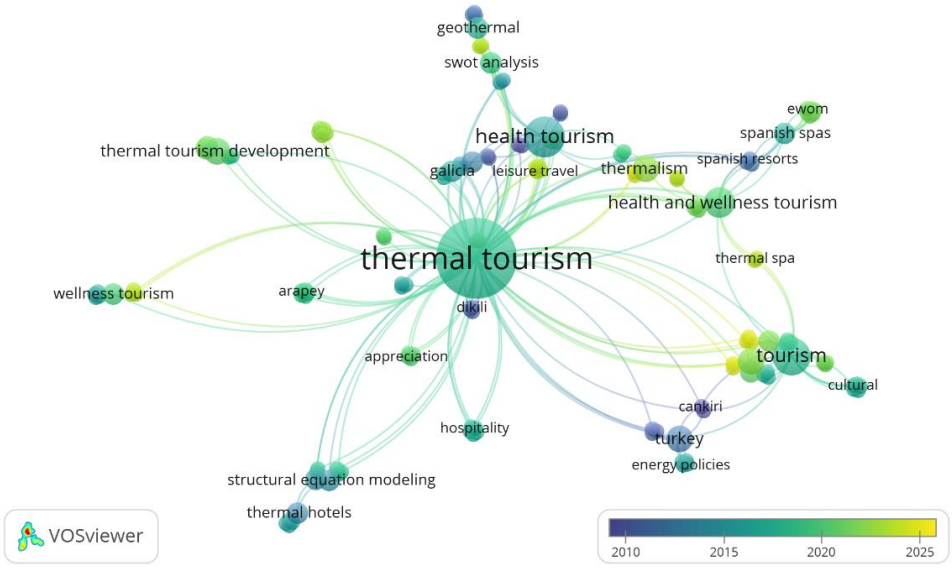

Figure 5: Keyword analysis

The analysis of 140 observation units with connections identified 21 clusters, 377 links, and a total connection strength of 391. The keyword analysis confirmed that "thermal tourism" remains the dominant research theme, often linked to "health tourism" and "wellness," reflecting the sector's integration with broader health and wellness tourism trends.

2.6. Bibliographic Coupling of Documents

Bibliographic coupling occurs when two independent sources cite common work. An analysis was conducted on 14 documents that had received at least one citation and had established connections. The analysis revealed 6 clusters and 19 connections, with a total connection strength of 23. Among the publications, the one with the most bibliographic coupling was Esiyok, which had 20 citations. Following that, Alonso-Alvarez received 16 citations, and Chrobak had 14 citations. In terms of total connection strength, the documents with the highest values were Esiyok, Kaya, and Kervankıran.

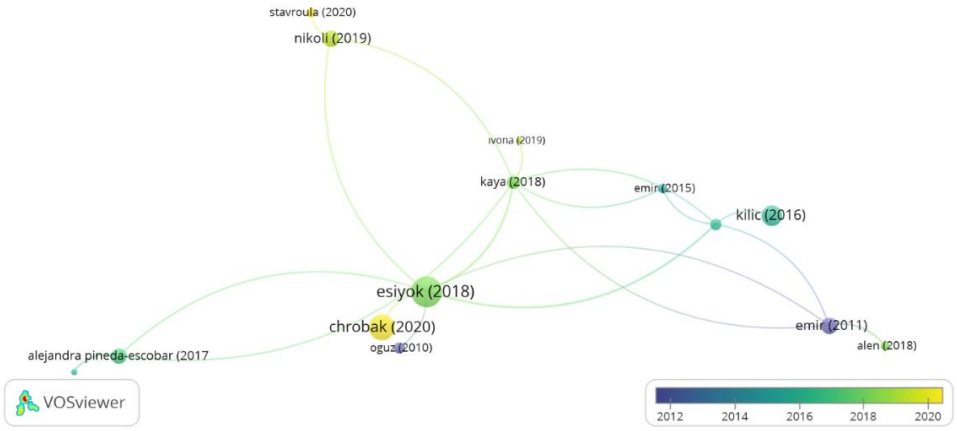

Figure 6: Bibliographic coupling analysis of documents

2.7.Bibliographic Coupling of Authors

The analysis focused on 43 authors, each having at least one publication and citation. This analysis identified 10 clusters, along with 236 connections. The total connection strength among the authors was 2594.

Among these authors, Esiyok, Kurtulmuşoğlu, and Özdemir had the highest level of bibliographic coupling, each having received 20 citations. On the other hand, the authors with the highest total connection strength were Pedro Liberto, Daila Liberto, and Filipa Brandao. Their combined connection strength amounted to 418.

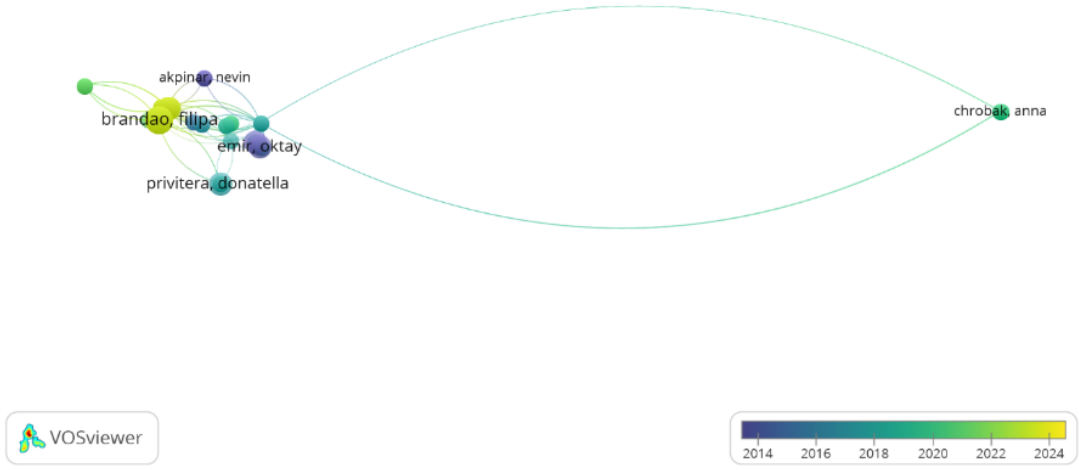

Figure 7: Bibliographic coupling analysis of authors

2.8. Co-citation of Co-authors

Co-citation refers to different sources cited together in a publication. An analysis was performed on 60 units, each with a minimum of 3 citations. This analysis revealed a total of 1119 in connection strength, 344 individual connections, and 7 distinct clusters. The authors who had the highest number of co-citations were Rocca, with 11 co-citations, Smith, with 10, and Becheri, with 9.

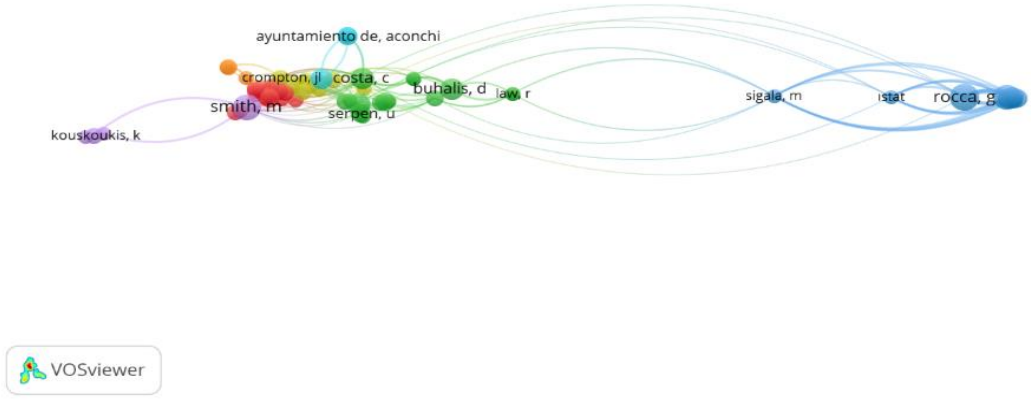

Figure 8: Co-citation analysis of co-authors

Bibliographic coupling and co-citation analysis highlighted the most influential studies and scholars, showing that certain authors and works significantly shape the academic discourse in this field. However, the fragmented nature of research networks suggests that greater interdisciplinary collaboration and cross-regional studies could strengthen the knowledge base of thermal tourism.

3. DISCUSSION

A detailed bibliometric analysis has been conducted to identify academic trends in the thermal tourism literature. The data obtained indicate that thermal tourism, as a subfield of health tourism, has been gaining increasing interest over the years. However, rather than making a broad claim about comprehensiveness, this study provides an in-depth analysis of specific aspects of thermal tourism research. Previous bibliometric analyses in tourism literature have focused on wellness tourism, health tourism, and medical tourism, but the specific positioning of thermal tourism within these fields remains an area requiring further exploration (Dahanayake, Wanninayake, & Ranasinghe, 2023; Pereira, Costa, & Gomes, 2023).

The analysis conducted in the Web of Science database highlighted key themes and authors in thermal tourism studies and evaluated the structure of scientific collaborations between countries and institutions. The findings reveal that countries such as Türkiye, Spain, and Italy have made significant contributions to the thermal tourism literature. In recent years, there has been an increase in publications originating from Portugal. Notably, Türkiye has been positioned centrally in the field of thermal tourism, with a high number of publications and citations. This aligns with previous findings that indicate Türkiye's prominence in the thermal tourism sector due to its rich geothermal resources and strong academic interest in the field (Kozak, 2002; Demir & Dağ, 2024). Similar to Pereira et al. (2023), this study also found that European countries, particularly Portugal and Spain, are becoming more prominent in the thermal tourism literature, reflecting their growing policy and economic interest in the sector.

The analysis of co-authorship reveals that thermal tourism studies are predominantly concentrated around specific researchers and institutions**.** This finding is supported by Dahanayake et al. (2023), who highlight the existence of concentrated research clusters in wellness tourism studies, with a few influential scholars shaping the field. The co-authorship patterns in thermal tourism demonstrate a similar structure, where key researchers contribute significantly to network formation. Raquel Pereira, positioned at the center of the network, has co-authored a total of 7 works. Similarly, Vania Costa and Helena Gomes contributed as co-authors to 7 studies, receiving 2 citations and producing 2 documents. These authors are significant figures in strengthening the collaboration structure within the field. On the other hand, Alcina Nune, Sabel Sofia Loureina, and Fernanda Ferreria have co-authored 5 works in total. Although these authors occupy a more

peripheral position in the network, their contributions are noteworthy in terms of maintaining the continuity of collaboration. This pattern is consistent with prior bibliometric research, which indicates that well-established researchers and institutions tend to shape academic collaborations in emerging tourism fields (Pereira et al., 2023).

The authors with the most co-citations are Rocca, Smith, and Becheri, respectively. In terms of citation analysis, Suban (2023) noted that Napier et al. received 36.5% of total citations annually, indicating a highly influential publication. Similarly, this study found that Türkiye had the highest number of citations (60), while Bülent Esiyok emerged as the most cited author (20 citations). Furthermore, both studies utilized VOSviewer for visualizing bibliometric networks; however, while Suban (2023) focused solely on Scopus-indexed publications, this study analyzed a broader scope, including author collaborations, country-based citation trends, and keyword co-occurrences. This methodological choice enhances the robustness of the findings by incorporating a wider range of academic sources, enabling a more nuanced understanding of research trends. Pereira et al. (2023) emphasized that bibliometric analyses should integrate diverse datasets to ensure comprehensive assessments, a principle followed in this study by including a multi-faceted approach to citation mapping.

The keyword analysis reveals that the most powerful terms in terms of total connection strength are "thermal tourism," "health tourism," and "tourism." These keywords are strongly connected with concepts such as wellness, health tourist behavior, infrastructure, and environmental impacts. The alignment between thermal tourism and wellness tourism is in line with previous studies that emphasize the growing demand for integrated wellness experiences within the tourism industry (Smith & Puczko, 2014). This study also supports findings by Nikoli & Lazakidou (2019), who indicated that thermal tourism services in Europe and Greece have been shaped by evolving consumer preferences and economic policies.

In terms of institutional citation analysis, Cintur, Polytech Inst Porto, and Uniax are the most represented institutions with the highest number of publications, while the institutions that received the most citations are Başkent University (20 citations), Ben Gurion Univ Negev (14 citations), and Polytech Inst Porto (11 citations). This situation highlights the fact that although the majority of publications are in the social sciences field, thermal tourism is evolving as a multidisciplinary domain. As Pereira et al. (2023) suggest, the integration of tourism research with medical and environmental sciences is becoming increasingly common, which also reflects the

research patterns observed in this study. Additionally, Alonso, Alvarez (2012) examined the historical transformation of thermal tourism in Spain and found that institutional collaborations play a key role in shaping regional tourism development, a pattern also evident in this study's findings.

Expanding bibliometric analyses to assess the intersection of wellness and thermal tourism with broader tourism experiences, including psychological, economic, and environmental perspectives, will provide deeper insights into emerging trends. This recommendation aligns with the gaps identified by Pereira et al. (2023), who stress the necessity for more empirical research in wellness tourism sectors, particularly in under-researched domains such as thermal tourism. Furthermore, Emir & Saraçli (2014) emphasized the importance of environmental factors in determining the location of thermal tourism investments, an aspect that future bibliometric analyses could explore further**.**

Publications from research centers in recent years have gained more presence in literature, enabling researchers to obtain more meaningful insights into the subject. Treating thermal tourism as a multidisciplinary field will significantly contribute to its development. This is consistent with previous research that emphasizes the necessity of integrating multiple disciplines, such as health sciences, environmental management, and hospitality studies, to fully understand the dynamics of thermal tourism (Pereira et al., 2023; Demir & Dağ, 2024).

4. CONCLUSIONS

This study not only provides an understanding of the current state of thermal tourism literature but also identifies research gaps for future studies. While research on health and wellness tourism and health tourist behavior has gained considerable attention in the literature, topics such as the fitness of elderly individuals, the benefits of thermal therapy for specific diseases, and studies targeting the middle and upper age markets are relatively underexplored. The global population is aging, and in aging societies, issues like fitness, healthy aging, and being the best version of oneself are becoming increasingly important. Topics such as utilizing thermal waters for rehabilitating lost abilities, segmentation of the middle and upper age groups, and addressing conservative trends are areas that have seen less attention in the research. More research is needed on how technological advancements, digital marketing, and sustainable practices influence thermal tourism competitiveness. While short-term health benefits are well-documented, long-term studies could assess the lasting effects of thermal therapy on physical and mental health. Examining government

strategies, incentives, and regulations could help shape policies that support thermal tourism infrastructure, workforce training, and environmental conservation. While thermal tourism has been widely studied, there is a need for more interdisciplinary, data-driven, and forward-looking research. Establishing specialized research centers focused on thermal tourism and increasing academic studies in this field will contribute to a deeper understanding and the development of innovative strategies. Addressing these gaps will help destinations enhance competitiveness, improve service quality, and sustain long-term growth in thermal tourism.

Strengthening interdisciplinary collaborations by integrating perspectives from public health, environmental sciences, and tourism management will contribute to the sustainability and long-term growth of thermal tourism while ensuring its alignment with evolving wellness tourism expectations. The findings of this study offer insights into the individual, societal, economic, and cultural aspects of thermal tourism. While not exhaustive, the study provides a useful perspective for future research and may serve as a reference for researchers and industry stakeholders in exploring different strategic approaches related to thermal tourism.

This study has certain limitations that should be acknowledged. First, while the selected database is a leading one, future research could include other databases to expand the scope. Second, the analysis reflects the situation at the time of data collection. Lastly, other software tools, aside from VOSviewer, may be used in future studies due to their different features.

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