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Research Article

ANALYSIS OF THE INFORMATIVE TERM THERMAL TOURISM IN SCOPUS

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ABSTRACT
Objective. The objective was to evaluate the status of the term thermal tourism in the international scientific literature for consultation and research use by universities, institutions and decision makers. **Methodology.** A bibliometric method was applied with the support of the Biblioshiny tool, analyzing 152 documents extracted from Scopus from 1975 to July 2024. The indicators evaluated were: annual scientific production, most productive publication sources, most prolific authors, most productive institutions, most cited articles, most frequent keywords, co-citation network, and collaboration network. **Results.** The year with the highest production was 2017 (19 articles), with the main source of contribution being the Springer Proceedings in Business and Economics conference (6 articles). Additionally, the University of Vigo (Spain) leads in contributions (17 articles) and is also the core of the most robust collaboration network along with Portugal. **Discussion.** Despite the growth of thermal tourism following the COVID-19 pandemic, there is low interest from the community in researching this topic. **Conclusions.** There is limited participation from South American institutions, despite the region's numerous thermal resources, which can be partly attributed to a lack of awareness and inadequate preservation and management actions by authorities and the local population. **Originality.** This study contextualizes the current scientific landscape of thermal tourism, offering an opportunity for researchers to contribute to the sustainable development of this sector in the region.
KEYWORDS: tourism; thermal baths; thermalism; sustainability; bibliometrics

INTRODUCTION

Tourism is an activity that generates foreign exchange income, creates jobs, and fosters the development of infrastructure in various countries (Cotrina-Coral & Flores-Ramírez, 2022; Lei et al., 2023). Socially and culturally, it facilitates the exchange and appreciation of different cultures, revitalizes communities, and improves quality of life; furthermore, it strengthens international relations and contributes to global stability (Cotrina-Trigozo, 2023; Ramkissoon, 2023). According to El Archi et al. (2023), tourism, when managed sustainably, serves as a driver of comprehensive development, primarily benefiting local economies.

According to the UNWTO World Tourism Barometer, international tourism reached 88% of pre-pandemic levels, with an estimated 1.3 billion international arrivals. In relative terms, the Middle East led the tourism recovery, surpassing 2019 levels by 122%. Europe, the world's most visited region, reached 94% of pre-pandemic levels, driven by intraregional demand and travel from the United States. Africa recovered 96% of its pre-pandemic visitors, while the Americas reached 90%. Asia and the Pacific achieved 65% of 2019 levels following the reopening of several markets and destinations (ONU Turismo, 2024).

In the current post-pandemic landscape, nature tourism, wellness tourism, and health tourism have gained increased interest among tourists (Chen et al., 2023; Cotrina-Trigozo et al., 2024; Gan et al., 2023), as, following social confinement, people seek experiences that allow them to reconnect with nature, improve their physical and mental well-being, and care for their health. These forms of tourism provide an opportunity to enjoy natural environments, engage in outdoor activities, and participate in health and relaxation programs. Additionally, the growing awareness of the importance of well-being and health has led to a rise in demand for destinations offering specialized services, such as thermal baths (Noriega Velázquez & Lara Enríquez, 2023).

This activity is referred to as thermal tourism, which, according to Tavares et al. (2022), is an emerging activity that reflects the increasing longevity of the population alongside the desires to live longer, live better, and seek new wellness experiences. Another conceptualization presented by Liberato et al. (2024), indicates that classical thermalism, primarily focused on the 'curative' dimension, has been replaced by modern thermalism, which is particularly based on the 'well-being' dimension. The offering of thermal tourism is now more centered on preventive therapeutic motivations, combined with recreational and touristic aspects.

Therefore, it can be stated that thermal tourism is an integral component of wellness and health tourism, as it focuses on the use of thermal waters to promote relaxation or alleviate various ailments. Nistoreanu & Aluculesei (2021) suggest that thermal tourism has become a popular option for those seeking to escape daily stress and find a balance between body and mind. Consequently, Pinos Navarrete & Shaw (2021) indicate that the growing demand for these experiences has driven the development of specialized facilities and fostered economic growth in regions with thermal springs, contributing to more sustainable tourism.

Given the current importance of thermal tourism, the need arises to explore its scientific production, a field that has been under-researched within the academic community, as most bibliometric studies have focused on wellness tourism in a general sense (Dahanayake et al., 2023; Gulyas & Molnar, 2023; Suban, 2022, 2023). In this context, the present research aimed to evaluate the status of the term 'thermal tourism' in the international scientific literature for consultation and investigative use by universities, institutions, and policymakers.

METHODOLOGY

The bibliometric method was applied, which provides techniques to quantitatively analyze the production or impact of scientific research on a particular topic, offering a comprehensive view of the dynamics and trends within the academic field (McBurney & Novak, 2002). The indicators evaluated in the present study were: 1) annual scientific production, 2) most productive publication sources, 3) authors with the highest output, 4) institutions with the highest output, 5) most cited articles, 6) most frequent keywords, 7) author co-citation network, 8) country collaboration network, and 9) institution collaboration network.

We analyzed 152 documents, extracted from the Scopus database (date of query: 07/24/2024), using the search string (“Thermal tourism”) OR (Tourism AND “Thermal baths”) OR (Tourism AND “Thermal waters”). No filters were applied regarding document type, language, etc., due to the limited number of results. These documents were then exported in CSV format and imported into the Biblioshiny tool developed byAria & Cuccurullo (2017), who works with the bibliometrix package from the RStudio application (Barón-Ramírez et al., 2021).

RESULTS Y DISCUSION

Figure 1 illustrates the annual scientific production on thermal tourism. The first scientific article was published by Kozak Kozak (1975), focusing on the reasons for the failure to recover thermal waters in the Aggtelek National Park (Hungary) and highlighting the need for their use for tourism purposes and regional development. The year 2017 saw the highest scientific production with 19 publications, with a steady increase from 2019 onwards. This rise is attributed to the onset of the COVID-19 pandemic, when the recovery of the tourism sector, focused on wellness and health tourism types, also included thermal tourism as a viable alternative (Pinos Navarrete & Shaw, 2021).

Figure 1. Annual scientific production

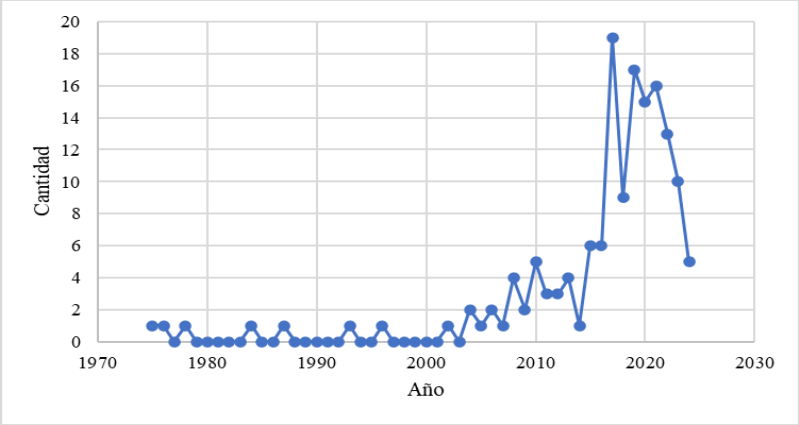


Table 1 presents the productivity of scientific publications on thermal tourism, classified by publication source. Notably, the conference *Springer Proceedings in Business and Economics*, published by Springer Nature, leads with six publications. It is followed by the journal *Geothermics*, published by Elsevier, with four articles. In contrast to the scientific production on wellness tourism reported by Ferrero Ronda et al. (2022), the three most productive sources between 1900 and 2022 according to Scopus were Tourism Recreation Research with 9 publications, *Asia Pacific Journal of Tourism Research* with 7 publications, and *Journal of Travel and Tourism Marketing*, also with 7 publications.

Tabla 1. Fuentes de publicación más productivas

N°	Source	N° of articles	Editorial	Type of publication
1	Springer Proceedings in Business and Economics	6	Springer Nature	Proceedings
2	Geothermics	4	Elsevier	Journal
3	Proceedings of The International Conference on Tourism Research	4	Academic Conferences and Publishing International Limited	Proceedings
4	Sustainability	4	MDPI	Journal
5	Geociencias	3	Universidade Estadual Paulista	Journal
6	International Multidisciplinary Scientific Geoconference Surveying Geology and Mining Ecology Management, Sgem	3	International Multidisciplinary Scientific Geoconference	Proceedings
7	Revista Galega de Economía	3	Universidad de Santiago de Compostela	Journal
8	Smart Innovation, Systems and Technologies	3	Springer Nature	Book
9	Tourismos	3	University of the Aegean	Journal
10	Anatolia	2	Routledge	Journal

Upon analyzing the most productive authors (Table 2), the top three are Liberato, D. and Liberato, P., affiliated with the *Instituto Politécnico do Porto*, and Brandão, F., affiliated with the *Universidade de Aveiro*, both institutions located in Portugal. Additionally, seven authors were identified, each with three publications on thermal tourism

Table 2. Most Productive Authors

1	Liberato, D.	5
2	Brandão, F.	4
3	Liberato, P.	4
4	Atunes, V.	3
5	Araujo-Nespereira, P.	3
6	Cid-Fernández, J.A.	3
7	Estevão, C.	3

8	Gonçalves, G.	3
9	Pola, M.	3
10	Simal-Gándara, J.	3

Additionally, Table 3 shows that the *Universidade de Vigo* (Spain) leads scientific production on thermal tourism with 17 articles, followed by the *Universidade de Aveiro* (Portugal) with 8 articles, and the *Instituto Politécnico do Porto* (Portugal) and *Universidade da Coruña* (Spain) with 6 articles each. Spain and Portugal are the most represented countries, indicating a strong focus on research related to thermal tourism in the Iberian Peninsula. The *Universidade Estadual Paulista Júlio de Mesquita Filho* (Brazil) is the only South American institution on the list, with 3 articles. This analysis aligns with the study by Ferrero Ronda et al. (2022), which highlights the prominence of Spanish institutions in wellness tourism research.

Table 3. Institutions with the Highest Production

1	Universidade de Vigo	Spain	17
2	Universidade de Aveiro	Portugal	8
3	Instituto Politécnico do Porto	Portugal	6
4	Universidade da Coruña	España	6
5	Escola Superior de Hotelaria e Turismo	España	4
6	Centro de Investigação, Desenvolvimento e Inovação em Turismo	Portugal	4
7	GOVCOPP – Research Unit on Governance, Competitiveness and Public Policies	Portugal	4
8	Portucalense University	Portugal	3
9	Universidade da Beira Interior	Portugal	3
10	Universidade Estadual Paulista Júlio de Mesquita Filho	Brazil	3

Table 4 shows that the most cited work is by Herrera-Franco et al. (2020), who found that 90% of the Santa Elena Peninsula (Ecuador) holds high and very high scientific interest, identifying natural thermal water springs and mud volcanoes that could promote geotourism. Another outstanding work is by Tut Haklidir & Haklidir (2020), with 44 citations, where they explored the benefits of using geothermal fluids for thermal tourism through artificial intelligence techniques. These studies demonstrate the relevance and scientific impact of thermal tourism, highlighting its potential to promote geotourism and technological innovation in the exploitation of natural resources

Table 4. Most Cited Articles

No	Authors/Article year	Citations
1	Herrera-Franco et al. (2020)	45
2	Tut Haklidir & Haklidir (2020)	44
3	Sayili et al. (2007)	40
4	Silvestri et al. (2017)	38
5	Huijbens (2011)	37
6	Olivier et al. (2019)	36
7	Ingrassia et al. (2022)	34
8	Baba et al. (2019)	29
9	Tomasović Mrčela et al. (2015)	27
10	Esiyok et al. (2018)	26

Figure 2 presents a keyword map showing the highest-occurrence terms in the scientific production on thermal tourism, highlighting terms such as 'thermal tourism,' 'tourism,' and 'thermalism' that dominate the field, indicating their centrality in academic research. Other frequent terms include 'health tourism' and 'medical tourism,' which link thermal tourism to health benefits, as well as 'thermal water,' 'thermal baths,' and 'thermal springs,' underscoring the importance of natural resources. The presence of 'sustainability' and 'sustainable development' reflects growing concerns about the environmental impact and sustainable

management of these resources. Additionally, technical terms such as 'geothermal energy' and 'hydrogeochemistry' suggest studies focused on geothermal energy and water chemistry. This analysis reveals a network of interconnected themes spanning scientific, technical, health, and sustainability aspects, providing a comprehensive overview of the research landscape in thermal tourism.

Figure 2. Most Frequent Keywords

The author co-citation network illustrates the structure of connections between researchers in thermal tourism, where the nodes represent authors, and the lines indicate the frequency with which they are cited together (Figure 3). Three main groups stand out. The green group, led by 'Smith M,' shows a dense network of connections with 'Esiyok B' and 'Liberato D,' suggesting an interrelated focus; the blue group, with 'Erfurt-Cooper P' and 'Smith MK' as central nodes, indicates frequent collaborations; and the red group, featuring 'Lund JW' and 'Simsek S,' reflects a focus on more specialized or technical studies. 'Smith M' emerges as the most influential author, being the largest and most central node, while the connections within the different groups reveal subcommunities within the field of thermal tourism.

Figure 3. Author Co-Citation Network

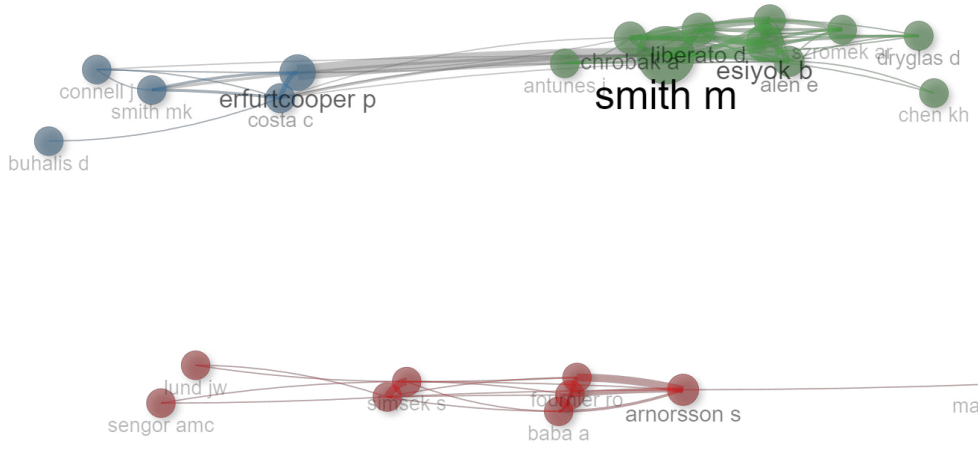


Figure 4 presents the country collaboration network, showing the connections and collaborations between different nations in the field of thermal tourism research. The nodes represent countries, with their size indicating the number of publications, while the lines between them reflect the frequency of collaboration. Spain and Portugal stand out, forming the core of the network with the most intense collaborations, indicating their central role in the research. Other countries, such as Turkey, Germany, and the United States, also show collaborations, though to a lesser extent. Regional clusters are observed, such as those including Italy, Poland, and Israel, and Bulgaria, Albania, and Austria, reflecting specific collaborations

within these groups. Countries such as Ethiopia, Brazil, Uruguay, and Hungary appear more isolated, suggesting less international interaction in this field of study.

Figure 4. Country Collaboration Network

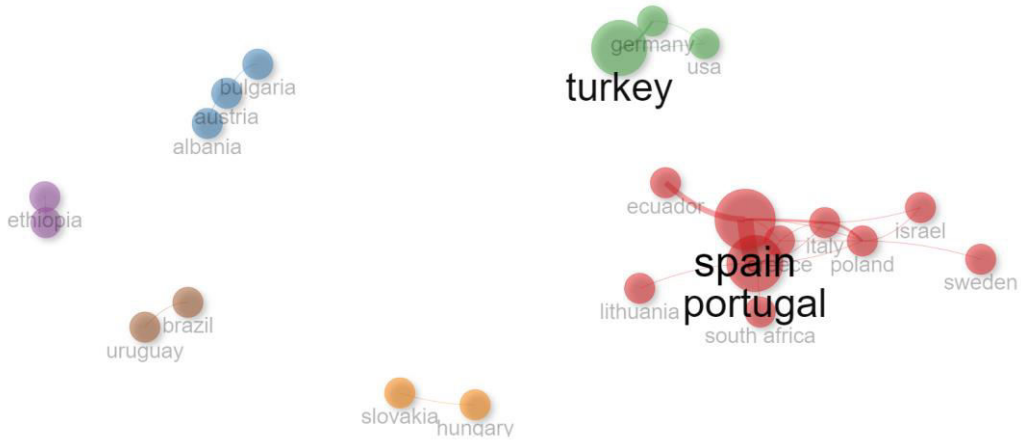
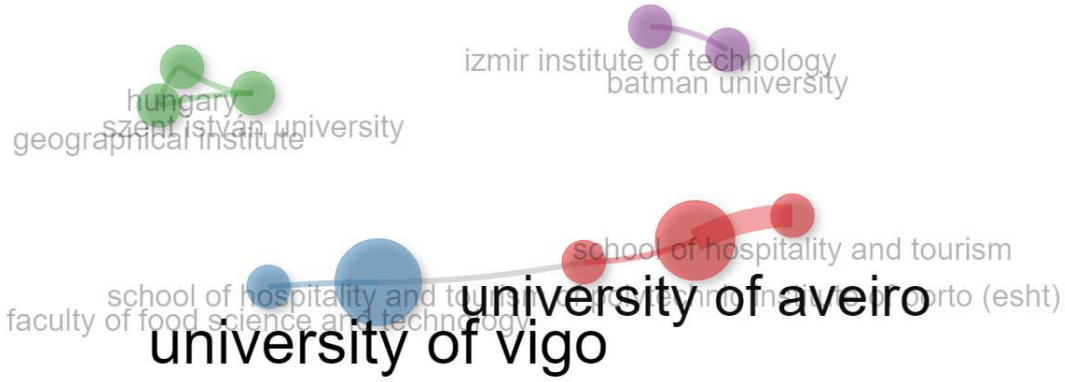


Figure 5 displays the network of collaboration between institutions. It highlights the *University of Aveiro and the University of Vigo* as the most central nodes, consistent with the most productive institutions according to Table 3. Notable clusters also include *Szent István University and the Geographical Institute* in Hungary, and *Izmir Institute of Technology* and *Batman University* in Turkey. The network underscores the geographical diversity, with institutions from different countries, including Portugal, Spain, Hungary, and Turkey, reflecting active, albeit limited, international collaboration in thermal tourism research.

Figure 5. Institution Collaboration Network



The findings of this analysis are consistent with those reported by Teixeira de Lacerda & Salete Mecca (2018), who, through a bibliometric study, identified a limited number of publications and a reduced concentration of authors dedicated to the field of thermal tourism, suggesting incomplete knowledge on the subject. Therefore, to strengthen the development of thermal water-based tourism destinations and maximize their benefits for health, economy, and society, it is essential to promote broader and more in-depth research that addresses current sectoral structures and dynamics.

On the other hand, it is noteworthy that there has been limited research in South America on the influence of thermal tourism on regional development. For example, in Peru, there are

estimated to be around 500 thermal baths. However, as noted Vargas (2010), most authorities, technicians, and the population are not aware of the value of this resource, and there are few actions for adequate preservation and management.

CONCLUSIONS

The bibliometric analysis, covering the period from 1975 to the present, reveals a notable scarcity of research on thermal tourism despite the growing post-pandemic interest in this area. There are very few studies in the context of increasing demand for wellness and health tourism, where thermal tourism presents a viable alternative. Additionally, there is limited involvement from South American institutions, despite the region's abundant thermal resources. This can be attributed, in part, to a lack of awareness and inadequate preservation and management actions by authorities and the local population.

The results represent an opportunity for researchers to increase their engagement and contribute to the sustainable development of thermal tourism in the region. Increased research activity could foster the creation of new public policies that promote the sustainable use of thermal baths, as well as encourage interdisciplinary collaboration to address the environmental, economic, and social challenges associated with thermal tourism. Furthermore, the dissemination of these studies could attract investments and improve tourism infrastructure, ensuring that thermal tourism becomes a driver of sustainable regional development.

REFERENCES

Aria, M., & Cuccurullo, C. (2017). bibliometrix : An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959-975. https://doi.org/10.1016/j.joi.2017.08.007

Baba, A., Şaroğlu, F., Akkuş, I., Özel, N., Yeşilnacar, M. İ., Nalbantçılar, M. T., Demir, M. M., Gökçen, G., Arslan, Ş., Dursun, N., Uzelli, T., & Yazdani, H. (2019). Geological and hydrogeochemical properties of geothermal systems in the southeastern region of Turkey. *Geothermics*, *78*, 255-271. https://doi.org/10.1016/j.geothermics.2018.12.010

Barón-Ramírez, E., García-Estrella, C. W., & Sánchez-Gárate, S. K. (2021). La inteligencia de negocios y la analítica de datos en los procesos empresariales. *Revista Cientifica de Sistemas e Informatica*, *1*(2), 38-53. https://doi.org/10.51252/rcsi.v1i2.167

Chen, J., Huang, Y., Wu, E. Q., Ip, R., & Wang, K. (2023). How does rural tourism experience affect green consumption in terms of memorable rural-based tourism experiences, connectedness to nature and environmental awareness? *Journal of Hospitality and Tourism Management*, *54*, 166-177. https://doi.org/10.1016/j.jhtm.2022.12.006

Cotrina-Coral, G., & Flores-Ramírez, R. (2022). Gestión municipal y promoción turística de Tarapoto. *Revista Amazónica de Ciencias Económicas*, *1*(2), e348. https://doi.org/10.51252/race.v1i2.348

Cotrina-Trigozo, T. (2023). Tendencia potencial de la demanda del desarrollo turístico en la provincia de Lamas, región San Martín. *Revista Amazónica de Ciencias Económicas*, *2*(1), e482. https://doi.org/10.51252/race.v2i1.482

Cotrina-Trigozo, T., Horna-Rodríguez, R., & Flores-Pinedo, C. (2024). Ecoturismo, alternativa de desarrollo socioeconómico en la comunidad nativa de Yurilamas en la cuenca del Alto Shanusi. *Revista Amazónica de Ciencias Económicas*, *3*(1), e662. https://doi.org/10.51252/race.v3i1.662

Dahanayake, S., Wanninayake, B., & Ranasinghe, R. (2023). Memorable experience studies in wellness tourism: systematic review & bibliometric analysis. *International Journal of Spa and Wellness*, *6*(1), 28-53. https://doi.org/10.1080/24721735.2022.2145417

El Archi, Y., Benbba, B., Nizamatdinova, Z., Issakov, Y., Vargáné, G. I., & Dávid, L. D. (2023). Systematic Literature Review Analysing Smart Tourism Destinations in Context of Sustainable Development: Current Applications and Future Directions. *Sustainability*, *15*(6), 5086. https://doi.org/10.3390/su15065086

Esiyok, B., Kurtulmuşoğlu, F. B., & Özdemir, A. (2018). Heterogeneity in the determinants of length of stay across middle age and senior age groups in thermal tourism. *Journal of Travel & Tourism Marketing*, *35*(4), 531-540. https://doi.org/10.1080/10548408.2017.1374906

Ferrero Ronda, R., Batista Sánchez, E., Ochoa Reyes, M., & Hernández Carreón, N. (2022). Wellness tourism. A bibliometric analysis of research published on SCOPUS. *Revista Interamericana de Ambiente y Turismo*, *18*(1), 107-117. https://riat.utalca.cl/index.php/test/article/view/612

Gan, T., Zheng, J., Li, W., Li, J., & Shen, J. (2023). Health and Wellness Tourists' Motivation and Behavior Intention: The Role of Perceived Value. *International Journal of Environmental Research and Public Health*, *20*(5), 4339. https://doi.org/10.3390/ijerph20054339

Gulyas, G., & Molnar, E. I. (2023). Wellness Tourism Management Research A bibliometric

analysis. *Management & Marketing*, *18*(2), 172-191. https://doi.org/10.2478/mmcks-2023-0010
Herrera-Franco, G., Carrión-Mero, P., Alvarado, N., Morante-Carballo, F., Maldonado, A., Caldevilla, P., Briones-Bitar, J., & Berrezueta, E. (2020). Geosites and Georesources to Foster Geotourism in Communities: Case Study of the Santa Elena Peninsula Geopark Project in Ecuador. *Sustainability*, *12*(11), 4484. https://doi.org/10.3390/su12114484
Huijbens, E. H. (2011). Developing Wellness in Iceland. Theming Wellness Destinations the Nordic Way. *Scandinavian Journal of Hospitality and Tourism*, *11*(1), 20-41. https://doi.org/10.1080/15022250.2011.525026
Ingrassia, M., Bellia, C., Giurdanella, C., Columba, P., & Chironi, S. (2022). Digital Influencers, Food and Tourism—A New Model of Open Innovation for Businesses in the Ho.Re.Ca. Sector. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(1), 50. https://doi.org/10.3390/joitmc8010050
Kozak, M. (1975). Possibilities of water supply in the surroundings of Aggtelek. *Acta Geographica Debrecina*, *14-15*, 81 – 108.
Lei, W. S. (Clara), Suntikul, W., & Chen, Z. (2023). Tourism development induced social change. *Annals of Tourism Research Empirical Insights*, *4*(1), 100088. https://doi.org/10.1016/j.annale.2023.100088
Liberato, D., Quintela, J. A., Neto, P., Liberato, P., Brandão, F., & Costa, E. (2024). Strategic Approach to Thermal Tourism During and After Covid-19. En *Recent Advancements in Tourism Business, Technology and Social Sciences*. (pp. 641-652). Springer. https://doi.org/10.1007/978-3-031-54342-5_40
McBurney, M. K., & Novak, P. L. (2002). What is bibliometrics and why should you care? *Proceedings. IEEE International Professional Communication Conference*, 108-114. https://doi.org/10.1109/IPCC.2002.1049094
Nistoreanu, P., & Aluculesei, A.-C. (2021). Can Spa Tourism Enhance Water Resources and Turn Them into a National Brand? A Theoretical Review about the Romanian Case. *Information*, *12*(7), 270. https://doi.org/10.3390/info12070270
Noriega Velázquez, P. J., & Lara Enríquez, B. E. (2023). Nueva ruralidad y turismo termal en el territorio rural: Parque Agua Caliente en el Ejido San Pedro de Aconchi, Sonora. *El Periplo Sustentable*, *45*, 160. https://doi.org/10.36677/elperiplo.v0i45.16534
Olivier, J., Van Niekerk, H. J., & Van der Walt, I. J. (2019). Physical and chemical characteristics of thermal springs in the Waterberg area in Limpopo Province, South Africa. *Water SA*, *34*(2), 163-174. https://doi.org/10.4314/wsa.v34i2.183636
ONU Turismo. (2024). *El turismo internacional alcanzará en 2024 los niveles registrados antes de la pandemia*. https://n9.cl/xmery
Pinos Navarrete, A., & Shaw, G. (2021). Spa tourism opportunities as strategic sector in aiding recovery from Covid-19: The Spanish model. *Tourism and Hospitality Research*, *21*(2), 245-250. https://doi.org/10.1177/1467358420970626
Ramkissoon, H. (2023). Perceived social impacts of tourism and quality-of-life: a new conceptual model. *Journal of Sustainable Tourism*, *31*(2), 442-459. https://doi.org/10.1080/09669582.2020.1858091
Sayili, M., Akca, H., Duman, T., & Esengun, K. (2007). Psoriasis treatment via doctor fishes as part of health tourism: A case study of Kangal Fish Spring, Turkey. *Tourism Management*, *28*(2), 625-629. https://doi.org/10.1016/j.tourman.2006.08.010
Silvestri, C., Aquilani, B., & Ruggieri, A. (2017). Service quality and customer satisfaction in thermal tourism. *The TQM Journal*, *29*(1), 55-81. https://doi.org/10.1108/TQM-06-2015-0089
Suban, S. A. (2022). Wellness tourism: a bibliometric analysis during 1998–2021. *International Journal of Spa and Wellness*, *5*(3), 250-270. https://doi.org/10.1080/24721735.2022.2107815
Suban, S. A. (2023). Bibliometric analysis on wellness tourism – citation and co-citation analysis. *International Hospitality Review*, *37*(2), 359-383. https://doi.org/10.1108/IHR-11-2021-0072
Tavares, F. O., Gomes Almeida, L., Garcia Pinto, A., & Tavares, V. C. (2022). The Role of Stakeholders in Thermal Tourism: A Bibliography Review. En *Stakeholder Entrepreneurship* (pp. 45-61). Springer. https://doi.org/10.1007/978-981-16-7091-6_4
Teixeira de Lacerda, L., & Salete Mecca, M. (2018). Turismo Termal: um estudo bibliométrico. *XV Seminário da Associação Nacional de Pesquisa e Pós-Graduação em Turismo*. https://www.anptur.org.br/anais/anais/files/15/1069.pdf
Tomasović Mrčela, N., Borovac, J. A., Vrdoljak, D., Grazio, S., Tikvica Luetić, A., & Tomek-Roksandić, S. (2015). When elders choose: Which factors could influence the decision-making among elderly in the selection of health tourism services? *Medical Hypotheses*, *85*(6), 898-904.

https://doi.org/10.1016/j.mehy.2015.09.013
Tut Haklidir, F. S., & Haklidir, M. (2020). Prediction of Reservoir Temperatures Using Hydrogeochemical Data, Western Anatolia Geothermal Systems (Turkey): A Machine Learning Approach. *Natural Resources Research*, *29*(4), 2333-2346. https://doi.org/10.1007/s11053-019-09596-0
Vargas, V. (2010). Las fuentes termales en el Perú, estado y uso actual. *XV Congreso Peruano de Geología*. https://hdl.handle.net/20.500.12544/3009