

Exploring the Tourism, Neuro-tourism, and Hospitality Nexus: A Comprehensive Bibliometric Analysis

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Abstract

Despite the considerable attention toward tourism and hospitality, neuro-tourism remains largely unexplored within academic investigations. This study is designed to provide bibliometric analysis in tourism, neuro-tourism, and hospitality research using VOSviewer to fill the gap. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to select relevant papers on the Scopus database between January 2009 and July 2023. Analyzing 971 papers revealed that the UK is the top country in publication (289 papers and 11,391 citations), while Italy was the lowest country on the list (42 papers and 4651 citations). Buhalis, D., was identified as the most influential author, with 18 papers and the highest-cited papers (1833 citations). Furthermore, the strongest pair authors correlation was between Okumus, F. and Rahimi, R., with 468 links, highlighting a significant degree of connection between their respective references. Keywords related to tourism, neuro-tourism, and hospitality include "halal tourism," "urban tourism," "rural tourism," "food tourism," "Islamic hospitality," "hospitality ecosystem," and "neuroscience." "International Journal of Contemporary Hospitality Management" was the most productive journal (96 papers and 4,312 citations). Furthermore, this journal published the most-cited paper, "An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research," with 687 citations. This is the first study to conduct the bibliometric analysis of tourism, neuro-tourism, and hospitality research; therefore, it will lead to more publications on related subjects by directing the researchers to less studied fields such as neuro-tourism. Additionally, scholarly collaborations may improve the depth of this research.

Key Words: tourism; neuro-tourism; hospitality; bibliometric analysis; Scopus database.

JEL Classification: M30, Z30, Z39

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1. Introduction

Tourism has captured the attention of scholars and researchers across multiple disciplines throughout history (Al-Nafjan et al., 2023; Lazo et al., 2023). It encompasses diverse aspects of human life and profoundly impacts individuals and economies. By participating in tourism, people can enrich

their lives through new experiences, cultural learning, travel to different places, engagement in unique activities, and enhancing well-being and quality of life (Andereck & Nyaupane, 2011; Wen et al., 2021). Also, tourism plays a vital role in the tourism industry and contributes to the overall economic development (Luvsandavaajav & Narantuya, 2021).

In recent years, neuroscience tools have been widely used to study consumer behavior towards advertising (H-Alsharif et al., 2023; Pilelienè et al., 2022), marketing mix (Ahmed et al., 2023), tourism and hospitality (Ali Gaafar & Al-Romeedy, 2022; Lei et al., 2022). Theories and methods from neuroscience and related disciplines such as economics, marketing, psychology, and tourism are combined to understand consumer choices and behavior (Cardoso et al., 2022). Therefore, the fields of neuroscience, tourism, and hospitality have converged, giving rise to the emerging discipline of "neuro-tourism" (Giudici et al., 2017; Panyik & Gonçalves, 2017). Neurotourism encompasses the application of neuroscientific principles and methodologies (e.g., eye-tracking, electroencephalography, galvanic skin response, electromyography, ..., etc.) to gain deeper insights into tourist behavior, experiences and preferences (Doborjeh et al., 2022; Lei et al., 2022). By employing advanced neurophysiological measurements, including brain imaging techniques, neuro-tourism seeks to unravel the neural mechanisms that underlie various aspects of the tourist journey (Boz & Koç, 2022; De-Frutos-Arranz & López, 2022; Lei et al., 2022). This multidisciplinary approach holds tremendous potential for revolutionizing the tourism and hospitality industry by providing a novel understanding of consumer behavior and informing the design and delivery of exceptional tourist experiences (Giudici et al., 2017; Panyik & Gonçalves, 2017; Zhou et al., 2022).

Aware of the growing interest in tourism, hospitality, and neuro-tourism, several studies analyzing scientific production on tourism and neuroscience have already been published. However, no previous research was performed to map the ((neuro*tourism OR tourism) AND (hospitality)) research production in the Scopus (SC) database. Therefore, this study differs from other review papers concentrating on the global academic research trends of tourism and neuro-tourism studies between 2009 and 2023 on the SC database. To this end, this study fills the gap in scientific literature and provides a valuable framework and milestones for future research. This study aims to provide a comprehensive bibliometric analysis of outstanding countries, academic institutions, authors, and journals. In addition, the articles that have the highest numbers of citations, the co-citation network of authors and papers, and the hot keywords with occurrences will be determined. The main contributions and steps of this bibliometric analysis study are summarized and listed as follows:

- To provide an overview of the tourism and neuro-tourism extensively utilized in marketing research.
- To identify the growth of annual scientific publications based on journals' outputs.
- To identify the overall performance, such as outstanding countries, institutions, journals, and authors.
- To identify the most prominent themes/keywords.
- To identify the most-cited review articles and articles to be considered in future studies.

The structure of this research is as follows: Section 2 provides the theoretical substantiation. Section 3 outlines the methodology employed in this study. Section 4 is concerned with a bibliometric analysis of pertinent literature and discussions. Section 5 provides concise conclusions. Finally, Section 6 presents the study's limitations and potential future directions.

2. Theoretical Substantiation

Tourism is becoming a component of key importance in the contemporary economy of a destination, whether it is a region or a country (Arimavičiūtė, 2015). Tourism is important to the country's economy and competitiveness (Gavurova et al., 2021). During the last few decades, tourism has experienced significant growth in both emerging and advanced economies (Lu et al., 2019). In the scientific literature, various aspects of tourism have been analyzed: environmental (e.g., nautical tourism with emphasis on destination image with a sustainability marketing approach (Cardoso et al., 2023), ecotourism in a framework of the lodging and the consumer (Do Paço et al., 2012); pro-environmental behaviors of hotel guests and their willingness to pay for sustainable hotel services (Puciato et al., 2023)), managerial (e.g., the interplay of innovativeness, innovation behavior and SMEs' performance indicators) (Domi et al., 2019); workforce capacity in the field of tourism (Polukhina et al., 2016)), behavioral (e.g., the experiences sought by tourists (Nowacki & Niezgoda, 2023); determinants of tourist satisfaction (Pilelienė & Grigaliūnaitė, 2019); attributes influencing responsible tourism consumer choices (Vázquez, 2023); travel risk perception (Devkota et al., 2022)), economical (e.g., the economic impact of city branding on tourism (Herget et al., 2015), the impact of the investment component on the development of the recreational and tourist industry (Shpak et al., 2022)), cultural-historical (Almeida et al., 2023), etc.

A number of changes in the tourism and hospitality industry have been triggered by the use of information and communication technologies (ICTs) (Folgado-Fernández et al., 2023; Skare et al. 2023) including the usage of big data, cloud, artificial intelligence technologies (Civelek et al., 2023a). Including smartness into value co-creation can increase and enhance and destination competitiveness (Al-Nafjan et al., 2023; Cimbalević et al., 2019). The emergence of ICTs manifests in the use of artificial intelligence, chatbots and digital assistance, content personalization, and other technology-based improvements in consumer services (Worndl et al., 2021). In this regard, the quality of services that businesses provide increases and this fact enables businesses increasing their profits (Civelek et al., 2023b). Moreover, artificial intelligence is said to substantially change the tourism industry and tourist behavior (Tuo et al., 2021). The emergence of the Metaverse is also revolutionizing tourism management and marketing (Buhalis et al., 2023). On the other hand, recent technological enhancements also manifest in the methods used by tourism and hospitality companies to understand their consumer behavior. As one of the recent technology-based research trends, emerged neuromarketing – research concerned with the application of neuroscience technology to the traditional goals and questions of interest of the marketing industry (Bastiaansen et al., 2018; H-Alsharif et al., 2021b). In the last two decades, neuromarketing studies have snowballed because it provides understanding the mechanisms of decision-making in the consumer's brain toward marketing stimuli (H-Alsharif et al., 2021b). Neuromarketing has become an academic and commercial area of interest, as the advancements in neural recording techniques and interpreting algorithms have made it an effective tool for recognizing the unspoken response of consumers to marketing stimuli (H-Alsharif et al., 2021a; Rawnaque et al., 2020). Neurological and physiological data collection methods attempt to estimate the attitudes and emotions evoked in consumers by a message according to the changes in their brains or bodies before and after viewing the message (Boz & Koç, 2022). Accordingly, neuro-tourism is the application of neuroscientific methods in tourism to improve tourism marketing efforts based on the brain activities of tourists (Al-Nafjan et al., 2023). Neuro-tourism explores the neural mechanism underlying tourists' behaviors and emotions in order to measure tourist satisfaction and revisiting intention (Panyik & Gonçalves, 2017). It provides accurate real-time data on tourists' conscious and unconscious emotions (Ma et al., 2014). Emotional reactions to marketing stimuli are essential to tourist destination marketing yet difficult to measure (Bastiaansen et al., 2018). Therefore, the growth of neuroscience studies within tourism has been relatively slow, with limited well-executed studies and little interdisciplinarity (Li et al., 2023).

To discuss the potential of neuroscience in tourism research, it is first necessary to provide an overall picture of its current application in the field (Li et al., 2023). To understand the inner structure

in the research of a particular area, it is suggested to perform a bibliometric analysis. Researchers perform bibliometric analyses in different fields of science (Shukla et al., 2020), e.g., do Rosário Mira & de Jesus Breda (2021) provided systematic review of the literature on the internationalization of tourism destinations; Pimonenko et al. (2021) used bibliometric analysis to identify publication activities' general tendency on the the relationships between economic growth, ecological indicators, and tourism development; Şimşek & Kalıpçı (2022) analyzed the trends in scientific publications about "education quality" and "tourism faculties" by revealing interactions among the authors, institutions, and countries; Chen et al. (2022) provided bibliometric analysis to substantiate the relationship between natural disasters and tourism business management. Moreover, bibliometric analyses are provided to uncover emerging trends in article and journal performance, collaboration patterns, and research constituents and to explore the intellectual structure of a specific domain in the extant literature (Donthu et al., 2021; Koseoglu et al., 2016). They are intended to provide a structured overview of the existing publication databases (Yao et al., 2022) and are seen as a popular and rigorous method for exploring and analyzing large volumes of scientific data (Donthu et al., 2021). Ogotu et al. (2023) describe bibliometric analyses as an area of study that employs quantitative methods to analyze and evaluate scientific research and its effect. According to Hadinejad et al. (2019); Hadinejad et al. (2021), since the inception and proliferation of bibliometric reviews, researchers have examined the theories, concepts, and methods used in various subfields of tourism. Bibliometric analysis are extremely important for the emerging fields (Ferreira & Demarzo, 2023). Identification of emerging trends in the field of knowledge can provide valuable insights into the its evolution and help identify areas for improvement and directions for future research (Ogotu et al., 2023). However, Li et al. (2023) emphasize that scholars in the field of tourism may not be fully aware of the developments of neuroscience as most relevant studies are published in neuroscience journals. To understand the current state of research in tourism and hospitality and to find out how the emergence of neuroscientific methods in form of neurotourism manifests in scientific research, a comprehensive bibliometric analysis is needed.

3. Methods

The bibliometric analysis aims to provide a systematic and visualized overview of the existing publications (Yao et al., 2022). In order to conduct this review, the study rigorously followed the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol, ensuring a meticulous identification of relevant scholarly papers (Page et al., 2021). The PRISMA protocol has been widely used in several areas (Ahmed et al., 2022b; Alsharif et al., 2022; Anup Singh et al., 2023; Folgado-Fernández et al., 2023). Employing a bibliometric analysis approach, the study aimed to uncover and examine global research trends within neuro-tourism, tourism, and hospitality. This comprehensive investigation encompassed the analysis of various facets, including the most productive countries, academic institutions, journals, authors, highly cited papers, and keyword occurrences, all serving as critical indicators for assessing the progress in scholarly publications within this domain.

The primary objective of this study was to provide a comprehensive overview of the current trends in neuro-tourism, tourism, and hospitality research while addressing gaps in the existing literature. To achieve this, four research questions were formulated to guide the structure of the analysis and gain a thorough understanding of the existing scientific research in the analyzed domain. These research questions were thoughtfully designed to shed light on key areas of interest and contribute to the advancement of knowledge in the field of neuro-tourism, tourism, and hospitality, as follows:

RQ1: Is there and what is the annual growth of scientific publications in the field?

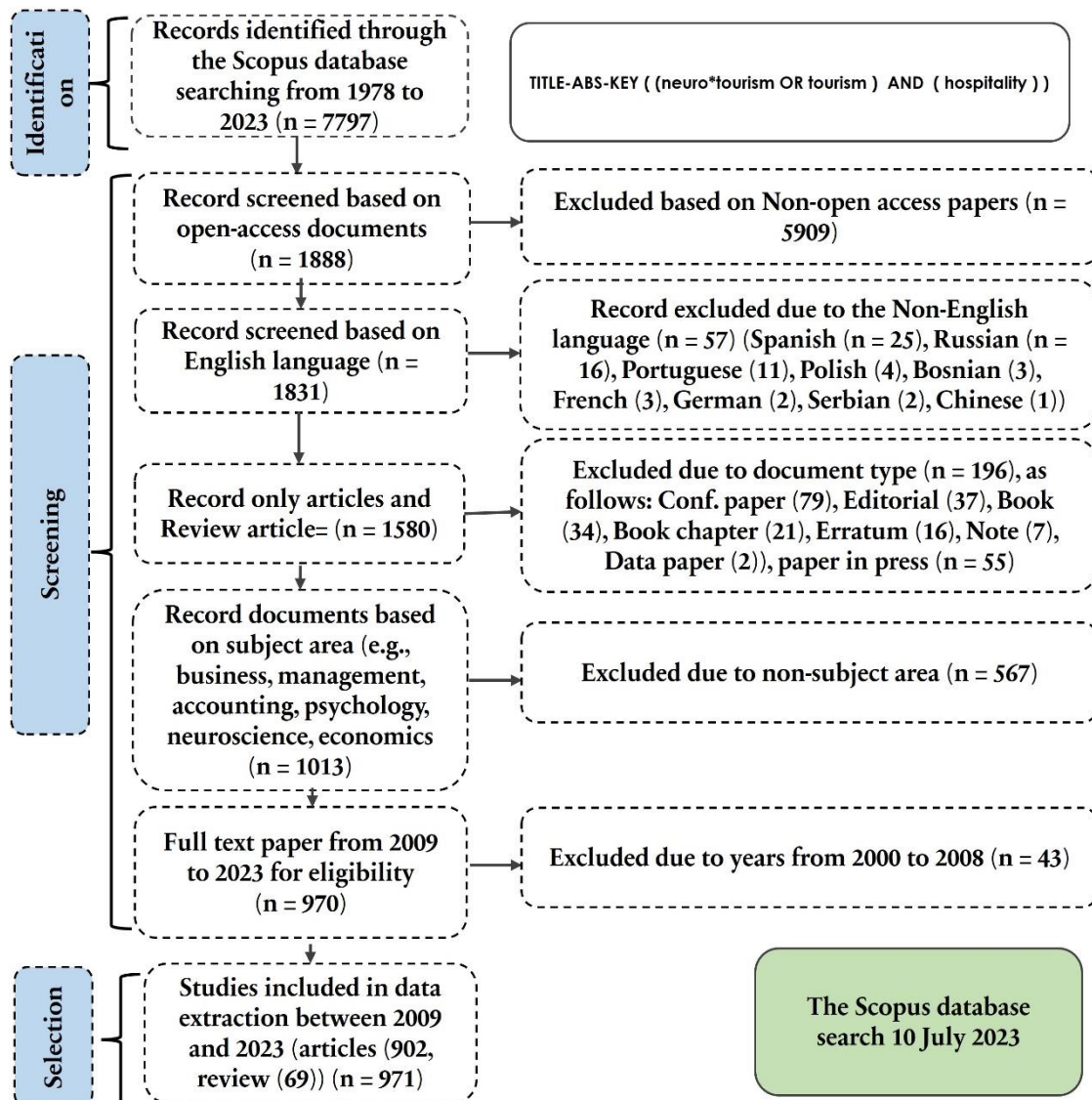
RQ2: What are the prominent “a) countries; b) academic institutions; c) journals; d) authors”?

RQ3: What are the most prominent keywords in selected articles?

RQ4: What are the most-cited articles in the field?

Endeavoring to answer the research questions, the current study starts by extracting articles and reviewing articles from the SC database in July 2023. In addition, this study has followed the instruction of Donthu et al. (2021) to present a thorough bibliometric analysis detecting and listing “the prominent countries, institutions, journals, and authors”; later on, a brief description of each analyzed parameter is provided. The VOSviewer software was utilized to create visualization maps, which simplifies bibliometric research across various fields, such as neuromarketing (Alsharif et al., 2021; Pilelienė et al., 2022), tourism (Koseoglu et al., 2016; Pimonenko et al., 2021), hospitality (Palácios et al., 2021). In particular, VOSviewer has been used in several studies related to neuromarketing (Ahmed et al., 2022a; Alsharif et al., 2023; Zheng et al., 2021), tourism and hospitality (Koseoglu et al., 2016; Palácios et al., 2021), and neuro-tourism (Al-Nafjan et al., 2023) to gain a comprehensive understanding of the development of using neuroimaging tools in this field.

Graph 1. PRISMA process for extracting documents



Source: Page et al. (2021)

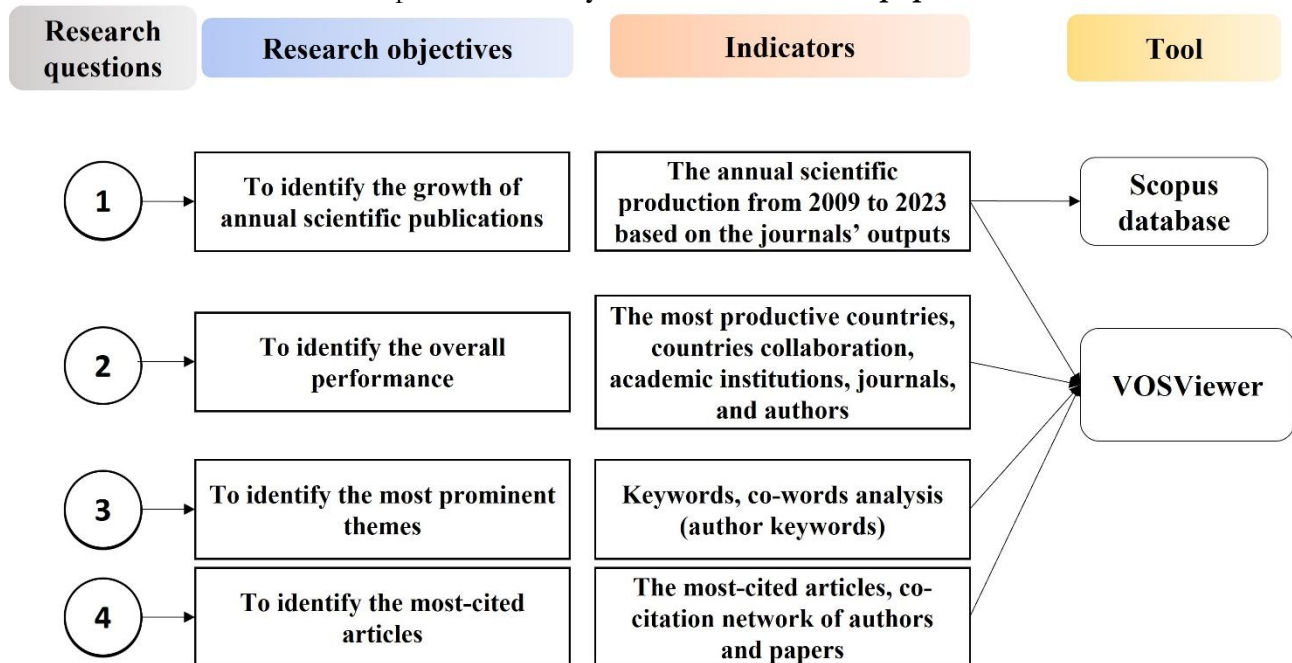
Data was collected from the SC database in July 2023. The key theme of this study was articles in tourism, hospitality, and neuro-tourism research; the following query was applied to the title, abstract, and keywords: “TITLE-ABS-KEY ((neuro*tourism OR tourism) AND (hospitality)) AND (EXCLUDE (PUBYEAR , 2024)) AND (LIMIT-TO (OA , "all")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "NEUR")) AND (LIMIT-TO (PUBYEAR , 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009))”.

Through this process, 971 articles and review articles were identified, all published between January 2009 and July 2023. Graph 1 illustrates the selection process followed in this study, and the papers included in the analysis had to meet specific characteristics as outlined below.

- “Publication year: 2009 to July 2023”
- “Language: English (Non-English documents were excluded)”
- “Document type: Article (902) and review articles (69) (Other types of documents were excluded)”

Graph 2 presents an illustrative framework of the analytical structure employed in this study, aiming to enhance comprehension of the methodologies and tools utilized throughout the research process.

Graph 2. The analytical structure of the paper

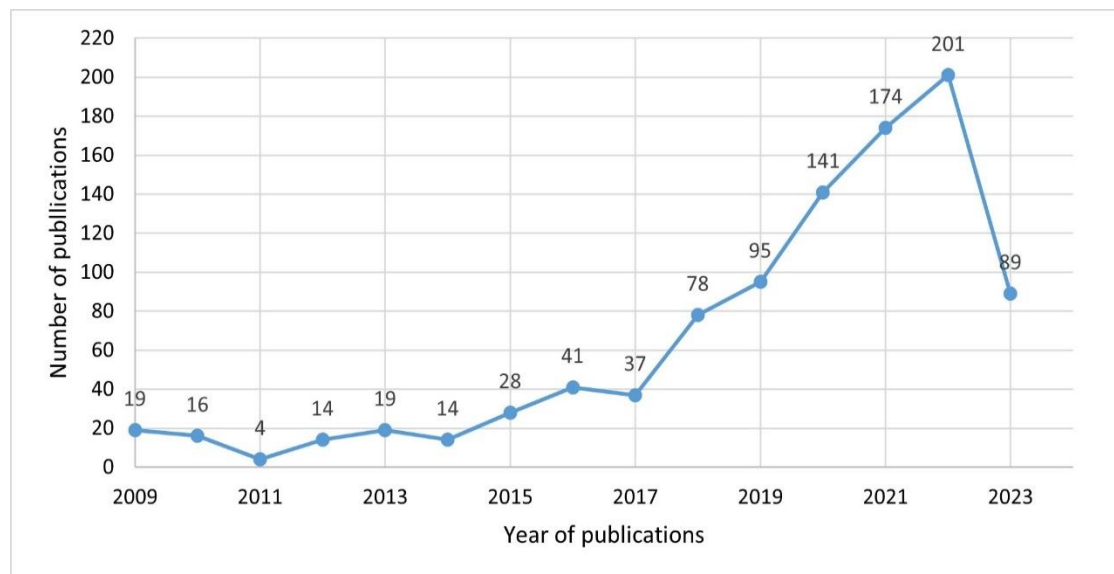


Source: own elaboration

4. Results and Discussions

As a result of the procedure, 971 articles and review articles in neuro-tourism, tourism, and hospitality were identified. The analysis revealed a significant publication growth, with over 60% of the total papers (605 documents) published in the last four years, from 2020 to 2023. Graph 3 illustrates the annual publications published between January 2009 and July 2023, with nineteen papers published in 2009 and the number increasing almost ten times in 2022 before slightly decreasing to four times in July 2023 because it is just the middle of the year. The increasing interest among scholars in neuro-tourism, tourism, and hospitality has led to a rise in publications.

Graph 3. The annual publications between 2009 and 2023



Source: own elaboration

3.1 A Bibliometric Analysis

3.1.1 Outstanding countries and academic institutes

The analysis conducted in this study reveals that countries exhibiting a significant presence, with a minimum of 42 documents, can be classified into four distinct categories based on their productivity levels. The first category encompasses one country, namely the UK, which has demonstrated high productivity by producing 289 documents. The second category comprises two countries, the USA and Australia, which have published between 100 and 120 documents. The third category involves three countries, Spain, Hong Kong, and China, producing 50-100 documents. The 4th category includes four countries that have produced less than 50 documents.

The data presented in Table 1 provides a comprehensive overview of the findings, demonstrating that the combined contributions of the UK, USA, and Australia account for more than 50% of the total documents published since 2009. Notably, the UK stands out as the most productive country, producing a remarkable total of 289 documents. Furthermore, the University of Surrey, which is affiliated with the UK, emerged as the leading academic institution, contributing 29 documents that have received the highest number of citations (1734).

Conversely, although Hong Kong has published 63 papers, its most prominent academic institution, the Hong Kong Polytechnic University, has contributed 57 documents, with 2421 citations.

Moreover, despite publishing 44 documents overall, South Africa has the University of Johannesburg as a notable institution, which has published 26 documents and attained the fourth-highest citation count (965). Finally, with 42 published documents, Italy is positioned at the lower end among the ten prominent countries, and its notable academic institution, the University of Reading, has contributed six documents to the body of research.

Table 1. The prominent countries with min. 42 papers

Category	Country	TPs	TCs	The productive institution	TPs	TCs
Category 1	UK	289	11391	University of Surrey	29	1734
Category 2	USA	118	4651	University of Central Florida	19	908
	Australia	102	4920	Griffith University	27	1308
Category 3	Spain	84	1734	Universitat d'Alacant	11	241
	Hong Kong	63	2591	Hong Kong Polytechnic University	57	2421
	China	60	2031	Sun Yat-Sen University	5	633
Category 4	Portugal	46	684	Universidade do Algarve	12	79
	Turkey	45	1249	Akdeniz Üniversitesi	6	56
	South Africa	44	1050	University of Johannesburg	26	965
	Italy	42	1217	University of Reading	6	355

TPs: total publication, TCs: total citations

Source: own elaboration

3.1.2 Productive Journals

Table 2 provides an overview of the key academic journals that have significantly contributed to tourism, neuro-tourism, and hospitality. The International Journal Of Contemporary Hospitality Management stands out as a highly regarded publication, publishing 96 documents and amassing 4312 citations. Notably, the paper titled “An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research” occupied the highest-cited document, totaling 687 citations. International Journal Of Hospitality Management and Tourism Management have also emerged as notable journals, publishing 55 and 48 documents, respectively. Tourism Management, in particular, has garnered significant attention, accumulating 3700 citations overall. This journal's most highly cited paper is titled “What makes a useful online review? Implication for travel product websites”, which has received a notable citation count of 602.

It is worth noting that the remaining journals listed in Table 2 have made relatively fewer contributions to tourism, neuro-tourism, and hospitality, with each journal publishing less than 30 documents in this domain. However, despite its lower ranking in terms of publication volume, the Tourism Review stands out due to the impact of its publications. This journal has published the third highest-cited document, "COVID-19: Potential Effects on Chinese Citizens' Lifestyle and Travel," accumulating 417 citations. Finally, Frontiers in Psychology published 16 documents with 77 citations, considered the 10th journal in the list.

Table 2. The most ten productive journals in neuro-tourism or tourism with min. 16 publications

Source/Journal	TPs	TCs	Title of the most cited document	Year	Time cited
“International Journal of	96	4312	“An assessment of the use of partial	2018	687

Contemporary Hospitality Management”			least squares structural equation modeling (PLS-SEM) in hospitality research”		
“International Journal of Hospitality Management”	55	3179	“Factors influencing tourist food consumption”	2012	297
“Tourism Management”	48	3700	“What makes a useful online review? Implication for travel product websites”	2015	602
“Current Issues in Tourism”	30	777	“A review of eye-tracking research in tourism”	2019	99
“Journal of Tourism Futures”	30	770	“Airbnb: the future of networked hospitality businesses”	2016	323
“Journal of Hospitality Leisure Sport and Tourism Education”	30	299	“E-learning in tourism and hospitality: A map”	2009	43
“Tourism Management Perspectives”	22	920	“Tourism and corporate social responsibility: A critical review and research agenda”	2013	215
“Tourism Review”	18	841	“COVID-19: potential effects on Chinese citizens' lifestyle and travel”	2021	417
“Tourism Economics”	17	282	“On the determinants of Airbnb location and its spatial distribution”	2019	52
“Frontiers in Psychology”	16	77	“Online tourism information and tourist behavior: a structural equation modeling analysis based on a self-administered survey”	2020	34

Source: own elaboration

3.1.3 Productive Authors

Table 3 presents a comprehensive analysis of the most prolific authors in tourism, neuro-tourism, and hospitality. The selection criteria for this analysis required authors to have a minimum of seven documents. This approach identified ten authors from five countries, namely UK, Australia, Bulgaria, USA, and China, representing ten distinct academic institutions.

Among the selected authors, five are affiliated with UK institutions. Specifically, Buhalis, D., Mariani, M., Baum, T., Rahimi, R., and Pappas, N. Two authors belong to USA institutions, namely King, B. and Okumus, F., affiliated with Texas A&M University and the University of Central Florida. One author represents The University of Queensland in Australia, namely Dolnicar, S. Ivanov, S. is affiliated with Varna University of Management in Bulgaria, and Law, R. is affiliated with the University of Macau in China.

Notably, Buhalis, D. emerges as the most prolific author, having published 18 documents with 1833 citations. Although Baum, T. has published nine documents, their work boasts the second highest citations, accumulating 1043. Okumus, F. has contributed seven documents, ranking fifth in citation count with 384 citations.

Moreover, it is important to highlight that authors from the UK have published the largest number of documents, with a total of 51 publications, and their work is located as the first rank in terms of citation count, accumulating 4038 citations. Similarly, authors from the USA have published 16 documents, which have garnered the second highest citation, totaling 548 citations. Lastly, the

author from Australia, Dolnicar, S., has published ten documents with a relatively third highest citation count of 531 citations. The remaining authors, such as Ivanov, S., and Law, R., have documents with less than 300 citations.

Table 3. The ten most productive authors

Author's name	TPs	TCs	Author's SC ID	Affiliation	Country
Buhalis, D.	18	1833	6603014980	The Business School at BU	UK
Dolnicar, S.	10	531	6505868314	The University of Queensland	Australia
Mariani, M.	10	522	36817705700	Henley Business School	UK
Baum, T.	9	1043	7102086841	University of Strathclyde	UK
Ivanov, S.	9	151	19337727400	Varna University of Management	Bulgaria
King, Brian E.M.	9	164	55458625100	Texas A&M University	USA
Okumus, F.	7	384	6602197423	University of Central Florida	USA
Rahimi, R.	7	325	56534389200	University of Wolverhampton Business School	UK
Pappas, N.	7	315	55946075900	University of Sunderland	UK
Law, R.	7	283	7201502135	University of Macau	China

Source: own elaboration

3.1.4 Keywords Analysis

In bibliometric analysis, keywords are a crucial quantitative metric, providing insights into the strength of associations between paired keywords. A higher frequency of occurrence signifies a stronger connection between keywords. It refers to the research themes obtained from the conceptual structure of the articles included in the bibliometric analysis (Arar & Yurdakul, 2023). This analytical approach facilitates a comprehensive understanding of the article's content. The strength of linkage between keywords reflects their frequency within the article, while the overall number of links represents the total occurrences of keywords throughout the article.

In this study, a comprehensive analysis of co-occurring keywords was performed using VOSviewer software. This analysis focused on all keywords that appeared at least three times within the article, ensuring a robust dataset for examination. This methodology proves valuable in elucidating key findings concerning the article's content and evaluating thematic trends within the specific domain of tourism, neuro-tourism, and hospitality. The outcomes of this analysis are visually represented in Graph 4, providing a clear illustration of these findings.

Table 4 presents a comprehensive summary of the most frequently utilized keywords in the dataset, with each keyword appearing at least ten. The term "Tourism" has the highest frequency, occurring 239 times and exhibiting a total-link-strength (TLS) of 839. Following closely is the term "Hospitality," with 162 occurrences, accompanied by TLS values (514).

The fields of tourism, neuro-tourism, and hospitality are extensively used to evaluate consumer behavior (i.e., Customer satisfaction, Job satisfaction, Customer experience, and Satisfaction), hotels sector (i.e., Service quality, Service sector, and Online reviews), booking websites (i.e., Airbnb and Booking.com), sustainability (i.e., Sustainable tourism). Among the specific keywords, "Customer satisfaction" appears 12 times, reflecting a TLS of 42; "Satisfaction" appears 11 times, with 35 TLS; "Job satisfaction" appears ten times, with 31TLS; while "Customer experience" term appears five times, with 16 TLS.

In summary, these keywords provide a comprehensive snapshot of the core themes and concepts prevalent within tourism, neuro-tourism, and hospitality research, shedding light on consumer satisfaction, service quality, social media, online reviews, gender, and sustainability.

Table 4. The top all keywords with three occurrences of at least

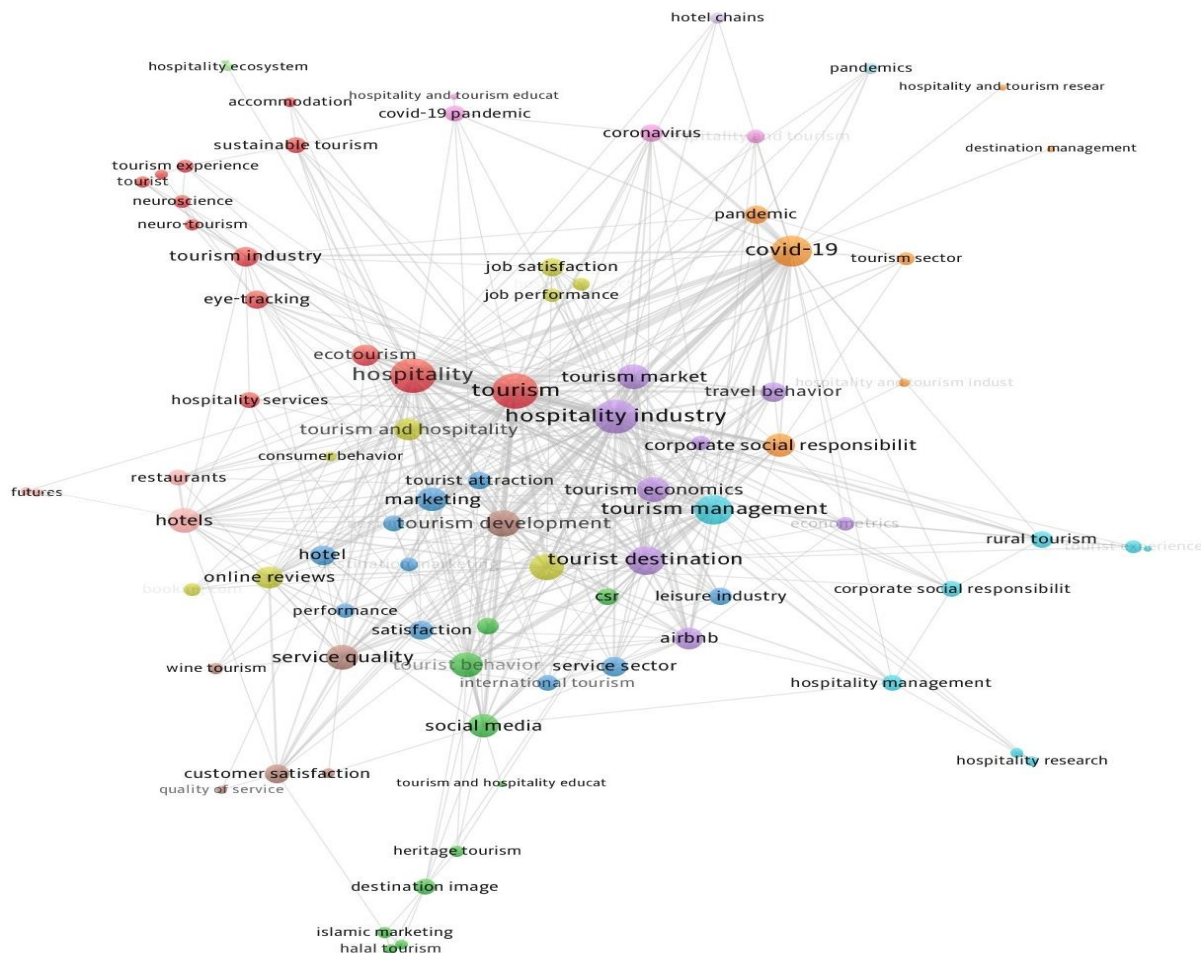
#	Keyword	Occ	TLS	#	Keyword	Occ	TLS
1	Tourism	239	839	34	Hospitality research	7	17
2	Hospitality	162	514	35	Tourism research	7	13
3	Covid-19 or covid-19 pandemic or coronavirus	137	462	36	Destination marketing or destination	10	37
4	Hospitality industry	131	647	37	Hospitality sector	10	55
5	Tourism and hospitality or tourism and hospitality industry or tourism and hospitality research	64	130	38	Corporate social responsibility or CSR	31	129
6	Tourism management	47	268	39	Rural tourism	6	26
7	Hotel(s) or hotel chains	46	163	40	Neuro-tourism	6	10
8	Tourism development	38	239	41	Hospitality services	5	18
9	Hotel industry	32	172	42	Booking.com	5	17
10	Social media	32	92	43	Tourism sector	5	17
11	Tourist experience	6	18	44	Customer experience	5	16
12	Tourism economics	29	193	45	Wine tourism	5	13
13	Tourism market	28	191	46	Tourist attraction	4	23
14	Tourist destination	28	188	47	Eye-tracking	4	17
15	Pandemic	22	65	48	Destination development	4	12
16	Tourist behavior	22	114	49	Service industry	4	12
17	Airbnb	22	92	50	Destination image	4	11
18	Service quality	22	87	51	Travel intention	4	9
19	Marketing	19	87	52	Tourist	4	8
20	Online reviews	15	69	53	Job performance	4	7
21	Customer satisfaction	12	42	54	Destination management	4	5
22	Sustainable tourism	12	31	55	Urban tourism	4	4
23	Ecotourism	11	60	56	Food	3	8
24	Satisfaction	11	35	57			
25	Tourism and hospitality education	11	14	58	Heritage tourism	3	7
26	Leisure industry	6	41	59	Neuroscience	3	7
27	Travel behavior	10	63	60	Halal tourism	3	6
28	Tourism industry	10	33	61	Hospitality ecosystem	3	6
29	Job satisfaction	10	31	62	Islamic hospitality	3	6
30	Restaurants	10	30	63	Accommodation	3	5
31	Consumer behaviour	9	34	64	Restaurant industry	3	5
32	Service sector	8	42	65	Smart hospitality	3	4
33	Hospitality management	7	24	66	Food tourism	3	3

TLS: total-link-strength, Occ: occurrences

Source: own elaboration

Graph 5 illustrates the co-word network analysis of tourism, hospitality, and neuro-tourism. At the same time, Table 5 shows the number of co-word related to each searching word. For example, tourism is connected with 28 co-words, while hospitality has been found with 17 co-words. Furthermore, neuro-tourism was associated with three co-words, as tabulated in Table 5.

Graph 5. The co-word network analysis of tourism, hospitality, and neuro-tourism research (2009-2023)



Source: own elaboration

Table 5. The Co-word analysis of tourism, hospitality, and neuro-tourism research (2009-2023)

Word	Co-word analysis	Number of co-word
Hospitality	Hospitality, Hospitality services, Islamic hospitality, Tourism and hospitality education, Hospitality sector, Tourism and hospitality, Hospitality industry, Hospitality management, Hospitality research, Hospitality and tourism industry, Hospitality and tourism research, Tourism and hospitality industry, Hospitality and tourism, Hospitality and tourism education, Hospitality ecosystem, Smart hospitality, Tourism and Hospitality	17
Tourism	Ecotourism, Neuro-tourism, Neurotourism, Sustainable tourism,	28

	Tourism, Tourism experience, Tourism industry, Halal tourism, Heritage tourism, Tourism and hospitality education, International tourism, Tourism and hospitality, Tourism economics, Tourism market, Food tourism, Rural tourism, Tourism management, Tourism sector, Hospitality and tourism industry, Hospitality and tourism research, Tourism sector, Tourism and hospitality industry, Tourism development, Wine tourism, Hospitality and tourism, Hospitality and tourism education, Urban tourism, Tourism and hospitality	
Neuro-tourism	Neuro-tourism, neurotourism, neuroscience	3

Source: own elaboration

3.1.5 Citations

Table 6. The top cited documents (minimum 280 citations)

Title of paper	Journal	Year	TCs
“An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research”	“International Journal of Contemporary Hospitality Management”	2018	687
“What makes a useful online review? Implication for travel product websites”	“Tourism Management”	2015	602
“COVID-19: potential effects on Chinese citizens' lifestyle and travel”	“Tourism Review”	2021	417
“Tourism supply chain management: A new research agenda”	“Tourism Management”	2009	341
“Airbnb: the future of networked hospitality businesses”	“Journal of Tourism Futures”	2016	323
“Factors influencing tourist food consumption”	“International Journal of Hospitality Management”	2012	297
“Smart technologies for personalized experiences: a case study in the hospitality domain”	“Electronic Markets”	2015	294
“Technological disruptions in services: lessons from tourism and hospitality”	“Journal of Service Management”	2019	291
“What do Airbnb users care about? An analysis of online review comments”	“International Journal of Hospitality Management”	2019	290
“The impact of non-pharmaceutical interventions for 2009 H1N1 influenza on travel intentions: A model of goal-directed behavior”	“Tourism Management”	2012	287
“Hospitality and tourism industry amid COVID-19 pandemic: Perspectives on challenges and learnings from India”	“International Journal of Hospitality Management”	2021	281

Source: own elaboration

The analysis of citations plays a crucial role in understanding global trends within specific fields, such as tourism, neuro-tourism, and hospitality, as it offers valuable insights into the most frequently referenced papers. This information is of significant importance for future researchers and practitioners

seeking to identify influential documents. In this study, we analyzed a total of 971 publications in tourism, neuro-tourism, and hospitality research. We specifically focused on identifying the most highly cited articles in Table 6, with a minimum of 280 total citations (TCs), which explored tourism, neuro-tourism, and the hospitality field.

Table 6 presents a comprehensive overview of these highly cited documents. Notably, two documents have received over 600 TCs. One article, titled “An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research,” was published in the *International Journal of Contemporary Hospitality Management*, with 687 citations. The second paper, titled “What makes a useful online review? Implication for travel product websites,” was published in *Tourism Management* and has garnered 602 citations. Furthermore, three documents have cited between 300 and 450 citations. The remaining documents listed in Table 6 have received less than 300 citations, for example, the title "Hospitality and tourism industry amid COVID-19 pandemic: Perspectives on challenges and learnings from India", which was published by the *International Journal of Hospitality Management* has the least citations with 281.

3.1.6 Bibliographic Coupling (authors)

In this study, the VOSviewer tool was employed to assess the strength of the correlation between the two authors. The tool utilized bibliographic coupling (authors) to determine the link strength between references associated with both authors. Table 7 presents the link strengths, which indicate the degree of correlation. A higher number of links indicates a stronger connection between the references.

Table 7. The top authors pair with minimum documents (5) and citations of authors (260)

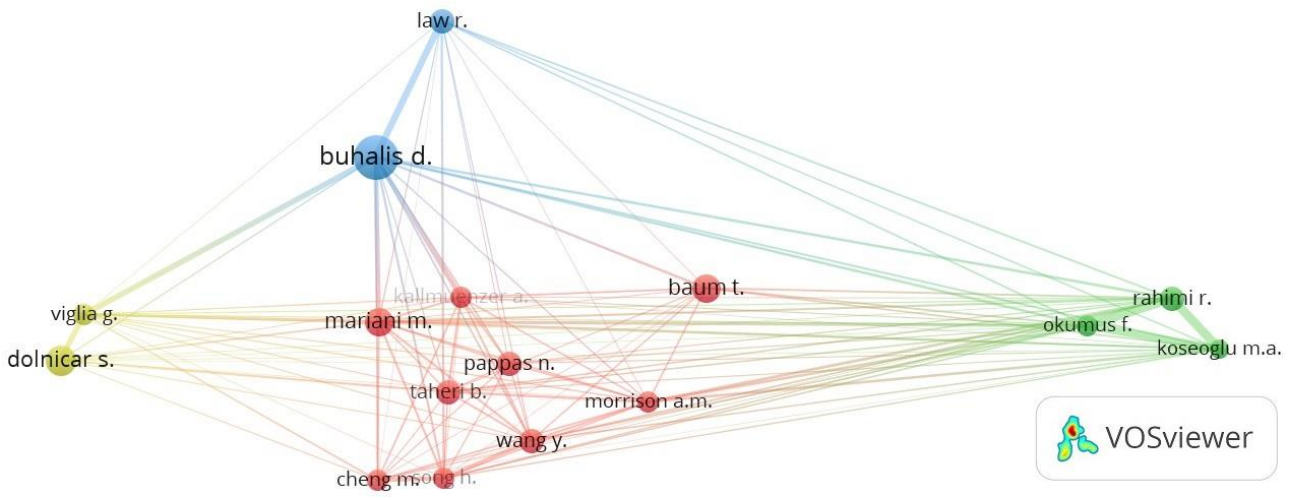
#	Item 1	Item 2	Links between items 1, 2
1	Okumus, F.	Rahimi, R.	468
2	Koseoglu, M.A.	Rahimi, R.	445
3	Buhalis, D.	Law, R.	245
4	Dolnicar, S.	Viglia, G.	168
5	Cheng, M.	Song, H.	98
6	Song, H.	Wang, Y.	85
7	Morrison, A.M.	Rahimi, R.	44
8	Mariani, M.	Viglia, G.	44
9	Baum, T.	Buhalis, D.	35
10	Kallmuenzer, A.	Taheri, B.	28
11	Law, R.	Song, H.	28
12	Taheri, B.	Wang, Y.	22
13	Rahimi, R.	Wang, Y.	17
14	Pappas, N.	Taheri, B.	10
15	Viglia, G.	Viglia, G.	7

Source: own elaboration

The analysis revealed notable correlations between various author pairs. The strongest correlation was observed between Okumus, F. and Rahimi, R., with 468 links, highlighting a significant degree of connection between their respective references. A closely following correlation was identified between Koseoglu, M.A. and Rahimi, R., with 445 links. The third strongest correlation was found between Buhalis, D. and Law, R., with 245 links. Conversely, the links between Viglia, G. and Viglia, G.

were minimal, with only seven links. These represented the weakest links between the two authors regarding correlation strength. Graph 6 illustrates the map visualization of top authors pairs with min. five documents and 260 citations at least.

Graph 6. Snapshot of top authors pair with minimum documents (5) and citations of authors (260)



Source: own elaboration

4.2 Neuro-Tourism on SC database

Relying on the data from the SC database collected in July 2023, 7 documents met the query applied to the title, abstract, and keywords: “TITLE-ABS-KEY (neurotourism OR neuro-tourism)”. However, none of them were indicated as ‘Article’: 4 were indicated as ‘Conference paper’, two as ‘Review’, and one as ‘Conference review’ (Table 8). Despite the primary condition of this research to exclude the documents that are not specified as ‘Article’ or ‘Review article’ from the analysis, in order to demonstrate the trend in scientific discourse, the conference papers on neuro-tourism will not be excluded from this part of the study.

Table 8. Publications on neuro-tourism found in the SC database

Authors	Title	Source/Journal	Year	Type	TCs
(Al-Nafjan et al., 2023)	“Systematic Review and Future Direction of Neuro-Tourism Research”	Brain Sciences	2023	RW	1
(Gkintoni et al., 2022)	“A Conceptual Framework for Applying Social Signal Processing to Neuro-Tourism”	Springer Proceedings in Business and Economics	2023	CP	0
(Pourfakhimi et al., 2019)	“A critique of the progress of eTourism technology acceptance research: time for a hike?”	Journal of Hospitality and Tourism Technology	2019	RW	20
(Nagaj & Zuromskaitė, 2018b)	“A Scientific Experiment as a Research Method in the Tourism Sector in the Context of Increased Terrorism Risks”	Springer Proceedings in Business and Economics	2018	CP	1
(Nagaj &	“The Role of Behavioral	Springer Proceedings	2018	CP	1

Zuromskaitė, 2018a)	Methods Used in Research on Tourism Development”	in Business and Economics			
(Ma et al., 2014)	“Applying neuroscience to tourism management: A primary exploration of neurotourism”	Applied Mechanics and Materials	2014	CP	15

CP: conference paper, RW: review, TCs: total citations

Source: own elaboration

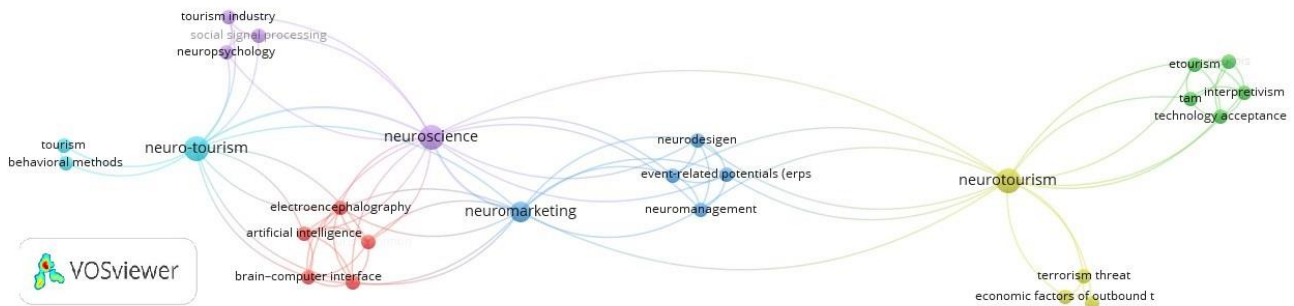
As demonstrated in Table 7, 3 out of 4 conference papers were published in Springer Proceedings in Business and Economics. It is worth noticing that only 1 of 2 research articles was published in the Journal of Hospitality and Tourism Technology. Considering the total citations, it is worth noting that only one conference paper was not cited until this review; therefore, the growing interest in applying neuroscientific methods in tourism might be predicted.

Filtering results by country, Lithuania and Poland emerged with two (conference papers) publications each; other contributing countries (with one publication per country) were Sweden, Saudi Arabia, New Zealand, Greece, China, and Australia.

The analysis revealed 73 keywords that were provided with the publications. Neurotourism, Neuroscience and Neuro-tourism were mentioned 3 times each; Tourism and Neuromarketing - 2 times each; and all the remaining 60 keywords (Visual Attention, Visual Acuity, Tourist Emotion, Tourist, Tourism Industry, Tourism Experience, Terrorism Threat, Technology Acceptance, Task Performance, TAM, Systematic Review, Social Signal Processing, Social Psychology, Scheduling, Review, Questionnaire, Qualitative Research, Principal Component Analysis, Physiology, Perception, Neuropsychology, Neurophysiology, Neuromanagement, Neurology, Neurodesigen, NeuroIS, Mathematical Parameters, Manufacture, Magnetoencephalography, Interpretivism, Information Management, Human, Heart Rate, Glycemic Index, Functional Near-infrared Spectroscopy, Functional Magnetic Resonance Imaging, Facial Expression, Eye-tracking, Eye Tracking, Eye Movement, Eventrelated Potential (ERPs), Event-related Potentials (ERPs), Event Related Potential, Emotionality, Emotion, Electromyography, Electroencephalography, Electrodermal Response, Economic Factors Of Outbound Tourism, ETourism, Decision Making, Computer Aided Design, Cognitive Control Network, Brain-computer Interface, Biofeedback, Behavioral Methods, B-Alert X10 MindWave Mobile2 SMI Red 500, Attention, Artificial Intelligence, Anxiety) were indicated once. Considering the most occurrent keywords, the relation to neuromarketing can be noticed. Therefore, it reveals the possible further interdisciplinary research direction of combined neuroscientific marketing research in tourism.

Graph 7 thoroughly examines authors-provided keywords from the six papers documented in Table 7, employing the VOSviewer software. This meticulous analysis revealed the presence of 26 distinct keywords, each appearing at least once within the articles. This substantiates the dataset's resilience and suitability for in-depth scrutiny. The application of this approach proves highly advantageous in uncovering pivotal insights pertaining to the content of the articles and facilitating the assessment of recurring thematic patterns within the specialized realm of tourism, neuro-tourism, and hospitality. The graphical representation of the analysis outcomes in Graph 7 vividly portrays these discoveries coherently and intelligibly.

Graph 7. Snapshot of authors' keywords with a minimum of one occurrence



Source: own elaboration

5. Conclusion

Tourism has long been an area of interest for scholars and researchers across disciplines, with its wide-ranging impact on individuals and economies. It offers people opportunities for personal enrichment, cultural learning, travel, unique activities, and improved well-being. Neuroscience tools have been used to study consumer behavior, advertising, marketing, tourism, and hospitality. This convergence of neuroscience, tourism, and hospitality has led to "neuro-tourism," a field that uses neuroscientific principles and advanced measurements to understand tourist behavior. By uncovering the neural mechanisms behind the tourist journey, neuro-tourism has the potential to transform the industry. This is by providing a fresh understanding of consumer behavior and enhancing tourist experiences.

Despite the advancements in neuroscience tools, their widespread implementation in marketing and economy, but in the tourism and hospitality sector, remains somewhat limited. Further research is needed to explore the potential benefits and limitations of utilizing neuroscience technology in tourism and hospitality research and to investigate how this technology can be effectively integrated with traditional methods to attain a more comprehensive understanding of consumer behavior. Such research endeavors can also delve into the implications of employing this technology for marketing strategies, including enhancing service quality, customer satisfaction, and sustainability. Scholars can gain valuable insights into the tourism and hospitality field by conducting comprehensive investigations.

In the ever-evolving field of tourism and hospitality field, the application of neuromarketing tools, such as but not limited to eye-tracking, has garnered significant attention in pursuing a deeper understanding of consumer behavior, such as satisfaction, experiences toward services quality, service sector, foods, destination, online reviews, restaurants, halal foods, and accommodation in tourism and hospitality field. Motivated by this exciting quest, the present study undertook a remarkable investigation following the PRISMA framework. The aim was to uncover and examine global academic research trends within the field of neuro-tourism, tourism, and hospitality. The researchers systematically analyzed 971 documents from the Scopus database between January 2009 and July 2023. A bibliometric analysis was conducted to gain a profound understanding of the global academic landscape. This analysis unveiled prominent countries, distinguished academic institutions, influential authors, prestigious journals, and captivating citation trends. These findings are significantly fruitful for future studies in the field of tourism, neuro-tourism, and hospitality while offering valuable time-saving insights for emerging scholars.

The bibliometric analysis conducted in this study unveiled the remarkable scholarly contributions of various countries, institutions, journals, and authors in the tourism, neuro-tourism, and hospitality fields. The UK emerged as the most productive country, boasting 289 influential documents

that garnered 11391 citations. Notably, the USA and Australia also showcased their intellectual prowess, contributing 118 and 102 documents that received 4651 and 4920 citations, respectively. Within this scholarly landscape, the "Hong Kong Polytechnic University" took center stage with its 57 publications, demonstrating its significant research output. Other esteemed institutions, such as the "University of Surrey," "Griffith University," and the "University of Johannesburg," showcased their brilliance with 29, 27, and 26 documents each, earning trend citations of 1734, 1308, and 965, respectively. Even in the far reaches of academia, the flame of intellectual inquiry burned brightly, as evidenced by "Sun Yat-Sen University" noteworthy contributions with five intriguing works.

Regarding scholarly journals, the "International Journal of Contemporary Hospitality Management" emerged as a prominent publication, featuring 96 enlightening documents that accumulated 4312 citations. However, the "International Journal of Contemporary Hospitality Management" stood out as the highest-cited journal. Followed by the "International Journal of Hospitality Management" with 55 documents and 3179 citations. Although "Tourism Management" placed in the 3d position in the list, it has the second-highest citations. "Frontiers in Psychology" is located in the tail of the list with 16 documents. Among the authors, "Buhalis, D." secured the leading position with 18 publications and 1833 citations, demonstrating the breadth of their research contributions. Following closely behind were "Dolnicar, S." and "Mariani, M." each having published ten documents and receiving 531 and 522 citations, respectively. Notably, "Baum, T." contributed nine significant publications that garnered the second-highest citation count of 1043, underscoring their impact within the field.

Amidst the vast expanse of knowledge, "An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research" emerged as the most cited work, amassing 687 citations, published in the "International Journal of Contemporary Hospitality Management", it solidified its status as a seminal contribution within the field. Following closely behind, "What makes a useful online review? Implication for travel product websites" left its mark in the scholarly realm, accumulating 602 citations with its publication in "Tourism Management", securing the position as the second most cited article. As connections between authors were examined, the study unveiled the strongest link between "Okumus, F." and "Rahimi, R.", with an impressive 468 links. This was closely followed by the connection between "Koseoglu, M.A." and "Rahimi, R.", which demonstrated 445 links. On the other hand of the spectrum, the link strength between "Viglia, G." and "Viglia, G." amounted to 7 links, representing the weakest connection between these two authors.

Furthermore, the study identified "Tourism" as the most frequently encountered term, appearing 239 times and garnering a total link strength (TLS) of 839. This was closely followed by "Hospitality", with 162 occurrences and TLS values of 514, respectively. Furthermore, the co-word analysis found several words related to "Tourism" terms such as tourism development, tourism economics, tourism market, Sustainable tourism, tourism industry, food tourism, halal tourism, heritage tourism, urban tourism, wine tourism, destination, and neuro-tourism. For the "Hospitality" term, we found several hot keywords related to hospitality, such as hospitality industry, satisfaction, customer satisfaction, hospitality management, hospitality ecosystem, smart hospitality, Islamic hospitality, hospitality services, and Hospitality research. These keywords are significantly valuable for newbie researchers and scholars interested in tourism and hospitality.

Furthermore, neuro-tourism research represents an intriguing and promising avenue for future exploration, particularly during crises and pandemics. It is hoped that there will be an increase in the availability of training courses for scholars to gain the necessary skills and knowledge to effectively leverage this field. This, in turn, can lead to improved marketing strategies and enhanced advertising campaign effectiveness. Ultimately, integrating neuroscience tools with tourism research holds great potential for enhancing the understanding of consumer behavior and facilitating evidence-based decision-making in the tourism and hospitality domain.

6. Limitations and Future Directions of Research

The objective of this paper was to minimize methodological constraints in the study; however, despite efforts, some limitations were encountered, prompting recommendations for future research. The study focused exclusively on articles and review articles published in English-language journals between January 2009 and July 2023, specifically those indexed in the Scopus database. This narrow scope omitted other documents, such as conference papers and editorials, potentially introducing bias into the study. To mitigate this limitation, the authors suggest that researchers and marketers from emerging countries contribute their work to ensure a more comprehensive foundation for future investigations.

This paper offers a comprehensive overview of tourism, neuro-tourism, and hospitality between January 2009 and July 2023, based on the analysis of published literature. While the study acknowledges its methodological restrictions, it is a valuable resource for understanding the landscape of tourism, neuro-tourism, and hospitality research during the specified period.

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