

Jaime José Orts Cardador*, Carol Angélica Jara Alba, Jesús Claudio Pérez Gálvez,

Artificial Intelligence and Tourism: A Bibliometric Visualisation Review (2015-2024)

<https://doi.org/10.2478/ejthr-2026-0004>

received May 2, 2025; accepted August 21, 2025

Abstract: In recent years, technological advances have enabled the detection of changes in customer preferences and the review and adaptation of services in response. In this context, a tool that has been widely used in the tourism sector in recent years is Artificial Intelligence (AI). AI can be defined as a new trend that can solve many complex mathematical problems and algorithms, using comprehensive, computer-based systems to do so. In the tourism sector, this new tool has numerous applications: robots, chatbots, check-in/out or demand forecasting, among others. Therefore, this study, which employs bibliometric analysis, explores the relationship between AI and tourism to help policymakers and destination marketing organisations (DMOs) understand the main lines of research and identify the main applications of AI in tourism. Data were collected from 720 documents in the period 2015-2024 from the Web of Science database. VOSviewer software was used to create scientific maps showing the current and future lines of research in this scientific field. The results show evidence of research on ‘machine learning, deep learning and artificial neural networks in tourism’, ‘use of

robots and AI in tourism’, ‘sustainability and AI in tourism’ and ‘acceptance of chatbots in tourism’.

Keywords: Artificial Intelligence (AI); Chatbots; Tourism; Bibliometric Analysis; Web of Science; VOSviewer

1 Introduction

Artificial Intelligence (AI) is an intelligent learning system that uses mathematical algorithms to perform tasks that traditionally require human cognitive abilities (Shahzad et al., 2024). UNESCO has defined AI as “information processing technologies that incorporate models and algorithms that produce an ability to learn and perform cognitive tasks, leading to outcomes such as prediction and decision-making in real and virtual environments. AI systems are designed to operate with a certain autonomy, by modelling and representing knowledge and exploiting data and calculating correlations” (UNESCO, 2020, p.5). In addition, AI collaborates with other emerging technologies, such as machine learning, the Internet of Things, artificial neural networks, big data, intelligent robots, and virtual and augmented reality applications, among others (Knani et al., 2022)

The tourism field has been influenced by this technological revolution because AI improves interactions between service providers and tourists, enables personalised tourism experiences, and helps tourists search for information to make decisions, among other applications (Grundner & Neuhofer, 2021). This enhances the tourism experience before, during and after the trip, and creates value for the tourist (Knani et al., 2022). Based on Babin et al.’s (1994) conception of value in tourism, we consider that AI enhances both the hedonic value, related to the aesthetic, experiential and emotional characteristics of the product, and the utilitarian value, related to the functional, efficient and practical characteristics of the product.

***Corresponding author: Jaime José Orts Cardador**, Associate Lecturer in Department of Business Administration, Faculty of Law, Economics and Business - University of Cordoba (Spain), Researcher of the Research Group “Quantitative Methods in Economics, Finance and Business” of the University of Cordoba (Spain), Email: d42orcaj@uco.es

Carol Angélica Jara Alba, Associate Lecturer in Department of Business Administration, Faculty of Law, Economics and Business - University of Cordoba (Spain), Researcher of the Research Group “Quantitative Methods in Economics, Finance and Business” of the University of Cordoba (Spain), Email: z92jaalc@uco.es

Jesús Claudio Pérez Gálvez, Lecturer Senior in Applied Economics of the University of Córdoba (Spain), Manager of the Research Group “Quantitative Methods in Economics, Finance and Business”, Member of Ibero-American Network for Research in the Economics and Management of Tourism (REDEGETUR), Email: dt1pegaj@uco.es

Bibliometrics provides a detailed overview of the intellectual structure, the state of the art, and the prognosis for future lines of research in any scientific field (Cobo et al., 2011; Zupic & Cater, 2015). Due to the importance of AI among tourism entrepreneurs, tourists and researchers themselves, it is necessary to observe which topics will become more relevant in the coming years. This will enable us to make a series of recommendations, both practical and theoretical. Although there are bibliometric studies in the field of AI in tourism (Kirtıl et al., 2021; Knani et al., 2022; Saydam et al., 2022), there are a number of limitations that our study aims to address. For instance, the lines of research that these studies show and the limitation of the scope of analysis because these articles cover only up to 2022.

The main objective of this paper is to analyse the structure and trends of research on AI in tourism between 2015 and 2024 by applying mapping techniques. Using the WoS collection of scientific papers, we have used VOSviewer software to identify networks of document co-citation and keyword co-occurrence. These analyses allow the following intermediate research objectives to be achieved:

- O1) Describe the current state of research on AI in tourism.
- O2) To identify the theoretical foundations underpinning the academic literature on the topic under study.
- O3) Identify current and emerging lines of research on the topic under study.

2 Literature Review

One of the earliest definitions of AI can be considered to Minsky (1967), who defined it as a technology or machine that can perform a task that, if carried out by a human being, would require intelligence to complete (Buhalis et al., 2019). However, its antecedents date back to 1943 due to the artificial neuron model developed by Warren McCulloch and Walter Pitts. This model had neurons with a binary output (-1, +1) with a sign activation function (Latah & Toker, 2019).

However, it was not until the Fourth Industrial Revolution, starting in the second decade of the 21st century, that AI began to establish itself as a technology applicable in different sectors. This was possible thanks to the development of complementary technologies, such as big data and machine learning, which facilitated its practical implementation (Tussyadiah, 2020). This can be seen from the birth of ChatGPT (Chat Generative Pre-trained Transformer), introduced by OpenAI on 30 November 2022, Open Source DeepSeek in May 2023, or AI robots

such as Spot. From this moment on, AI became part of the general public, surpassing 100 million users in a few years (Lee, 2024).

According to Saydam et al. (2022) AI has different qualities and applications such as mechanical, analytical, intuitive, empathic, knowledge representation, optimisation, reasoning, planning, machine learning, decision making, and metaheuristic algorithms. Due to its real-world applications, AI has been used in a multitude of contexts, including coding, marketing, mathematics, statistics, engineering, translation, the service sector, hospitality, medicine, and physics (Saif et al., 2024; Baghran et al., 2025). Therefore, in the field of tourism, AI has had exponential growth in the tourism context due to its ability to improve productivity, efficiency, creativity, and the creation of personalised experiences (Chiengkul et al., 2025). Numerous authors have found its applicability in numerous contexts such as online booking engines (Bilgihan & Ricci, 2024), tourism demand prediction (Seker, 2024), virtual reality (Deriu et al., 2021), virtual agents (Lei et al., 2021), robots (Ivanov, 2024) or augmented reality (Yilmazdogan, 2024).

3 Methodology

3.1 Bibliometric analysis

Bibliometric analysis enables visualisation of the intellectual structure of a given field of research and identification of current and potential lines of research (Al-Rousan & Khasawneh, 2024). It has a number of advantages over traditional literature review analysis because, based on a series of quantitative and statistical techniques, it allows us to objectively visualise a scientific field through different types of analysis (bibliographic coupling, co-citation or keyword analysis, among others) (Khanra et al., 2020). In addition, we can see which journals, authors, academic institutions or bibliographic references have a greater scientific impact (Florida-Benítez, 2022).

Web of Science will be the database of choice for bibliometric analysis due to its academic acceptance, both in systematic literature review work and as a scientific basis for the creation of scientific articles (Al-Rousan & Khasawneh, 2024; Zulfiqar et al., 2024). This is due to its longevity, with more than 100 years, and its scope, with 65 million articles and more than 1 billion cited reference connections (Kim and So, 2022). Comparison with other databases shows that WoS has advantages over Google Scholar due to transparency, ease and quality of documents

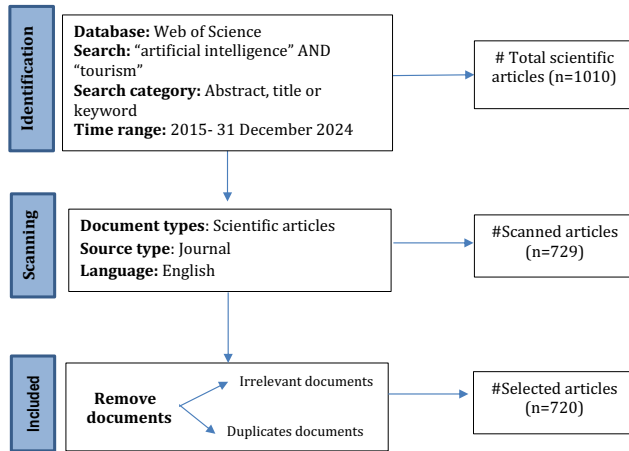


Figure 1: PRISMA Flowchart
Source: Own Elaboration

(Harzing & Alakangas, 2016). On the other hand, in the case of Scopus, integrating both databases creates difficulties, as both lack a homogeneous structure, increasing the risk of information duplication (De Oliveira et al., 2019; Atsiz et al., 2022). Due to these reasons, most researchers use WoS as their database, as it has a much broader structure and content.

Regarding the data analysis programme, our article uses the Visualisation of Similarities (VOS) viewer software (version 1.6.20), which will allow us to analyse the scientific structure of a given scientific field through co-citation analysis and to predict future lines of research and their evolution over time, through keyword analysis (Baker et al., 2021). This programme is widely accepted by researchers due to the creation of scientific maps that allow them to visualise thematic clusters and observe different lines of research (Gao et al., 2021).

3.2 Search string

First, we identify keywords to obtain accurate and reliable results. Researchers use, interchangeably, two methods in order to select keywords in a paper (Chen & Xiao, 2016): a) *a macro approach*, by searching for all keywords related to the scientific field; b) *a micro approach*, by analysing the details of the main research topics in a domain. Based on this, our article will be based on the micro approach from the articles with the highest number of citations in this scientific field (Buhalis et al., 2019; Lu et al., 2019; de Kervenoael et al., 2020; Pillai & Sivathanu, 2020; Dwivedi et al., 2023).

Following the Web of Science search, the PRISMA protocol was employed to refine and filter the database

Table 1: Main Information about Scientific data retrieved

Title	Topic
Number of articles	720
Number of citations	19788
Number of journals	290
Number of authors	2135
Number of institutions	1108
Number of countries	85
Number of keywords	2228
Number of references	37632
Time of study	2015-2024

Source: Own Elaboration

for relevant records (Moher et al., 1999). First, the search query only included TOPIC, so the keywords “artificial intelligence” AND “tourism” were included in the abstract, keywords or title. Secondly, only papers in English were included, corresponding to the period 2015 to 2024. Thirdly, to eliminate bias, the papers were carefully screened, and those unrelated to the subject matter of the study were excluded. Finally, the Excel spreadsheet was used to check for duplicate records. The research questions and review protocol conducted for this study are shown in Figure 1.

4 Results

4.1 Performance analysis

Table 1 shows the information on the scientific field of AI and Tourism (Table 1). We also note that, although this field was born in 2015, there are a large number of citations and articles, indicating that it is an emerging topic and that its scientific output will increase in the future.

Table 2 shows the academic impact and scientific production of the different authors in the scientific field analysed. Additional bibliometric indicators from WoS and Scopus were incorporated into the published articles, with their respective citations, to assess and visualize the greater or lesser academic relevance of both the research and its authors. Rob Law, from the University of Macau (China), is the researcher with the highest number of papers; while Dogan Gursoy from Washington State University (USA); Seongseop Kim from Hong Kong Polytechnic University (China); and Dimitrios Buhalis from Bournemouth University (United Kingdom) are the researchers with the highest average number of citations per

Table 2: Top ten most productive authors by number of published papers

Author/s	A	C	C/A	University	FWCI	DP	DJ	H-Index
Law, Rob	14	455	32,5	University of Macau (China)	1.9	66%	81.6%	79
Ivanov, Stanislav	11	766	69.64	Zangador Research Institute (Bulgary)	3.12	50.9%	56.8%	35
Buhalis, Dimitrios	9	1073	119.22	Bournemouth University (United Kingdom)	6.46	50%	82,8%	65
Gursoy, Dogan	7	1014	144.86	Washington State University (USA)	3.6	78.5%	92.9%	67
Webster, Craig	7	442	63.14	Ball State University (USA)	3.21	45.1%	55.2%	21
Kim, Seongseop	6	745	124.17	Hong Kong Polytechnic University (China)	1.95	80.5%	88%	51
Tussyadiah, Lis	6	440	73.33	Surrey University (United Kingdom)	4.49	75.9%	72.7%	34
Dwivedi, Yogesh	6	204	34	King Fahd University of Petroleum & Minerals (Saudi Arabia)	8.72	75.1%	79.5%	106
Li, Minglong	5	325	65	Zhongnan University of Economics and Law (China)	2.44	77.3%	91%	13
Qiu, Hailian	5	325	65	Hubei University (China)	4.19	90%	100%	8

Note: A (total number of articles), C (total number of citations), C/A (average citations per article), FWCI, proportion of citations received in relation to the expected world average for the subject area, type of publication and year of publication; DP: Documents in top citation percentiles; DJ: Documents in top 25% journals.

Source: Own Elaboration based on Web of Science data (2025)

Table 3: Top ten most productive institutions by number of published papers

University	A	C	C/A	Scimago Ranking	MCP
Hong Kong Polytechnic University (China)	31	2054	66.26	1	Kim et al. (2021)
University of Macau (China)	22	611	27.77	356	Wang et al. (2020)
Surrey University (United Kingdom)	11	881	80.09	72	Tussyadiah(2020)
Nankai University (China)	11	513	46.64	200	Lv et al. (2021)
Kyung Hee University (South Korea)	11	187	17	284	Gupta et al. (2023)
Bournemouth University (United Kingdom)	10	1095	109.5	177	Dwivedi et al. (2023)
Washington State University (USA)	9	1056	117.33	1912	Lu et al. (2019)
Central Florida University (USA)	9	220	24.44	68	Dwivedi et al. (2023)
Macau University Science and Technology (China)	9	85	9.44	526	Wang et al. (2020)
Sichuan University (China)	8	230	28.75	31	Huang et al. (2021)

Note: A (total number of articles), C (total number of citations), C/A (average citations per article), Ranking Scimago Universities (Business, Management and Accounting); MCP, Most cited paper.

Source: Own Elaboration based on Web of Science data (2025)

paper. According to the h-index metric, these authors have a consolidated and relevant scientific trajectory (h-index >20) (Hirsch, 2005; Díaz, 2014). Table-3 shows the academic institutions with the greatest scientific relevance with respect to the subject of analysis, with United Kingdom, China and the United States standing out.

4.2 Co-citation analysis

From the co-citation analysis, we will identify the intellectual structure of the scientific field analysed (Carvajal-Trujillo et al., 2024). In this work, we considered those documents that had been jointly cited in at least

40 papers. Accordingly, two distinct clusters of documents have been identified (Figure 2). The content of the most academically relevant papers in each of these clusters is described below:

- Cluster Red: “Robots in the service sector”: This cluster is focused on analysing the benefits of robots in the service sector for consumers, as well as the opportunities and improved experience. One of the papers with the greatest academic impact is Wirtz et al. (2018), who analyse the benefits of robots for consumers and the ethical and moral issues. To do so, the authors conceptualise the Service Robot Acceptance Model (sRAM), which is based on the technology acceptance model (TAM; Davis, 1989). To the TAM, they add the

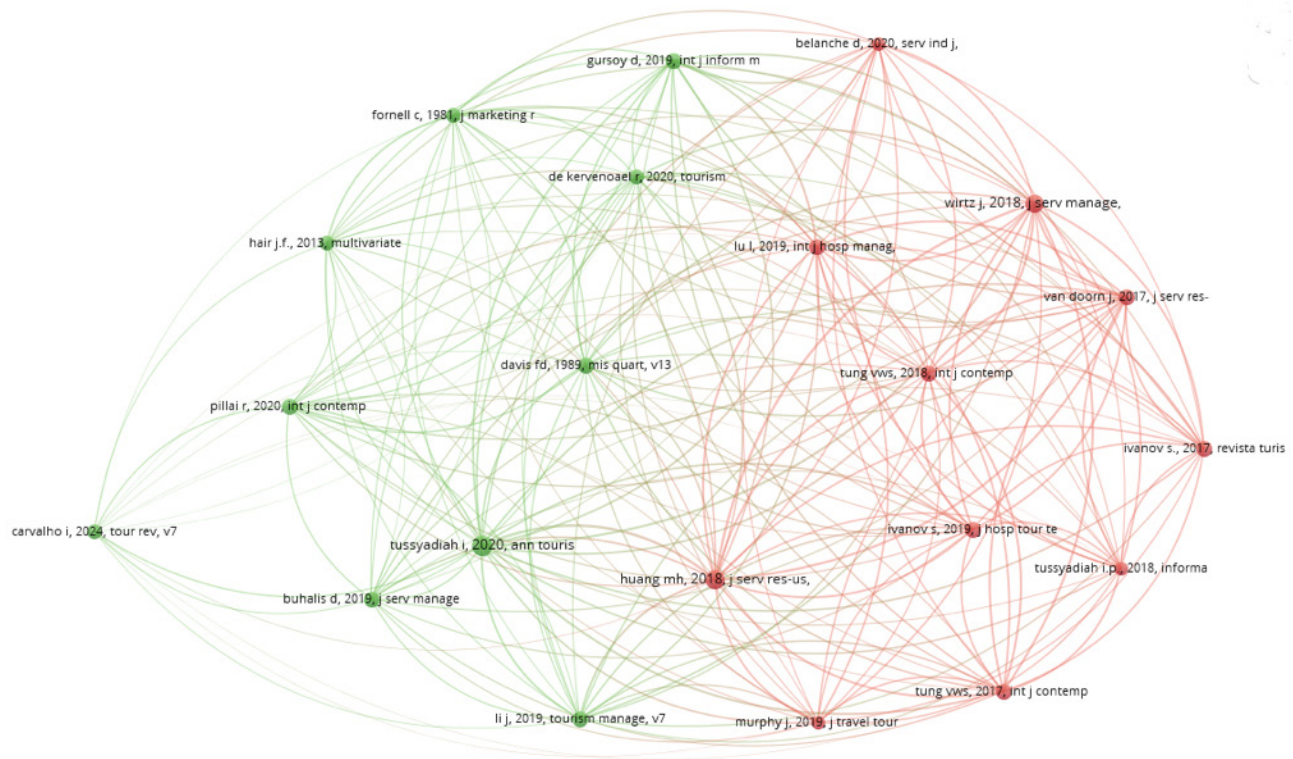


Figure 2: Co-Citation networks (documents) in the Web of Science data
Source: own elaboration with Web of Science (2025) processed with VOSviewer software

social-emotional elements of service (Heerink et al., 2008; van Doorn et al., 2017) and relational elements (Heerink et al., 2010; Nomura & Kanda, 2016). Thus, this model consists of three elements: *functional elements* (perceived ease of use, perceived usefulness, and subjective social norms), *social-emotional elements* (perceived humanness, perceived social interactivity, and perceived social presence), and *relational elements* (trust and rapport). The authors conclude with a series of moral dilemmas which must be addressed in the future, such as privacy and security, and dehumanisation (consumers), technological gap, and loss of jobs (society), monopolies, loopholes, and loss of human contact (markets). A second relevant paper is by Van-Doorn et al. (2017), who introduce the concept of automated social presence, in which consumers feel that they are with another human when they establish a relationship with a robot. They build on Biocca and Harms' (2002) conceptual framework of social presence, which they define as a "sense of being with another". This article serves as a basis for the analysis of Wirtz et al. (2018), because it concludes that robot characteristics such as warmth of service, competence, responsiveness, attractiveness and manageability imply technological acceptance of the robot.

— Green cluster: "Benefits and risks of using Artificial Intelligence in Tourism": This cluster analyses the use of AI in Tourism. One of the articles with the greatest academic impact is that of Pillai and Sivathanu (2020), who analyse the perceptions of customers and travel agency managers regarding the use of AI-powered chatbots in India. The proposed model is based on the Technology Acceptance Model (Davis, 1989), using the constructs of Perceived Ease of Use and Perceived Usefulness. In addition, they added context-specific variables such as anthropomorphism (Mori, 1970), perceived intelligence (Warner & Sugarman, 1986), perceived trust (Mayer et al., 1995) and technology anxiety (Igbaria & Parasuraman, 1989). A second relevant paper is Li et al. (2019), who analysed the substitution effect of AI on tourism employment. To do so, they analysed the psychological pressure AI exerts on workers to quit their jobs, considering the moderating role of perceived organisational support and competitive psychological climate. To do so, they drew on the estimates of Frey and Osborne (2017), who predict that almost half of all US jobs will be automated in the coming decades, and the forecasts of Bowles (2014), who predicted that 54% of European occupations could be computerised through rapid automation.

Table 4: Top 20 author keywords from co-word analysis

Keywords	Occurrences	Total Link Strength
1. Artificial Intelligence	360	1765
2. Tourism	129	648
3. Robot	74	378
4. Hospitality	71	374
5. Bibliometrics	56	279
6. Sustainability	55	250
7. Machine learning	41	208
8. Chat-GPT	36	167
9. Big Data	31	164
10. Deep Learning	28	144
11. Covid-19	24	147
12. Chatbots	22	136
13. Smart Tourism	20	92
14. Technology Acceptance Model	19	103
15. Tourism Demand Forecasting	19	91
16. Hotel	18	92
17. Internet of things	15	93
18. Technology	15	93
19. Social media	15	92
20. Artificial Neural Network	14	64

Source: Own Elaboration based on Web of Science data (2025) processed with VOSviewer software

4.3 Co-occurrence analysis

The analysis of keyword co-occurrence enables identification of distinct research fields within the analysed scientific domain (Callon et al., 1991; Liu et al., 2015). Following Cordova-Buiza (2025), this analysis is based on the “author keywords” provided in the analysis documents and not on the “keyword plus” indexed automatically by WoS. The thesaurus was applied with the aim of eliminating synonymy problems, avoiding repetitive terms and standardising information (Van Eck & Waltman, 2022). Table 4 provides the 20 keywords with the highest number of occurrences and their total link strength, with “artificial intelligence”, “tourism” and “robot” being the most scientifically relevant keywords.

The analysis by keyword groups from a number of 12 co-occurrences allows the identification of four relevant clusters of heterogeneous keywords (Figure 3):

- Red cluster: “Machine learning, deep learning and artificial neural networks in tourism studies”: Machine learning, deep learning and artificial neural networks

are hierarchically related approaches within the field of AI. In this context, machine learning is used for AI to learn data systematically without being explicitly programmed for each task; artificial neural networks are computational models inspired by the functioning of the human brain, and deep learning is a subtype of neural networks characterised by multiple hidden layers, allowing it to process larger volumes of data and tackle more complex tasks (IBM, 2023). In this sense, the articles in this cluster use this tool as a methodology for the purpose of analysing tourism. One of the articles with the greatest impact is Seker (2024), which uses a hybrid methodological approach to analyse international tourism receipts in Turkey and predict future behaviour. This method uses, on the one hand, traditional mathematical models based on polynomial equations and, on the other hand, machine learning algorithms based on AI. The results predict that tourism revenues will not exceed USD 45 billion in 2027, despite the expected high number of visitors. This is due to factors such as the competitiveness of nearby tourist destinations (Spain or Greece) and, especially, all-inclusive hotels, which limit tourists’ additional spending. Furthermore, the methodology shows how these algorithms can be effective tools for predicting tourism demand, offering new opportunities for strategic planning and decision-making in the sector. Another relevant current paper is Puri et al. (2023), who perform a bibliometric analysis on the tourism blockchain using the VOSviewer tool and AI models with the help of machine learning tools. Using the Web of Science database, the authors conclude that the main applications of the tourism blockchain are related to investments, consumer feedback, hotel reservations, car rentals, donations and immersive technology.

- Green cluster: “Use of robots in tourism”: This cluster analyses the use of robots in the tourism sector, from their different applications and benefits to their disadvantages. They are also related to the COVID-19 pandemic because many jobs were replaced by robots due to protective measures such as social distancing or confinement. One of the most relevant articles is Ivanov’s (2024), which conceptually analyses the role of robots in tourism. The author shows that in developed countries, there is an increasing lack of workers in this sector due to factors such as low birth rate, increased bargaining power, higher educational level or harsh working conditions. In addition, the author highlights the fragility of jobs during negative external shocks, such as COVID-19, and the positive

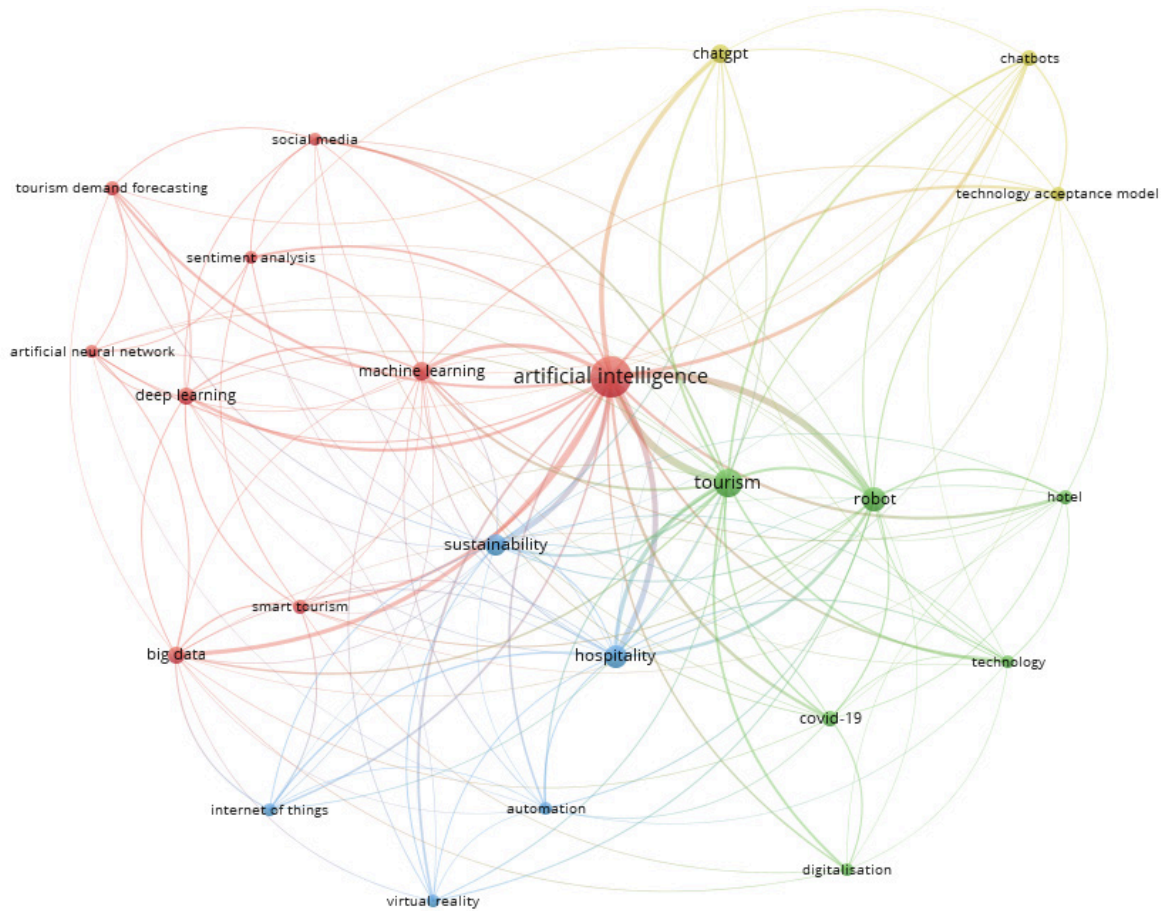


Figure 3: Co-occurrence networks (documents) in the Web of Science data

Source: own elaboration with Web of Science (2025) processed with VOSviewer software

role of robots in such contexts. In terms of practical recommendations, the authors consider that robots can help in this context, e.g. by automating tasks, increasing employee efficiency, or improving working conditions by eliminating repetitive or dangerous tasks. Another relevant paper is Zeng et al. (2020), who highlight the relevant role acquired by robots during the COVID-19 pandemic. In this way, the negative connotations of robots before the pandemic, due to concerns about job losses and data privacy, have been lost due to the help they have provided. Thus, the authors highlight aspects such as the distribution of materials, the disinfection and sterilisation of public spaces, or the detection or measurement of body temperature, among others. All in all, the authors establish a series of practical recommendations for the use of robots during the tourist experience, such as the surveillance and protection of natural resources or navigation systems to avoid tourist overcrowding.

- Blue cluster: “Sustainability and AI in tourism”: This group of articles analyses the role of AI in promoting sustainability in the tourism sector. A relevant article is that of Siddik et al. (2025), who integrate artificial neural network (ANN) analysis with traditional econometric models in order to analyse the role of AI in promoting sustainable growth in tourism. To do so, they investigate the interaction between AI adoption, gross domestic product, foreign direct investment, inflation and urbanisation in the top ten global tourism destinations between 2010 and 2022 (Austria, France, Germany, Greece, Turkey, Spain, Mexico, Italy, the United Kingdom, and the United States). Among other findings, the authors highlight that the factor that has the greatest influence on AI is economic growth. Furthermore, in relation to sustainability, AI serves, on the one hand, to manage the influx of tourists in cities such as Barcelona and, on the other hand, to improve sustainable urban development. Another

highly relevant article is that of Balsalobre-Lorente et al. (2023), who analyse the role of AI and Information and Communication Technologies (ICTs) in improving sustainability in tourism and assess whether digitalisation acts as a catalyst for achieving the Sustainable Development Goals (SDGs). The authors analysed the long-term effect of per capita income, tourism, natural resources, urbanisation, ICTs and AI on environmental sustainability in 36 OECD economies between 2000 and 2018. The authors highlight the role of AI in improving tourism efficiency and thus sustainability. This is highlighted in factors such as the creation of smart cities or the efficiency in the exploitation of natural resources.

- Yellow cluster “Acceptance of chatbots in tourism”: This cluster analyses the implementation of chatbots in tourism (such as ChatGPT), due to the advantages and risks they face. In addition, the authors of this cluster start from the TAM model of Davis (1989), with the aim of analysing the relationship between intention to use and actual consumer behaviour. In this way, Davis (1989) initially proposed that when users are confronted with a new technology, there is a set of factors that influence the intention to use and the actual use of the technology: perceived usefulness and perceived ease of use. One of the most prominent articles is Abed (2024), which establishes a behavioural model to analyse the intention to use and the actual use of Artificial Intelligence in tourism among Generation Z inhabitants in Saudi Arabia. Based on the TAM and DeLone and McLean’s Information Systems Success Model (DeLone & McLean, 2003), they analyse how system quality, service quality and information quality influence perceived usefulness and perceived ease of use, and these influence intention to use and actual use. All hypotheses were supported, except for the effect of service quality on service usability. Among the practical implications, the authors recommend the use of chatbots in tourism for the purpose of tourism planning and travel management. In addition, programmers should ensure that they provide accurate information while intelligently automating the tourism business with real-time solutions. A second important research study is that of Lei et al. (2021), who analyse the difference in the communication perceptions tourists get from chatbots on the one hand and a human agent on the other hand. To identify the factors that influence future usage intention, they draw on the TAM and the Unified Theory of Acceptance and Use of Technology (Venkatesh, 2003). In this sense, they analyse the effect of social presence and media

richness on social attraction and task attraction, which in turn influence trust and future use intention. When comparing the difference in perception between the two sources of information, the causal relationships are fulfilled in both lines of communication, with the exception of the relationship between social presence and task attraction in human agents. Furthermore, those users who communicated with human agents scored significantly higher on social presence, media richness, social attraction, task attraction, trust and reuse intention than chatbot users. Among the practical implications, the authors recommend that chatbots should improve communication and problem-solving skills, allow users to comment on the service provided, improve the speed of response, and improve the ability to understand human language, among others.

5 Discussion

Although there are bibliometric studies in the field of AI in tourism (Kırtıl et al., 2021; Knani et al., 2022; Saydam et al., 2022), our study aims to address several limitations. Firstly, the studies are from 2022, ours being up to 2024, which implies an update of the scientific field in a context in which AI research is advancing rapidly. Secondly, by comparing the scientific fields analysed by these authors, we have observed that our analysis has allowed us to observe three new scientific fields: “Machine learning, deep learning and artificial neural networks in tourism studies”, “Sustainability and Artificial Intelligence in Tourism” and “Acceptance of chatbots in tourism”. For example, AI-based machine learning algorithms can be used to estimate and model tourism revenues. Thus, Seker (2024) recommends that different tourism-related datasets be integrated in the future and that alternative machine learning algorithms be used. In the context of sustainability, we have observed a considerable increase in tourism in recent years, which can cause problems related to touristification and overcrowding. Therefore, AI is a mechanism for managing tourist influx, improving sustainable urban development, or enhancing the efficiency of natural resource exploitation (Balsalobre-Lorente et al., 2023; Siddik et al., 2025). Finally, AI-based chatbots are widely used to make and cancel reservations, assist users, and request recommendations or suggestions. In this regard, numerous companies, such as Booking and Expedia, integrate AI to improve the user experience and optimise travel planning. However, researchers must analyse how these platforms can provide a user-friendly

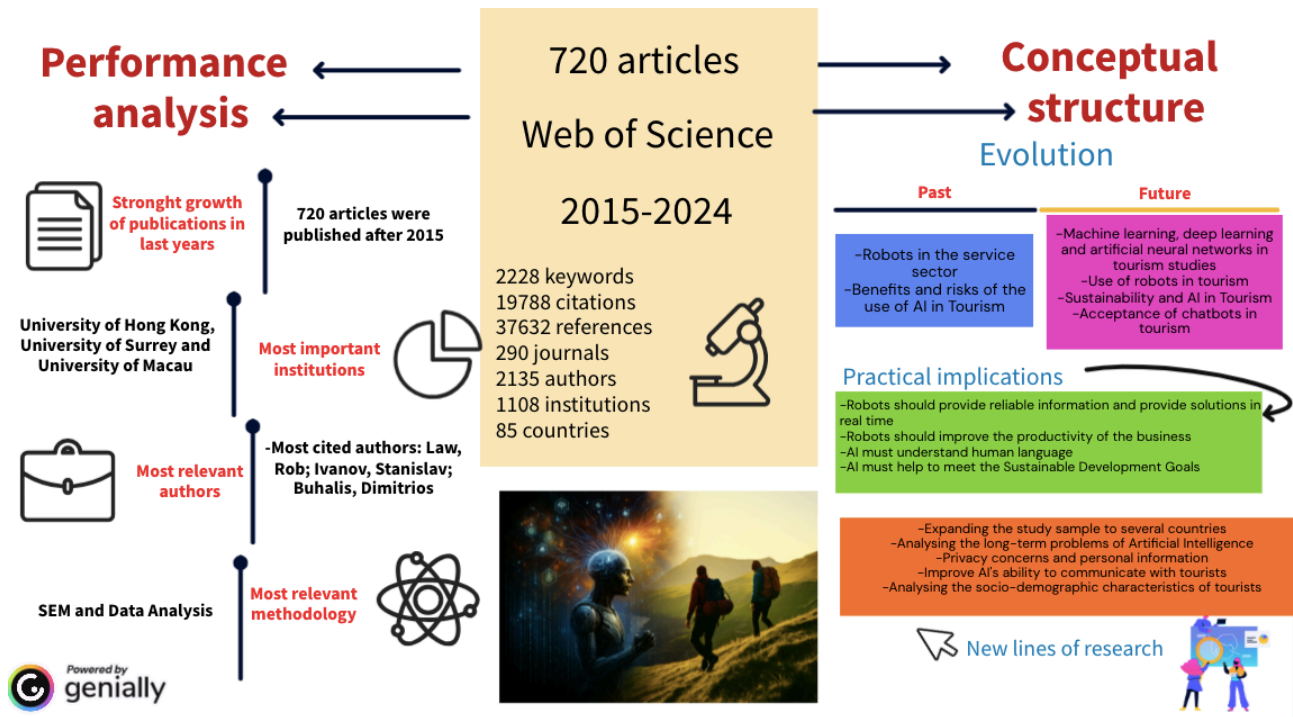


Figure 4: Main contributions of the bibliometric analysis
Source: own elaboration

experience with accurate and up-to-date information to facilitate tourist bookings and improve the user experience (Abed, 2024).

6 Conclusions

AI has established itself as a transformative technology in the tourism sector. On the one hand, it can improve the tourist experience through numerous applications such as online booking, virtual agents, augmented reality and virtual reality. On the other hand, destination marketing organisations and policy makers can also take advantage of its benefits by allowing them to predict tourism demand, better organise work, use robots in case of staff shortages or to supplement workers, data analysis, analyse tourist feedback or improve sustainability.

The main objective of this article is to visualise the scientific structure (through co-citation analysis) and research trends (through co-occurrence analysis) on AI in Tourism through VOSviewer. Firstly, the performance analysis (O1) allows us to observe that the main countries researching in this scientific field are China, the United Kingdom and the United States (Tables 2 and 3). Secondly, the theoretical foundations (O2) are related to “Robots in the service sector” and “Benefits and risks of using

Artificial Intelligence in Tourism” (Figure 2). Finally, the identification of current lines and future opportunities of research in AI in Tourism (O3) shows that it is a complex, dynamic and diverse topic. The co-occurrence analysis highlights the relevance of research on “Machine learning, deep learning and artificial neural networks in tourism studies”, “Use of robots in tourism”, “Sustainability and AI in tourism”, and “Acceptance of chatbots in tourism”.

In terms of practical applications. Firstly, robots using AI should provide reliable information and solutions in real time. This would improve both business efficiency and tourist satisfaction. Secondly, robots can also help to improve the productivity of tourism businesses by automating tasks (check-in/out), setting up surveillance systems in hotels or airports, or eliminating dangerous tasks (e.g. infrastructure maintenance). In this way, staff will focus on high-level tasks that machines cannot perform (such as tour guides or hotel managers). Third, chatbots with implanted AI have a number of constraints, such as limitations in understanding human language (empathy or double meaning), generating emotional intelligence, maintaining stable criteria in responses, or understanding the cultural or specific context in which the question is set (Rostami & Navabinejad, 2023). Therefore, developers must develop more contextualised communication skills and a deeper understanding of chatbots to better interpret human language, thereby

increasing their acceptance among tourists. Fourth, AI can help tourism to meet the Sustainable Development Goals (SDGs) by implementing smart and efficient cities, through energy optimisation of hotel infrastructures and natural resources, and improving sustainable urban development, through predictive modelling to avoid tourist situations or smart distribution of visitor flows.

In terms of the future research agenda. Firstly, although the articles focus on analysing the benefits of AI in tourism, few focus on analysing the problems it may generate in the long term. For example, future studies should analyse the negative impact that AI may have on the replacement of employees by this new technology or what could be the new place they would occupy in the company. Secondly, chatbots using AI collect data from tourists, for example, in the case of a person making a booking on a portal using this technology and entering socio-demographic data. Therefore, future research should define ethical privacy standards and boundaries; examine tourists' perceptions towards the use of their personal information; and develop an ethical framework and guidelines for ethical data management in tourism businesses. Third, AI engineers and developers must improve the communicative capabilities of these tools with tourists (e.g. establishing emotional intelligence, processing complex natural language, or understanding context). Fourthly, regarding the methodological aspect of the analysed articles, we understand that it is necessary to establish a global research to generalise the acceptance of AI in the tourism field and to encourage further academic debate on existing research results. Furthermore, the socio-demographic characteristics of tourists should be analysed to enable comparisons of acceptance between groups.

Figure 4 summarises the main contributions of the article:

Finally, like any study, it has its limitations. Firstly, Web of Science was the database used to carry out our bibliometric analysis. Although it is widely accepted in the academic world for its scientific impact, future studies should expand the database to include Google Scholar, Scielo, Dimensions, or Scopus. Specifically, future studies should analyse this scientific field by integrating the Web of Science and Scopus databases. To avoid duplicating information, reference management software such as Mendeley, Zotero, or EndNote can automatically eliminate duplicate references. Secondly, other bibliometric software, such as SciMAT or Bibliometrix, could be

used for longitudinal analysis and comparisons between research periods. Thirdly, the scientific impact of authors should not be assessed solely through the number of citations. Future studies should establish alternative metrics because currently, the number of citations does not always objectively assess societal impact.

Conflicts of Interest

The authors of the article “IA and Tourism: A Bibliometric Visualisation Review (2015-2024)” declare no conflict of interest.

Bionotes

Jaime José Orts Cardador, PhD from the University of Cordoba. Associate Lecturer in Business Administration of the University of Cordoba (Spain) and Researcher of the Research Group “Quantitative Methods in Economics, Finance and Business”. His main lines of research are the relationship between tourism and ethnocentrism, new technology and co-creation. He is the author of some research papers and book chapters of national and international interest. ORCID: 0000-0002-1229-8161

Carol Angélica Jara Alba, PhD at the University of Cordoba, Spain. Her graduate studies are in Marketing and Foreign Trades at Escuela Superior Politécnica del Litoral (ESPOL) in Ecuador. She has been a full-time Associate Professor and Researcher at Casa Grande University (Ecuador) where she taught the chairs of Emerging markets, Traditional international markets, Macro and Quantitative research. Currently is a Researcher at Group “Quantitative Methods in Economics, Finance and Business” (University of Cordoba). Her main interests are in Applied Economics and Migration. ORCID: 0000-0003-1365-4735

Jesús Claudio Pérez Gálvez, PhD from the University of Córdoba. Lecturer Senior in Applied Economics of the University of Córdoba (Spain), and Manager of the Research Group “Quantitative Methods in Economics, Finance and Business”. He is the author of more than 50 research papers of national and international interest. He has also written six books as a co-author and two of his own authorship. His research interest is related to the analysis of tourism and cultural activities in economic development. ORCID: 0000-0002-6204-2412

References

- [1] Abed, S. S. (2024). Acceptance and use of Artificial Intelligence in Online Tourism Services by Generation Z in Saudi Arabia. *IEEE Access*. <https://doi.org/10.1109/ACCESS.2024.3492001>
- [2] Al Rousan, R., & Khasawneh, N. (2024). Mapping 30 years of tourism and hospitality research in the Arab world: a review based on bibliometric analysis. *Tourism Review*, 79(6), 1280-1298. <https://doi.org/10.1108/TR-04-2023-0201>
- [3] Atsız, O., Öğretmenoğlu, M., & Akova, O. (2022). A bibliometric analysis of length of stay studies in tourism. *European Journal of Tourism Research*, 31, 3101. <https://doi.org/10.54055/ejtr.v31i.2305>
- [4] Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: measuring hedonic and utilitarian shopping value. *Journal of Consumer Research*, 20(4), 644-656. <https://doi.org/10.1086/209376>
- [5] Baghran, S. (2025). In search of extraterrestrial artificial intelligence through dyson sphere-like structures around primordial black holes. *The Astrophysical Journal*, 978(2), 132. <https://doi.org/10.48550/arXiv.2412.02671>
- [6] Baker, H. K., Kumar, S., & Pattnaik, D. (2021). Twenty-five years of the journal of corporate finance: A scientometric analysis. *Journal of Corporate Finance*, 66, 101572. <https://doi.org/10.1016/j.jcorpfin.2020.101572>
- [7] Balsalobre-Lorente, D., Abbas, J., He, C., Pilař, L., & Shah, S. A. R. (2023). Tourism, urbanization and natural resources rents matter for environmental sustainability: The leading role of AI and ICT on sustainable development goals in the digital era. *Resources Policy*, 82, 103445. <https://doi.org/10.1016/j.resourpol.2023.103445>
- [8] Bilgihan, A., & Ricci, P. (2024). The new era of hotel marketing: integrating cutting-edge technologies with core marketing principles. *Journal of Hospitality and Tourism Technology*, 15(1), 123-137. <https://doi.org/10.1108/JHTT-04-2023-0095>
- [9] Biocca, F., & Harms, C. (2002). Defining and measuring social presence: Contribution to the networked minds theory and measure. *Proceedings of PRESENCE*, 2002, 7-36.
- [10] Bowles, J. (2014). The computerisation of European jobs-Who will win and who will lose from the impact of new technology onto old areas of employment?. *Bruegel*, 2014.
- [11] Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in services: lessons from tourism and hospitality. *Journal of Service Management*, 30(4), 484-506. <https://doi.org/10.1108/JOSM-12-2018-0398>
- [12] Callon, M., Courtial, J. P., & Laville, F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemistry. *Scientometrics*, 22(1), 155-205. <https://doi.org/10.1007/BF02019280>
- [13] Carvajal-Trujillo, E., Pérez-Gálvez, J. C., & Orts-Cardador, J. J. (2024). Exploring tourists' pro-environmental behavior: a bibliometric analysis over two decades (1999-2023). *Journal of Tourism Futures*. <https://doi.org/10.1108/JTF-02-2024-0033>
- [14] Chen, G., & Xiao, L. (2016). Selecting publication keywords for domain analysis in bibliometrics: A comparison of three methods. *Journal of Informetrics*, 10(1), 212-223. <https://doi.org/10.1016/j.joi.2016.01.006>
- [15] Chiengkul, W., Kumjorn, P., Tantipanichkul, T., & Suphan, K. (2025). Engaging with AI in tourism: a key to enhancing smart experiences and emotional bonds. *Asia-Pacific Journal of Business Administration*. <https://doi.org/10.1108/APJ-BA-09-2024-0488>
- [16] Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. *Journal of the American Society for Information Science and Technology*, 62(7), 1382-1402. <https://doi.org/10.1002/asi.21525>
- [17] Cordova-Buiza, F., Medina-Viruel, M. J., & Pérez-Gálvez, J. C. (2025). Community-based rural tourism: a mapping technique analysis study from 2005 to 2023. *Humanities and Social Sciences Communications*, 12(1), 1-14. <https://doi.org/10.1057/s41599-025-04746-7>
- [18] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340. <https://doi.org/10.2307/249008>
- [19] de Kervenoael, R., Hasan, R., Schwob, A., & Goh, E. (2020). Leveraging human-robot interaction in hospitality services: Incorporating the role of perceived value, empathy, and information sharing into visitors' intentions to use social robots. *Tourism Management*, 78, 104042. <https://doi.org/10.1016/j.tourman.2019.104042>
- [20] De Oliveira, O. J., da Silva, F. F., Juliani, F., Barbosa, L. C. F. M., & Nunhes, T. V. (2019). Bibliometric

- method for mapping the state-of-the-art and identifying research gaps and trends in literature: An essential instrument to support the development of scientific projects. In S. Kunosic y E. Zerem (Eds.), *Scientometrics recent advances* (pp. 47–64). IntechOpen. <https://www.intechopen.com/chapters/69867>
- [21] DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems*, 19(4), 9–30. <https://doi.org/10.1080/07421222.2003.11045748>
- [22] Deriu, M., Bachis, F., & Massa, M. (2021, September). Improving the user engagement in a fully immersive experience by the means of a conversational non-playable character used as a tourist guide. In 2021 IoT Vertical and Topical Summit for Tourism (pp. 1–4). IEEE.
- [23] Díaz, S. (2014). Métodos de investigación mixtos: supuestos generales y contribuciones a la evaluación educativa. *Revista Portuguesa de Pedagogia*, 7–23.
- [24] Dwivedi Yogesh, K., Nir, K., Laurie, H., Slade Emma, L., Anand, J., Kar Arpan, K., & Ryan, W. (2023). ‘So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642. <https://doi.org/10.1016/j.ijinfomgt.2023.102642>
- [25] Florido-Benítez, L. (2022). The impact of tourism promotion in tourist destinations: A bibliometric study. *International Journal of Tourism Cities*, 8(4), 844–882. <https://doi.org/10.1108/IJTC-09-2021-0191>
- [26] Frey, C. & Osborne, M. (2017). The Future of Employment: How Susceptible Are Jobs to Computerization? *Technological Forecasting & Social Change*, 114, 254–280. <https://doi.org/10.1016/j.techfore.2016.08.019>
- [27] Gao, S., Meng, F., Gu, Z., Liu, Z., & Farrukh, M. (2021). Mapping and clustering analysis on environmental, social and governance field a bibliometric analysis using Scopus. *Sustainability*, 13(13), 7304. <https://doi.org/10.3390/su13137304>
- [28] Grundner, L., & Neuhofer, B. (2021). The bright and dark sides of artificial intelligence: A futures perspective on tourist destination experiences. *Journal of Destination Marketing & Management*, 19, 100511. <https://doi.org/10.1016/j.jdmm.2020.100511>
- [29] Gupta, S., Modgil, S., Lee, C. K., & Sivarajah, U. (2023). The future is yesterday: Use of AI-driven facial recognition to enhance value in the travel and tourism industry. *Information Systems Frontiers*, 25(3), 1179–1195. <https://doi.org/10.1007/s10796-022-10271-8>
- [30] Harzing, A. W., & Alakangas, S. (2016). Google Scholar, Scopus and the Web of Science: a longitudinal and cross-disciplinary comparison. *Scientometrics*, 106, 787–804. <https://doi.org/10.1007/s11192-015-1798-9>
- [31] Heerink, M., Kröse, B., Evers, V. & Wielinga, B. (2010). Assessing acceptance of assistive social agent technology by older adults: the Almere Model. *International Journal of Social Robots*, 2(4), 361–375.
- [32] Heerink, M., Kröse, B., Evers, V., & Wielinga, B. (2008). The influence of social presence on acceptance of a companion robot by older people. *Journal of Physical Agents*, 2(2), 33–40.
- [33] Hirsch, J. E. (2005). An index to quantify an individual’s scientific research output. *Proceedings of the National Academy of Sciences*, 102(46), 16569–16572. <https://doi.org/10.1073/pnas.0507655102>
- [34] Huang, D., Chen, Q., Huang, J., Kong, S., & Li, Z. (2021). Customer-robot interactions: Understanding customer experience with service robots. *International Journal of Hospitality Management*, 99, 103078. <https://doi.org/10.1016/j.ijhm.2021.103078>
- [35] IBM (2023). AI vs. machine learning vs. deep learning vs. neural networks: What’s the difference? <https://www.ibm.com/think/topics/ai-vs-machine-learning-vs-deep-learning-vs-neural-networks>
- [36] Igbaria, M., & Parasuraman, S. (1989). A path analytic study of individual characteristics, computer anxiety and attitudes toward microcomputers. *Journal of Management*, 15(3), 373–388. <https://doi.org/10.1177/014920638901500302>
- [37] Ivanov, S. (2024). Is “machina” a “deus ex machina” solution to the labour shortages in tourism and hospitality? *Worldwide Hospitality and Tourism Themes*, 16(5), 566–570. <https://doi.org/10.1108/WHATT-06-2024-0113>
- [38] Khanra, S., Dhir, A., & Mäntymäki, M. (2020). Big data analytics and enterprises: a bibliometric synthesis of the literature. *Enterprise Information Systems*, 14(6), 737–768. <https://doi.org/10.1080/17517575.2020.1734241>

- [39] Kim, H. & So, K.K.F. (2022). Two decades of customer experience research in hospitality and tourism: a bibliometric analysis and thematic content analysis. *International Journal of Hospitality Management*, 100, 103082. <https://doi.org/10.1016/j.ijhm.2021.103082>
- [40] Kim, S. S., Kim, J., Badu-Baiden, F., Giroux, M., & Choi, Y. (2021). Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic. *International Journal of Hospitality Management*, 93, 102795. <https://doi.org/10.1016/j.ijhm.2020.102795>
- [41] Kırtıl, İ. G., & Aşkun, V. (2021). Artificial intelligence in tourism: A review and bibliometrics research. *Advances in Hospitality and Tourism Research (AHTR)*, 9(1), 205–233. <https://doi.org/10.30519/ahtr.801690>
- [42] Knani, M., Echchakoui, S., & Ladhari, R. (2022). Artificial intelligence in tourism and hospitality: Bibliometric analysis and research agenda. *International Journal of Hospitality Management*, 107, 103317. <https://doi.org/10.1016/j.ijhm.2022.103317>
- [43] Latah, M., & Toker, L. (2019). Artificial intelligence-enabled software-defined networking: A comprehensive overview. *IET Networks*, 8(2), 79–99. <https://doi.org/10.1049/iet-net.2018.5082>
- [44] Lee, J. M. (2024). Strategies for integrating ChatGPT and generative AI into clinical studies. *Blood Research*, 59(1), 45. <https://doi.org/10.1007/s44313-024-00045-3>
- [45] Lei, S. I., Shen, H., & Ye, S. (2021). A comparison between chatbot and human service: customer perception and reuse intention. *International Journal of Contemporary Hospitality Management*, 33(11), 3977–3995. <https://doi.org/10.1108/IJCHM-12-2020-1399>
- [46] Li, J. J., Bonn, M. A., & Ye, B. H. (2019). Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. *Tourism Management*, 73, 172–181. <https://doi.org/10.1016/j.tourman.2019.02.006>
- [47] Liu, Z., Yin, Y., Liu, W., & Dunford, M. (2015). Visualizing the intellectual structure and evolution of innovation systems research: A bibliometric analysis. *Scientometrics*, 103(1), 135–158. <https://doi.org/10.1007/s11192-014-1517-y>
- [48] Lu, L., Cai, R., & Gursoy, D. (2019). Developing and validating a service robot integration willingness scale. *International Journal of Hospitality Management*, 80, 36–51. <https://doi.org/10.1016/j.ijhm.2019.01.005>
- [49] Lv, X., Liu, Y., Luo, J., Liu, Y., & Li, C. (2021). Does a cute artificial intelligence assistant soften the blow? The impact of cuteness on customer tolerance of assistant service failure. *Annals of Tourism Research*, 87, 103114. <https://doi.org/10.1016/j.annals.2020.103114>
- [50] Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, 20(3), 709–734. <https://doi.org/10.5465/amr.1995.9508080335>
- [51] Minsky, M. L. (1967). *Computation: Finite and Infinite Machines*. Prentice-Hall, Upper Saddle River, NJ.
- [52] Moher, D., Cook, D. J., Eastwood, S., Olkin, I., Rennie, D., & Stroup, D. F. (1999). Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement. *The Lancet*, 354(9193), 1896–1900. [https://doi.org/10.1016/s0140-6736\(99\)04149-5](https://doi.org/10.1016/s0140-6736(99)04149-5)
- [53] Mori, M. (1970). The uncanny valley. *Energy*, 7(4), 33–35.
- [54] Nomura, T., & Kanda, T. (2016). Rapport–expectation with a robot scale. *International Journal of Social Robotics*, 8(1), 21–30. <https://doi.org/10.1007/s12369-015-0293-z>
- [55] Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. *International Journal of Contemporary Hospitality Management*, 32(10), 3199–3226. <https://doi.org/10.1108/IJCHM-04-2020-0259>
- [56] Puri, V., Mondal, S., Das, S., & Vrana, V. G. (2023). Blockchain propels tourism industry—an attempt to explore topics and information in smart tourism management through text mining and machine learning. *Informatics*, 10(1), 9. <https://doi.org/10.3390/informatics10010009>
- [57] Rostami, M., & Navabinejad, S. (2023). Artificial empathy: User experiences with emotionally intelligent chatbots. *AI and Tech in Behavioral and Social Sciences*, 1(3), 19–27. <https://doi.org/10.61838/kman.aitech.1.3.4>
- [58] Saif, N., Sajid, U. K., & Imrab, S. (2024). Chat-GPT: validating Technology Acceptance Model (TAM) in education sector via ubiquitous learning mechanism. *Computers in Human Behavior*, 143747. <https://doi.org/10.1016/j.chb.2023.108097>
- [59] Saydam, M. B., Arici, H. E., & Koseoglu, M. A. (2022). How does the tourism and hospitality

- industry use artificial intelligence? A review of empirical studies and future research agenda. *Journal of Hospitality Marketing & Management*, 31(8), 908–936. <https://doi.org/10.1080/19368623.2022.2118923>
- [60] Şeker, F. (2024). Combining the power of artificial intelligence and mathematical modelling: A hybrid technique for enhanced forecast of tourism receipts. *European Journal of Tourism Research*, 36, 3614–3614. <https://doi.org/10.54055/ejtr.v36i.3246>
- [61] Shahzad, M. F., Xu, S., & Javed, I. (2024). ChatGPT awareness, acceptance, and adoption in higher education: the role of trust as a cornerstone. *International Journal of Educational Technology in Higher Education*, 21(1), 46. <https://doi.org/10.1186/s41239-024-00478-x>
- [62] Siddik, A. B., Forid, M. S., Yong, L., Du, A. M., & Goodell, J. W. (2025). Artificial intelligence as a catalyst for sustainable tourism growth and economic cycles. *Technological Forecasting and Social Change*, 210, 123875. <https://doi.org/10.1016/j.techfore.2024.123875>
- [63] Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the Annals of Tourism Research Curated Collection on Artificial Intelligence and Robotics in Tourism. *Annals of Tourism Research*, 81, 102883. <https://doi.org/10.1016/j.annals.2020.102883>
- [64] UNESCO (2020). Documento final: primera versión del proyecto de recomendación sobre la Etica de la Inteligencia Artificial. https://unesdoc.unesco.org/ark:/48223/pf0000373434_spa?posInSet=1&queryId=N-EXPLORE-5a12228a-bcd9-4c51-9dae-efc43e6966ab
- [65] Van Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., & Petersen, J. A. (2017). Domo arigato Mr. Roboto: Emergence of automated social presence in organizational frontlines and customers' service experiences. *Journal of Service Research*, 20(1), 43–58. <https://doi.org/10.1177/1094670516679272>
- [66] Van Eck, N.J. & Waltman, L., (2022). VOSviewer Manual. Manual for VOSviewer Version 1.6.v8. https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.18.pdf
- [67] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 425–478. <https://doi.org/10.2307/30036540>
- [68] Wang, W., Kumar, N., Chen, J., Gong, Z., Kong, X., Wei, W., & Gao, H. (2020). Realizing the potential of the internet of things for smart tourism with 5G and AI. *IEEE network*, 34(6), 295–301. <https://doi.org/10.1109/MNET.011.2000250>
- [69] Warner, R. M., & Sugarman, D. B. (1986). Attributions of personality based on physical appearance, speech, and handwriting. *Journal of Personality and Social Psychology*, 50(4), 792. <https://doi.org/10.1037/0022-3514.50.4.792>
- [70] Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: service robots in the frontline. *Journal of Service Management*, 29(5), 907–931. <https://doi.org/10.1108/JOSM-04-2018-0119>
- [71] Yilmazdogan, O. C. (2024). Elevating workforce stability: augmented reality and artificial intelligence solutions for overcoming employee turnover challenges in hospitality and tourism. *Worldwide Hospitality and Tourism Themes*, 16(5), 598–610. <https://doi.org/10.1108/WHATT-07-2024-0156>
- [72] Zeng, Z., Chen, P. J., & Lew, A. A. (2020). From high-touch to high-tech: COVID-19 drives robotics adoption. *Tourism Geographies*, 22(3), 724–734. <https://doi.org/10.1080/14616688.2020.1762118>
- [73] Zulfiqar, U., Abbas, A. F., Aman-Ullah, A., & Mehmood, W. (2024). A bibliometric and visual analysis of revisit intention research in hospitality and tourism. *Journal of Tourism Futures*. <https://doi.org/10.1108/JTF-01-2024-0013>
- [74] Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>