İSTANBUL UNIVERSITY PRESS

Journal of Tourismology,
JOT 2026, 12 (1): 1–24

https://doi.org/10.26650/jot.2026.10.1.1746476

Submitted: 19.07.2025
Revision Requested: 13.01.2026
Last Revision Received: 30.03.2026
Accepted: 04.05.2026
Published Online 24.08.2026

Journal of Tourismology

Research Article

Open Access

# Robots in Tourism: A Bibliometric Review of Current Patterns and Emerging Research Trends

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**Abstract** This study investigates the evolution, intellectual structure, and dominant research themes of tourism and robotics literature through a comprehensive bibliometric analysis. Using 469 publications indexed in the Web of Science database between 2005 and 2024, the study applied descriptive bibliometric techniques and keyword co-occurrence analysis using Biblioshiny and VOSviewer. The findings indicate steady growth in robot-oriented tourism research, with a marked acceleration after 2016 and further expansion following 2020. The literature is primarily organised around interconnected themes related to artificial intelligence and robots, service robots and human-robot interaction (HRI), and technology acceptance. Over time, research has shifted from technically oriented discussions towards more user-centred perspectives that emphasise interaction processes, acceptance mechanisms, and experiential outcomes in service settings. Despite the growing volume of research, the field remains conceptually fragmented, particularly in integrating HRI-related concepts with technology acceptance frameworks. By systematically mapping thematic structures and research trends, this study provides an overarching view of tourism and robotics research and identifies gaps that warrant further investigation. The findings offer a structured foundation for future theoretical and empirical research on service robots in tourism contexts.

**Keywords** Bibliometric analysis · Tourism · Robots · Robotics · Human-Robot Interaction · Artificial Intelligence

Citation: Eren, F., Genç, V. & Asıf, M. (2026). Robots in tourism: A bibliometric review of current patterns and emerging research trends. *Journal of Tourismology*, *12*(1), 1-24. https://doi.org/10.26650/jot.2026.10.1.1746476

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# Robots in Tourism: A Bibliometric Review of Current Patterns and Emerging Research Trends

## Introduction

The integration of AI into robotic systems has transformed robots from purely mechanical tools into entities endowed with human-like characteristics (Chi et al., 2024). Robots have emerged as agents capable of performing complex tasks that involve repetitive and straightforward activities and social interaction with humans (Chen et al., 2023). Parallel with this development, robots have expanded beyond industrial environments and have become increasingly prevalent in sectors such as education, healthcare, and tourism (Shang et al., 2026). The tourism sector, in particular, stands out as a domain in which robotic technologies can be implemented effectively and seamlessly (Ali et al., 2023; Çetinsöz et al., 2022). Robots are utilised in hotels for concierge and other service functions (Gursoy et al., 2019; Osawa et al., 2017), restaurants for cooking and serving tasks (Chi et al., 2020; Go et al., 2020), and airports for guidance, security, and cleaning services (Ivanov et al., 2017; Lu et al., 2019). In addition, virtual robots (e.g., chatbots) are employed in customer information services (Orden-Mejía & Huertas, 2022; Zlatanov & Popesku, 2019). In this context, the increasing use of robots in tourism has positioned them as an integral component of service delivery (Tuomi et al., 2021). Moreover, strong scenarios and expectations suggest that tourism services will be delivered mainly by robotic systems in the future (Chen et al., 2023).

How innovations (e.g., ideas and technologies) diffuse and generate impacts has long been a significant area of research and continues to be so today (Rogers, 2003). In this regard, studies focusing on AI and robots as emerging technologies in the tourism literature have increased markedly in recent years. Previous tourism-oriented bibliometric and systematic reviews have generally focused on AI and its applications or specific topics, such as technology acceptance. For instance, Knani et al. (2022) and Şengel and Işkın (2024) examined the evolution of AI research in tourism and hospitality, while Gökçe et al. (2024) conducted a bibliometric review of studies addressing robots and technology acceptance models in tourism. Bibliometric studies focusing specifically on robots in the tourism literature have primarily been conducted within particular contexts or thematic domains. For example, Çelik et al. (2024) and Özdemir and Taşkın (2025) examined service robot research in restaurant settings, Rana et al. (2025) focused on the hotel context, Yörük et al. (2023) analysed research trends related to guest experiences with service robots, Chen et al. (2024) addressed service robot acceptance research, and finally, Yılmaz and Şahin-Yılmaz (2025) reviewed chatbot research within the tourism literature.

On the other hand, AI represents a broad umbrella concept encompassing multiple domains, such as machine learning, deep learning, neural networks, natural language processing, the Internet of Things, robotics, automation, and big data (Knani et al., 2022; Mustak et al., 2021). However, the frequent use of these concepts in the literature, in an undifferentiated, broad manner, has constrained the deepening of knowledge specific to more narrowly defined fields, such as robotics (Cheong et al., 2026). Furthermore, despite the growing body of research, existing bibliometric studies remain insufficient in evaluating the trends and focal points of this literature within a comprehensive and systematic framework (Shang et al., 2026; Sun et al., 2024). In this context, examining the flow of knowledge and research trends in robot-related studies within the tourism literature, analysing thematic shifts, and offering directions for future research require a holistic examination of the existing robot literature without imposing contextual limitations. Conducting

bibliometric analyses at regular intervals is critical for mapping the theoretical landscape of the field and guiding future research (Gündüz & Eren, 2024; Şengel & Işkın, 2024). Accordingly, the research questions of this study, which aims to examine and understand the development of the robot-focused tourism literature, are described as follows:

**RQ1:** What is the current state of research on robots within the tourism sector?

**RQ2:** Which researchers have made notable contributions to this field, and which publications have received the highest citations?

**RQ3:** Which countries and academic journals exert the greatest influence on the development of research in this field?

**RQ4:** What emerging trends and significant patterns in this field could guide potential future research directions?

## Conceptual Background

The fourth industrial revolution has accelerated digital transformation in service industries through rapid advances in robotics, AI, the Internet of Things (IoT), big data, and autonomous systems (Schwab, 2017; Wang et al., 2021). In this context, robots, artificial intelligence, and service automation (RAISA) have become socio-technical elements that transform service delivery practices, driven by advances in computational power and machine learning (Knani et al., 2022; LeCun et al., 2015). According to ISO 8373 (2012), a robot is a programmable mechanism with a degree of autonomy that can move within its environment to perform intended tasks. Robots are generally classified into industrial, service, and medical categories (ISO 8373, 2021). In the tourism context, service robots have evolved from mechanical systems towards structures endowed with social and cognitive capabilities; they are considered entities capable of interacting with users and delivering personalised services (Chen et al., 2023; Ivanov, 2019). This perspective is closely related to the experiential, interaction-intensive nature of tourism services.

Service robots and RAISA technologies are increasingly adopted by tourism businesses to enhance customer experience, improve operational efficiency, reduce costs, address labour shortages, and automate routine or risky tasks (Belanche et al., 2020; Choi et al., 2021; Ivanov, 2019; Xu et al., 2023). These technologies generate substitutive, augmentative, and transformational effects on jobs and tasks, thereby altering the structure of service delivery (Ivanov, 2024). Nevertheless, adopting service robots also entails various limitations. In addition to financial costs, such as robot acquisition, maintenance, software updates, and staff training, tourism organisations face non-financial costs, including employees' perceptions of job insecurity and customers' reservations towards robot-based services (Binesh & Baloglu, 2023; Ivanov & Webster, 2019). Moreover, existing service robots remain insufficient in performing specific tasks that require fine motor skills, contextual judgement, and high adaptability (Ivanov, 2024). This situation necessitates a balanced and critical evaluation of service robots in the tourism context.

Bibliometric and systematic review studies indicate that academic interest in service robots within tourism has increased significantly over the past decade (Chen et al., 2023; Knani et al., 2022; Yörük et al., 2023). As robots have become more prevalent in the tourism sector, robot research has evolved from an initially technical to a multi-layered structure encompassing the social sciences, psychology, and management disciplines (Ivanov et al., 2019). In this context, human-robot interaction (HRI) has emerged as a central research domain in the tourism literature. HRI is an interdisciplinary field that examines how robotic systems interact with humans and how individuals perceive in-service environments (Bartneck et al., 2024).

One of the prominent concepts in the HRI literature is anthropomorphism. Anthropomorphism refers to the attribution of human-like characteristics to non-human entities and plays a decisive role in shaping perceptions of and responses towards robots (Epley et al., 2007). While anthropomorphic features can strengthen the perception of robots as social entities (Chatzoglou et al., 2024; Chen et al., 2023; Vishwakarma et al., 2024), excessively high levels of anthropomorphism may elicit negative reactions (Appel et al., 2020; Tinwell et al., 2011). In this respect, the uncanny valley theory suggests that when robots closely resemble humans but are not perceived as fully human, they may evoke feelings of discomfort and eeriness (Mori et al., 2012). However, it remains a critical question how different dimensions of multidimensional anthropomorphism—such as human-like appearance, social intelligence, emotional capacity, and self-understanding—shaped user responses in distinct ways (Chi et al., 2024). Along with anthropomorphism, consumer acceptance and adoption constitute a substantial portion of the service robot literature.

The acceptance and adoption of robots are commonly examined through traditional theories and models, such as the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2012). Although these models provide fundamental insights into technology usage intentions, they are limited in explaining the acceptance of technologies such as social robots, which possess humanoid physical embodiments, natural language interaction capabilities, and operate within social service environments. The multidimensional nature of robots has therefore made the need for new acceptance models unavoidable. Accordingly, Wirt et al. (2018) proposed the Service Robot Acceptance Model, Go et al. (2020) introduced the Interactive Technology Acceptance Model, Gursoy et al. (2019) developed the AIDUA model, and Lu et al. (2019) proposed the Service Robot Integration Willingness (SRIW) model. These models particularly emphasise hedonic motivation, anthropomorphism, and trust. Indeed, trust in responses towards robots (Chi, 2021). In addition, ethical and security issues have increasingly become focal points in the service robot literature. Topics such as robots' potential to manipulate individuals, the risk of creating emotional dependency, privacy violations, and bullying or abuse directed towards robots are discussed as ethical concerns that extend beyond technology acceptance (Bartneck et al., 2024). Consequently, the tourism service robot literature has expanded into a multidimensional framework encompassing robot design and characteristics, consumer and employee perceptions, operational impacts on tourism businesses, robot manufacturers, the service environment (servicescape), external contextual factors (ethical and legal regulations), and education and research (Ivanov et al., 2019).

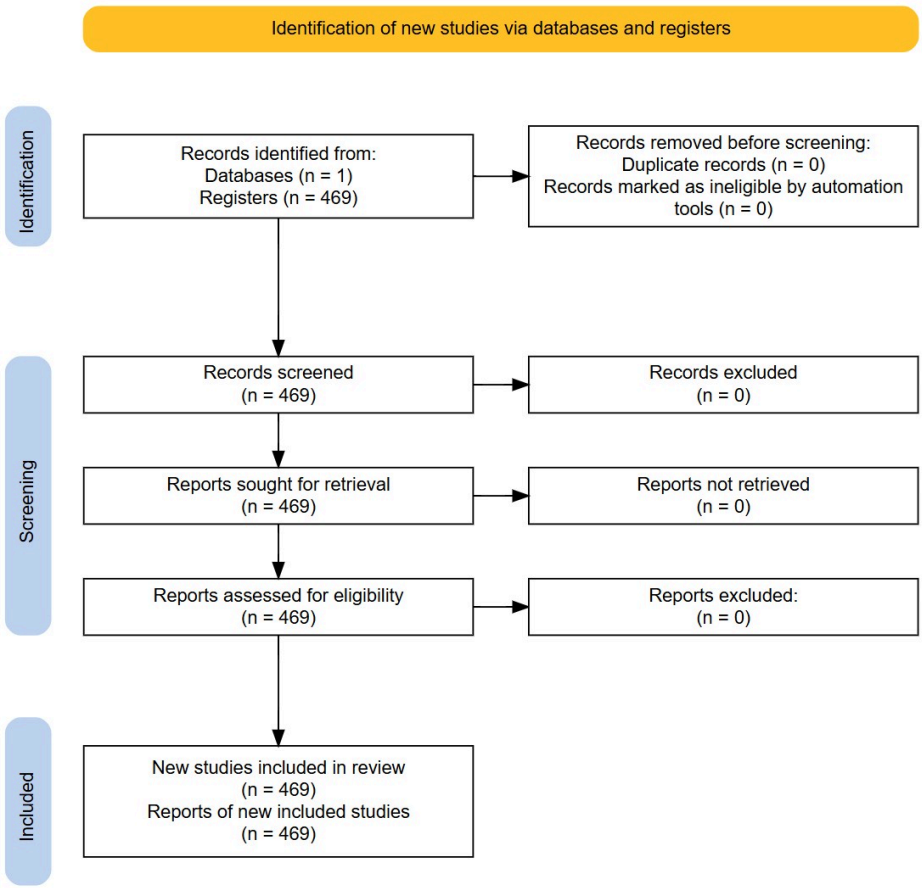
Recent bibliometric findings indicate that the COVID-19 pandemic has increased academic interest in issues such as contactless services, hygiene, health safety, and labour shortages; however, this period has not resulted in a fundamental transformation of the core thematic structure of the literature (Chen et al., 2023; Park & Kim, 2024). Nevertheless, existing studies remain theoretically fragmented and offer limited conceptual integration across themes. In this respect, the present study aims to systematically examine the tourism service robot literature from a long-term bibliometric perspective to identify dominant research themes, theoretical orientations, and existing research gaps—the bibliometric mapping and synthesis.

## Methods

Figure 1 presents a PRISMA diagram of the systematic article selection process used in this study. The diagram outlines the stages of identification, screening, eligibility assessment, and final inclusion based on predefined inclusion and exclusion criteria. These criteria were established to ensure a systematic, relevant dataset aligned with the research objectives, and all studies that met the criteria were included in the analysis.

**Figure 1**

*Search process for the bibliometric analysis study (PRISMA)*




## Effective Strategies for Selecting Bibliometric Methods in Research

Bibliometric analysis is a statistical method enabling quantitative examination of scientific publications' data (Lodhi et al., 2024). This method is increasingly used to comprehensively map and summarise the structure and dynamics of existing and emerging scientific fields (Koseoglu et al., 2016). Bibliometric analysis enables a rapid review of articles, tracking publications, citations, productive authors, institutions, countries, and research patterns over time (Del Gesso et al., 2024). It also facilitates the evaluation of the data obtained (Asif et al., 2024; Öğretmenoğlu et al., 2022). In addition, the bibliometric analysis method is widely used in the field of tourism and hospitality, as in many other fields (Öğretmenoğlu et al., 2025).

## Selection of Tools

In the data analysis phase of the research, RStudio-based "Biblioshiny" (Aria & Cuccurullo, 2017) and "VOSviewer" (van Eck & Waltman, 2017) programmes were used. VOSviewer is a software tool used to construct and visualise bibliometric networks, such as those of researchers, journals, or individual publications (Öğretmenoğlu et al., 2022). Additionally, Microsoft Excel was used to create tables, graphs, and charts. "Biblioshiny" was preferred for answering RQ1, RQ2, and RQ3, and "VOSviewer" was preferred for RQ4.

## Database Selection

This study used the well-known Web of Science Core Collection database to examine and select articles. This database combines high-quality academic materials, including academic journals, articles, books, and conference proceedings (Lodhi et al., 2024). It is one of the most widely used and reliable sources among databases (Asif et al., 2024; Fosso Wamba et al., 2023). There are additional justifications for selecting the WoS database. This study, which focuses on robot technologies in the tourism domain, encompasses an interdisciplinary field such as HRI. In this respect, compared to Scopus, WoS provides more suitable and standardised data for conducting interdisciplinary bibliometric analyses (Liu et al., 2024). Moreover, compared to databases such as Google Scholar and Scopus, WoS provides data in a standardised, interoperable format that facilitates co-occurrence and network-based analyses using various bibliometric analysis software (Li et al., 2023; Şengel & Işkın, 2024; Yılmaz & Şahin-Yılmaz, 2024). Many bibliometric studies focusing on AI and robots have preferred the WoS database (Yılmaz & Şahin-Yılmaz, 2024; Yörük et al., 2023).

## Selection of Keywords

This study aims to examine and understand how robotics research in the tourism sector has developed. In the context of this purpose, a search was carried out in the WoS database on December 29, 2024, using the terms ("Robot" AND "Tourism") OR TS=("Robotic" AND "Tourism") OR TS=("Robot" AND "hospitality") OR TS=("Robotic" AND "hospitality") OR TS=("Robot" AND "travel") OR TS=("Robotic" AND "travel") OR TS=("Robot" AND "leisure") OR TS=("Robotic" AND "leisure".)." Search terms were performed in the "topic (TS)" field.

## Data Collection

The literature search conducted in the WoS database was restricted by WoS indexes (SSCI or ESCI), document type (articles or review articles), publication language (English), and publication period (2005-2024) (Figure 1). To ensure the representativeness and scientific rigour of the data, only studies published in peer-reviewed academic journals (research articles or review articles) were included in the review. The choice of English as the publication language is associated with its status as the most widely used language in international academic literature. The restriction of the publication period to 2005-2024 was determined based on previous studies indicating that tourism-focused robot research began to gain noticeable momentum from 2012 onwards (Chen et al., 2023). Moreover, before 2005, only a limited, fragmented body of research existed in this field.

In line with these criteria, only studies directly relevant to the research topic and meeting high academic quality standards were included in the analysis. As a result, 469 scholarly publications retrieved during the search process comprised the study dataset.

## Analytical approaches

The bibliometric analysis was conducted using data derived from 469 publications, which were imported into the "Biblioshiny" and "VOSviewer (version 1.6.20)" software tools. The analysis aimed to answer four central research questions. First, the number of publications on robots and robotic technologies in tourism was examined and evaluated to determine whether there was an increasing trend in this field (RQ1). The most influential authors were determined by those articles (RQ2). Then, the countries and journals that produced the most articles were identified (RQ3). At the final stage, an analysis of keyword frequency and co-occurrence highlighted the primary themes and overarching patterns within the research domain (RQ4).

## *Findings*

The outcomes of the bibliometric analysis are detailed in the subsequent sections.

### *Descriptive Overview of Robot Research in Tourism*

Table 1 summarises publications on robots in tourism between 2005 and 2024, totaling 469 documents. The descriptive indicators reported in this table were obtained using the Biblioshiny software based on data retrieved from WoS. The annual growth rate is 25.42%, representing the compound annual growth rate and reflecting the rapid development of the field. These publications span 221 sources, with 1,749 author keywords and contributions from 1,630 authors, of whom 38 produced single-authored documents. The average number of authors per publication is 4.15, highlighting a high level of collaboration, while the international collaboration rate is 35.18%. Publications have an average document age of 3.09 years, calculated based on the difference between each publication year and the final year of the dataset (2024), and receive an average of 25.01 citations per article. In total, 18.564 references were cited, and the dataset consists of 439 research articles and 30 review articles.

**Table 1**
*Main information about the data.*

| Description | Results |
|---|---|
| **MAIN INFORMATION ABOUT DATA** | |
| Timespan | 2005:2024 |
| Sources (Journals) | 221 |
| Documents | 469 |
| Annual growth rate % | 25.42 |
| Document average age | 3.09 |
| Average citations per doc | 25.01 |
| References | 18564 |
| **DOCUMENT CONTENTS** | |
| Keywords Plus (ID) | 868 |
| Author's Keywords (DE) | 1749 |
| **AUTHORS** | |
| Authors | 1630 |
| Authors of single-authored documents | 38 |
| **AUTHORS COLLABORATION** | |
| Single-authored docs | 38 |
| Co-Authors per Doc | 4.15 |
| International co-authorships % | 35.18 |
| **DOCUMENT TYPES** | |
| **article** | **439** |
| **Review article** | **30** |

**Notes**: The information presented in this table was reported using the Biblioshiny software.

**Figure 2**

*Publications published by the year*

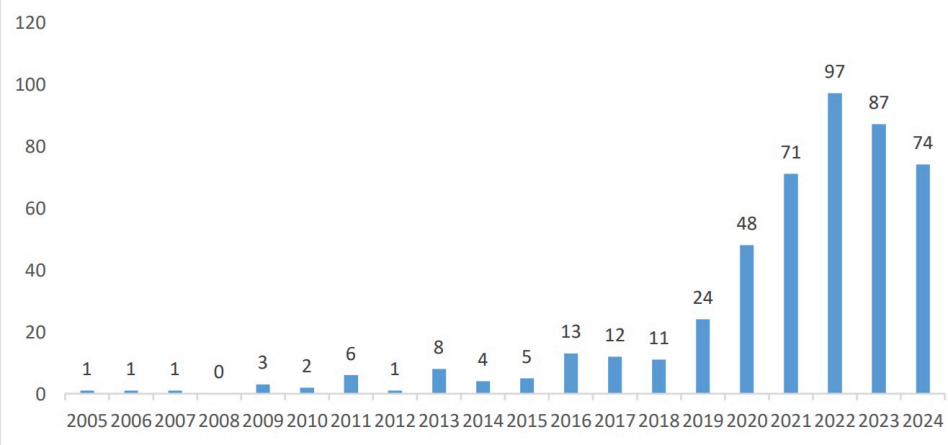



Figure 2 shows the distribution of publication numbers by years. The graph can be divided into two periods according to the annual publication volume of the publications: 2015 and before and 2016 and after.

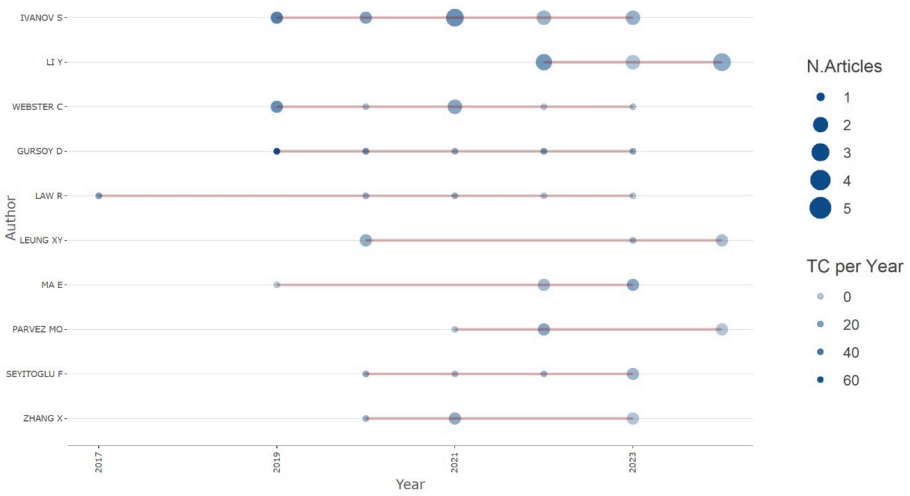
The number of publications has increased over time, especially since 2016, and a continuous upward trend has continued since 2020. RAISA advancements (Vishwakarma et al., 2024) and the need for reduced human contact during COVID-19 (Shin, 2022; Zeng et al., 2020) have driven this rise. Although a downward trend is observed as of 2023, an upward trend is expected to resume in 2024. As we have just entered the second half of 2024, the number of publications has almost reached that of the previous year. In line with the data in Table 1 and Figure 2, researchers have been processing the subject with increasing interest, especially in 2016 and after.

## *Author Productivity and Citation Impact Analysis*

Figure 3 shows the distribution of publications by the most productive authors over 2017-2024, while Table 2 shows the total number of publications by the most productive authors. The most productive author is Stanislav Ivanov, with 15 publications as of 2019. Ivanov's publications focus on robotics, automation, consumer behaviour, service experience, and sustainability. As of 2022, Yi Li has been ranked as the second most prolific author with 12 publications. As of 2019, Craig Webster is the third most productive researcher with eight publications. Yi Li's publications focus on consumer behaviour, privacy-confidentiality, trust, service experience, and satisfaction. Craig Webster's publications also seem to focus on similar topics. Other authors share the following places with five publications each. Rob Law is the only researcher with a consistent publication history spanning 2017 and 2023. It is a striking finding that the productivity of many writers increased in 2020.

**Figure 3**

*Most productive authors (generated using Biblioshiny)*




In addition, when the "Articles Fractionalised" value, which shows the total contribution rate to all publications authored by the sole or co-author, is examined, Stanislav Ivanov ranks first with 6.87, Craig Webster ranks second with 4.00, and Yi Li ranks third with 3.05.

**Table 2**

*Most productive authors*

| Authors | Articles | Articles Fractionalised |
|---|---|---|
| IVANOV S | 15 | 6,87 |
| LI Y | 12 | 3,05 |
| WEBSTER C | 8 | 4,00 |
| GURSOY D | 5 | 1,45 |
| LAW R | 5 | 1,83 |
| LEUNG XY | 5 | 2,17 |
| MA E | 5 | 1,25 |
| PARVEZ MO | 5 | 1,92 |
| SEYITOGLU F | 5 | 2,03 |
| ZHANG X | 5 | 1,84 |

Table 3 shows details of the top 10 most cited publications focusing on robots. Publication years vary between 2018 and 2021. The publication by Lu et al. (2019) is the most cited study, with 383 citations. Researchers proposed the SRIW scale to assess consumer willingness to adopt service robots. The second-placed study by Bösch et al. (2018), with 318 citations, offers a comprehensive cost-based analysis of autonomous mobility services and their operational models. The third-placed study by Zeng et al. (2020), with 318 citations, analysed how COVID-19 reduced contact service settings. In their 276-cited study, Tussyadiah (2020) presents a research agenda to prepare tourism for this future, with the expectation that smart automation will continue to grow. In their 274-cited study, Kim et al. (2021) examined traveller preferences for robot- or human-assisted hotel services during COVID-19. Other studies are listed below, in order of the

number of citations: de Kervenoael et al. (2020), Pillai and Sivathanu (2020), Azadeh et al. (2019), Tung and Au (2018), Murphy et al. (2019).

**Table 3**

*Most globally cited documents*

| Paper | DOI | Total Citations | TC per year | Normalised TC |
|---|---|---|---|---|
| LU L, 2019, INT J HOSP MANAG | 10.1016/j.ijhm.2019.01.005 | 383 | 63,83 | 5,77 |
| BOESCH PM, 2018, TRANSP POLICY | 10.1016/j.tranpol.2017.09.005 | 318 | 45,43 | 4,71 |
| ZENG Z, 2020, TOUR GEOGR | 10.1080/14616688.2020.1762118 | 307 | 61,40 | 4,13 |
| TUSSYADIAH I, 2020, ANN TOURIS RES | 10.1016/j.annals.2020.102883 | 276 | 55,20 | 3,71 |
| KIM SS, 2021, INT J HOSP MANAG | 10.1016/j.ijhm.2020.102795 | 274 | 68,50 | 8,07 |
| DE KERVENOAEL R, 2020, TOURISM MANAGEMENT | 10.1016/j.tourman.2019.104042 | 272 | 54,40 | 3,66 |
| PILLAI R, 2020, INT J CONTEMP HOSP MANAG | 10.1108/IJCHM-04-2020-0259 | 266 | 53,20 | 3,58 |
| AZADEH K, 2019, TRANSP SCI-a | 10.1287/trsc.2018.0873 | 240 | 40,00 | 3,62 |
| TUNG VWS, 2018, INT J CONTEMP HOSP MANAG | 10.1108/IJCHM-06-2017-0322 | 234 | 33,43 | 3,46 |
| MURPHY J, 2019, J Travel Tour Mark | 10.1080/10548408.2019.1571983 | 210 | 35,00 | 3,17 |

## *Country productivity, international collaboration, and journal influence*

Figure 4 and Table 4 show the distribution of 469 publications by country, including whether they are single-country (SCP) or multi-country (MCP). The most productive country is China, which has 110 publications. The USA ranks second with 83 publications, followed by Japan with 47. India and the UK share fourth place with 24 publications each. In terms of multiple country publications (MCP), reflecting international collaboration, the UK leads with 66.7%, followed by China (39.1%) and the USA (32.5%). Among 14 countries, Japan (12.8%) and India (12.5%) have the lowest MCP rates, indicating a more introverted research approach despite their strong tourism sectors.

**Figure 4**

*Most productive countries (generated using Biblioshiny)*

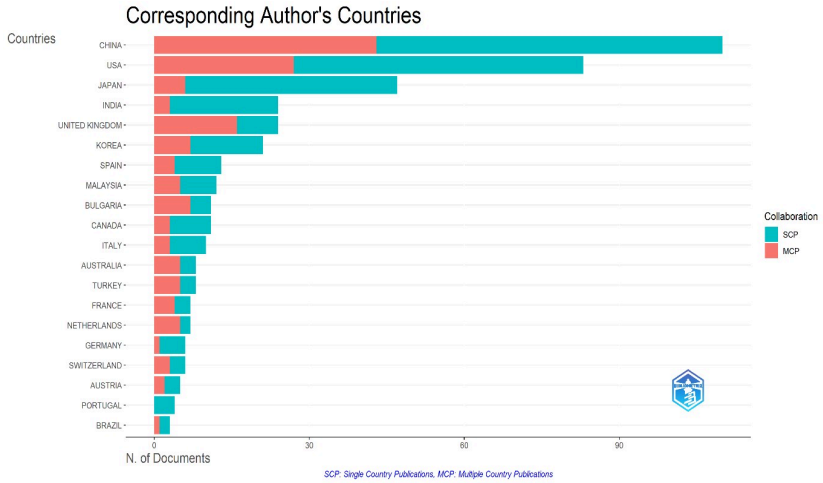


**Table 4**
*Most productive corresponding authors' countries*

| Country | Articles | Articles % | SCP | MCP | MCP % |
|---|---|---|---|---|---|
| China | 110 | 23.5 | 67 | 43 | 39.1 |
| USA | 83 | 17.7 | 56 | 27 | 32.5 |
| Japan | 47 | 10 | 41 | 6 | 12.8 |
| India | 24 | 5.1 | 21 | 3 | 12.5 |
| United Kingdom | 24 | 5.1 | 8 | 16 | 66.7 |
| Korea | 21 | 4.5 | 14 | 7 | 33.3 |
| Spain | 13 | 2.8 | 9 | 4 | 30.8 |
| Malaysia | 12 | 2.6 | 7 | 5 | 41.7 |
| Bulgaria | 11 | 2.3 | 4 | 7 | 63.6 |
| Canada | 11 | 2.3 | 8 | 3 | 27.3 |
| Italy | 10 | 2.1 | 7 | 3 | 30 |
| Australia | 8 | 1.7 | 3 | 5 | 62.5 |
| Türkiye | 8 | 1.7 | 3 | 5 | 62.5 |
| France | 7 | 1.5 | 3 | 4 | 57.1 |

SCP: single-country, MCP: multi-country

Table 5 shows the distribution of journal publications. The "International Journal of Contemporary Hospitality Management" and "International Journal of Hospitality Management" led with 30 publications each, followed by the "Journal of Robotics and Mechatronics" with 21. The "Sustainability" journal ranks fourth, highlighting a focus on sustainability in robotics research.

**Table 5**
*Most influential journals*

| Sources | Articles |
|---|---|
| International Journal of Contemporary Hospitality Management | 30 |
| International Journal of Hospitality Management | 30 |
| Journal of Robotics and Mechatronics | 21 |
| Sustainability | 16 |
| Journal of Hospitality and Tourism Technology | 14 |
| Journal of Hospitality and Tourism Management | 13 |
| Tourism Management | 9 |
| Tourism Review | 9 |
| Journal of Hospitality & Tourism Research | 8 |
| Tourism Management Perspectives | 8 |

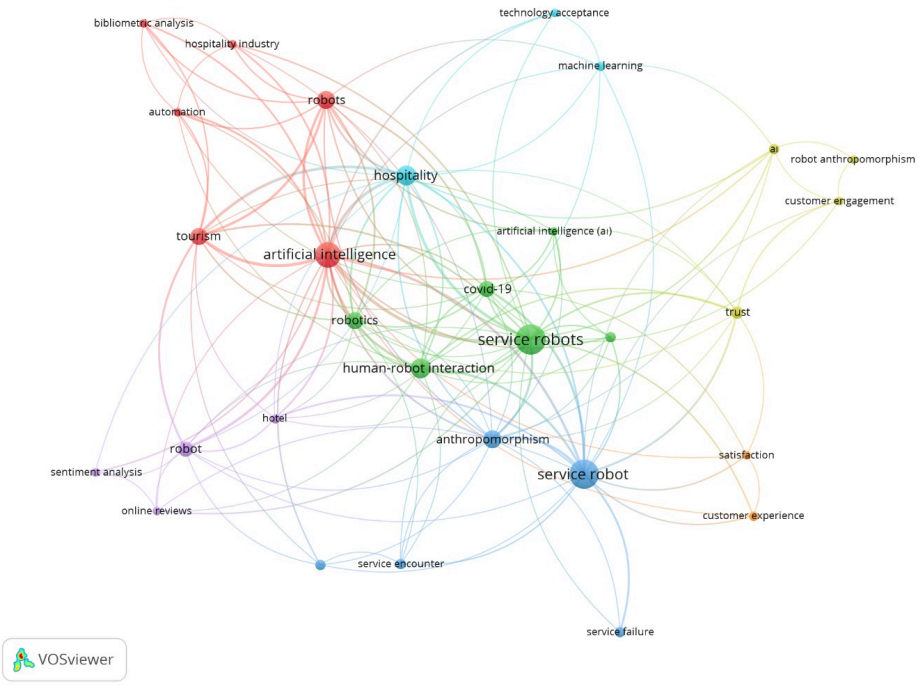
### *Thematic Cluster Analysis and Emerging Research Trends*

Table 6 and Figure 5 present the co-occurrence analysis of 469 publications' most-used keywords. Using VOSviewer, this analysis identified emerging themes and future research directions in tourism and robotics (Asif & Fazel, 2024). Out of 1659 keywords, 36 met the five-repetition threshold; six were excluded due to

interpretability issues, leaving 30 keywords. These keywords form a network divided into seven clusters, as shown in Table 6 and Figures 5 and 6.

**Figure 5**

*Visualisation of keywords co-occurrence analysis (generated using VOSviewer)*




The dataset highlights “AI and Robot” as the dominant theme in Cluster 1. AI integration has transformed robots into entities with humanoid and social attributes, marking a paradigm shift in robotics. This shift has made robots central to tourism and a focus of research. The cluster’s concepts align with the field (AI and Robot), application area (tourism), and interrelations (bibliometric analysis).

Cluster 2 is shaped around “service robots and human-robot interaction (HRI).” HRI studies the characteristics of robots and the behaviour and attitudes of humans (Fosso Wamba et al., 2023). Its goal is to develop robot interactions that are effective and respectful of human values and meet social and emotional needs (Dautenhahn, 2014). HRI is critical to successfully implementing and accepting service robots (de Kervenoael et al., 2020; Gursoy et al., 2019; Murphy et al., 2019). As a result, service quality has become an important research topic. As a fundamental element shaping the customer service experience, service quality is considered helpful for examining and measuring various dimensions of HRI (Choi et al., 2020; Fosso Wamba et al., 2023).

However, when the co-occurrence analysis of the “human-robot interaction” concept is analysed, its relationship with the concepts of “service quality,” “anthropomorphism,” and “trust” draws attention (Chi et al., 2024). In this context, considering the three different approaches of service-robot interaction (robot-centred, human-centred, and robot cognition-centred) (Dautenhahn, 2007), it can be said that the “human-centred” approach, which contains human expectations, satisfaction, needs, and emotions in its nature, is more adopted in the studies. The low adoption of the other two approaches, which examine both the technical and cognitive abilities of robots, may lead to the failure and rejection of robots in dynamic service

environments, such as tourism, because these three approaches complement each other (Dautenhahn, 2007). Cluster 2 concepts are thematically consistent, showing that COVID-19's health and safety needs have prioritised HRI, making it vital to service quality.

Cluster 3 revolves around the theme of "technology acceptance." Proliferation of service robots in tourism has made consumer adoption and acceptance critical topics of discussion. (Fosso Wamba et al., 2023). Various models and theories in the literature examine these topics. However, some traditional models and theories (e.g., TAM and UTAUT) generally focus on non-smart technologies. Considering that AI products differ significantly from traditional technological products due to their human-like mental characteristics (Lin et al., 2020), new models and theories are needed for smart technologies (Gursoy et al., 2019). For example, Go et al. (2020) used iTAM to determine consumers' perceptions of advanced robotics acceptance, while Gursoy et al. (2019) proposed AIDUA to investigate consumer acceptance of AI. On the other hand, when the co-occurrence analysis results of the concept of "technology acceptance" are analysed, a strong relationship is observed with the concepts of "hospitality" and "anthropomorphism."" This situation indicates that acceptance model research focuses on the hospitality sector on the axis of anthropomorphism.

The concept of "service encounter" in Cluster 3 highlights how robot performance and anthropomorphism are key to successful service delivery and consumer acceptance (Chi et al., 2023). Co-occurrence analysis confirms its strong ties to anthropomorphism and service-robot interaction.

Another noteworthy concept in Cluster 3 is anthropomorphism. Recent studies have focused on anthropomorphism. The level of anthropomorphism of robots is an important factor in terms of their adoption and use by consumers (Chi et al., 2020; Shin & Jeong, 2020). Some studies have shown that anthropomorphism levels affect consumer acceptance and satisfaction (Lin et al., 2022; Singh et al., 2021). However, the implications of this effect on consumers' intention to use AI service robots are still complex (Chi et al., 2020; Della Corte et al., 2023; Vitezić & Perić, 2024).

The results of the co-occurrence analysis of the concept of "anthropomorphism" indicate that it has a very wide network. This shows that anthropomorphism is frequently included with other concepts (service robots, service encounters, trust, customer engagement, service failure, satisfaction, artificial intelligence, service quality, hospitality, and customer engagement) and has an important place in the literature. Cluster 3 concepts, including service robots, anthropomorphism, and technology acceptance, show strong thematic connections. Anthropomorphism, service encounters, and robot performance are critical factors influencing robot acceptance or rejection, and they demonstrate consistency.

**Table 6**

*Intersection of robots and tourism*

| Rank | Author's Keywords | Occurrences | Total link strength |
|---|---|---|---|
| 1 | artificial intelligence | 44 | 87 |
| 2 | robots | 23 | 36 |
| 3 | tourism | 19 | 40 |
| 4 | automation | 5 | 13 |
| 5 | hospitality industry | 5 | 10 |
| 6 | Bibliometric analysis | 5 | 10 |
| 7 | service robots | 60 | 55 |
| 8 | human-robot interaction | 27 | 31 |

| Rank | Author's Keywords | Occurrences | Total link strength |
|---|---|---|---|
| 9 | robotics | 20 | 24 |
| 10 | COVID-19 | 17 | 26 |
| 11 | service quality | 7 | 10 |
| 12 | Artificial intelligence | 5 | 11 |
| 13 | service robot | 56 | 51 |
| 14 | anthropomorphism | 22 | 29 |
| 15 | technology acceptance model | 7 | 7 |
| 16 | service encounter | 7 | 7 |
| 17 | service failure | 7 | 6 |

Clusters 4, 5, 6, and 7 focus on consumer attitudes, behaviours, and satisfaction in robot interactions, extending themes from previous clusters. Trust in Cluster 4 is considered an essential factor in consumers' adoption and use of robots (Chi et al., 2023). Due to anthropomorphic designs, interaction capabilities, AI use, and complex service environments, the trust formed in interactions with AI social robots differs significantly from that in traditional technologies (Gursoy et al., 2019). Furthermore, trust is critical in social technology interactions, affecting customers' perceptions of service quality and service experiences (Della Corte et al., 2023). When the co-occurrence analyses of the concept of "trust" are examined, it is in relationship with the concepts of "human-robot interaction," "services robots," "human-robot interaction," "anthropomorphism," "satisfaction," "customer engagement," and "hospitality," which shows the importance of trust in consumer behaviour and perceptions. Like trust, consumer engagement is a critical factor in HRI (Liu et al., 2022; Morosan & Dursun-Cengizci, 2024). Consumer engagement includes co-creation, word-of-mouth social influence, customer referrals, purchasing, influencing, and information behaviour. Co-occurrence analyses of the "customer engagement" concept reveal that it is associated with service robots, anthropomorphism, and trust. In other words, these analyses identify the key factors in consumers' interactions with robots.

The terms "hospitality" and "hotel" in clusters 1, 5, and 6 highlight the focus on AI robots in hospitality. As businesses integrate these technologies, researchers have increasingly addressed related issues (Lin et al., 2020). The co-occurrence analysis of the concepts of "hospitality" and "hotel" confirms their relationship. The studies' results reveal that the related concepts are associated with most concepts across all clusters and have the highest total strength of association.

When the consistency of the concepts in Clusters 4, 5, 6, and 7 is examined, they are compatible with the density of the literature on consumer adoption of robots in social environments. In this context, the related concepts exhibit a thematically consistent structure.

## Discussion and Conclusion

The findings of this bibliometric study reveal that research on robot technologies in the tourism literature has undergone a marked transformation over the past decade. The increase in publication output, particularly after 2016, and the accelerated growth in the post-2020 period indicate that robots have evolved from a niche innovation topic into a well-established research domain within tourism. Previous bibliometric and review studies have noted that early research predominantly focused on technical issues such as automation, cost reduction, and operational efficiency, whereas more recent studies have increasingly focused on user perceptions, interaction processes, and experiential outcomes (Chen et al., 2023; Ivanov et

al., 2019; Knani et al., 2022). The temporal pattern identified in this study largely aligns with this broader developmental trajectory reported in the literature. The COVID-19 pandemic emerged as a critical turning point that accelerated this transformation, as heightened concerns about hygiene, safety, and contactless service delivery significantly shaped the direction of robot-related research in tourism (Cheong et al., 2026; Park & Kim, 2024).

Findings at the journal and author levels indicate that the robotics and tourism literature has become concentrated around specific academic outlets and research communities. The prominence of high-impact journals, such as the International Journal of Contemporary Hospitality Management and the International Journal of Hospitality Management, demonstrates that robot research has become integrated into the mainstream debates of tourism scholarship. Prior studies emphasise that robot research has gradually shifted away from technically oriented engineering outlets towards journals focusing on service, management, and experiential perspectives (Ivanov et al., 2019; Knani et al., 2022). Patterns of author productivity and citation further suggest that the field's intellectual structure is shaped by a relatively small group of core scholars. In particular, the high productivity and citation impact of researchers such as Stanislav Ivanov and Craig Webster highlight their central role in shaping research agendas and conceptual frameworks within the literature. Moreover, international collaboration patterns suggest that robot and tourism research is increasingly characterised by multi-country and interdisciplinary cooperation, although knowledge production remains concentrated in specific regions. The emergence of interdisciplinary studies at the intersection of tourism, robotics, psychology, and computer science—particularly within HRI research—has been instrumental in advancing the field (Bartneck et al., 2024).

Thematic analysis results indicate that the conceptual core of the literature is structured around HRI, anthropomorphism, trust, and technology acceptance. This structure is closely related to the inherently interaction-intensive and experience-driven nature of tourism services. Previous studies have consistently emphasised that the success of robots in tourism contexts depends not only on their technical capabilities but also on the quality of interaction and users' perceptual evaluations (Ivanov et al., 2019; Rana et al., 2025; Yörük et al., 2023). The strong associations between HRI and multiple thematic concepts observed in this study suggest that robots are increasingly conceptualised as social service actors rather than purely functional tools within the tourism literature. Anthropomorphism has become an increasingly central construct and is positioned as one of the key explanatory mechanisms in HRI research. Earlier studies conceptualised anthropomorphism primarily through human-like physical features attributed to robots; however, more recent research has adopted a multidimensional perspective that encompasses perceived intelligence, sociability, emotional capacity, and cognitive competence (Bartneck et al., 2009; Shang et al., 2026; Zhang et al., 2022). Chen et al. (2024) demonstrated that anthropomorphism indirectly shapes acceptance processes by influencing trust formation and interaction quality. At the same time, the literature underscores the contextual and conditional nature of anthropomorphism, noting that excessively anthropomorphic designs may raise user expectations and evoke discomfort or distrust when these expectations are not met (Appel et al., 2020; Tinwell et al., 2011). The co-occurrence of anthropomorphism with trust and interaction quality identified in this study is therefore consistent with these conditional interpretations in prior research.

Trust and technology acceptance emerge as additional core constructs within the thematic network. Previous research suggests that trust in service robots differs fundamentally from trust in conventional technologies, as it is shaped by perceived intentionality, behavioural consistency, and social presence (Gursoy et al., 2019; Liu & Tao, 2022). In tourism contexts, trust has been shown to play a critical role during

the early stages of service encounters while being continuously reconstructed through repeated interactions (Rana et al., 2025). At the same time, traditional technology acceptance models have been criticised for their limited capacity to explain socially interactive robot technologies. As a result, acceptance research has increasingly evolved towards enriched frameworks that incorporate anthropomorphism and trust as central explanatory variables (Chen et al., 2024; Lu et al., 2019).

Finally, the findings indicate that the literature remains heavily concentrated on the accommodation sector. Prior studies emphasise that robot applications vary considerably across tourism sub-sectors and that the dominance of hospitality-focused research limits the generalizability of existing knowledge (Ivanov & Webster, 2019; Özdemir & Taşkın, 2025). The central position of hotel- and accommodation-related concepts within the thematic network of this study confirms this structural characteristic frequently reported in the literature. Overall, the findings suggest that tourism robot research has evolved from an early, technically oriented phase towards a more mature research trajectory centred on HRI, anthropomorphism, trust, and acceptance.

## Practical Implications

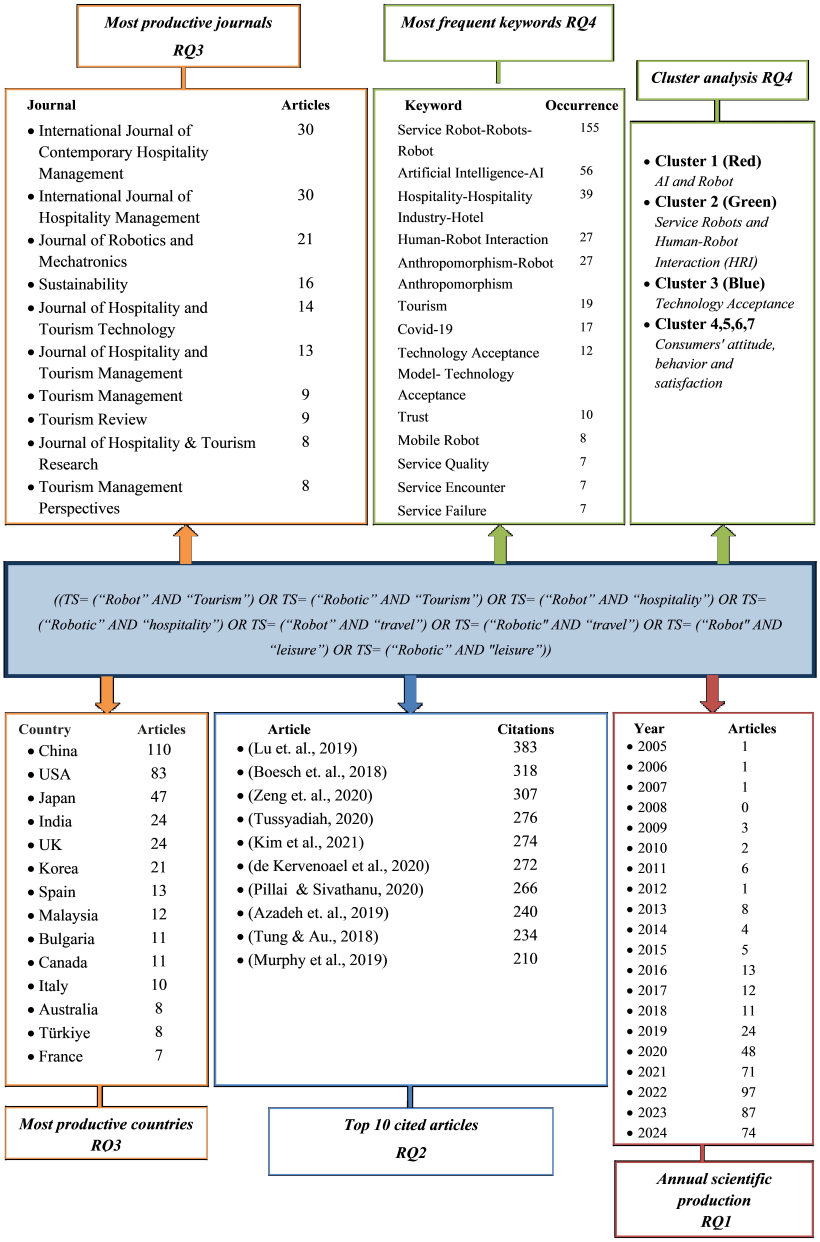
Integrating robots into the tourism sector is a hot agenda. It seems that robots will continue to become widespread in the tourism sector. Integrating robots into the workplace is a complex and dynamic process. Therefore, this study provides important insights into the integration of robots for practitioners, managers, and marketers in the tourism sector. For example, knowing the factors that are effective in the acceptance and adoption process from the HRI and consumer perspective in service encounters will provide an important basis for integration strategies. Similarly, for robot manufacturers and designers, knowing or predicting the effects of robots' features (e.g., social and anthropomorphic) on consumer perception and behaviour will significantly contribute to the production and design process. The successful integration of robots into the tourism sector is an area that requires collaborative efforts in many aspects. Therefore, this study recommends that all components be interactive and collaborative.

As a result, this study provides important information to tourism practitioners, managers, marketers, robot manufacturers, and designers in determining the processes and strategies for integrating HRI and robots into the business environment.

## Theoretical Implications

This bibliometric study makes significant theoretical contributions to the tourism and robotics literature. It highlights the role of service robots, identifies key research themes, and uncovers gap in existing scholarship. By systematically reviewing relevant studies, it provides a foundation for future inquiry and helps bridge theory and practice. In doing so, this work not only expands current theoretical frameworks but also indicates new research directions and areas warranting deeper exploration.

**Figure 6**
*The findings of the research.*




## Limitations and Suggestions for Future Research

This study has some limitations. Firstly, the data were obtained only from the WoS database. Secondly, the studies obtained were limited to the English language only. Therefore, future studies may provide a broader perspective and information by including data from different databases (e.g., scopus, google scholar) and studies written in other languages. Third, this study utilised a broader conceptual framework for the search criteria, which may have excluded specific subfields such as "hotel," "restaurant," and "bar."" Future research

could focus on these more specific areas to gain a deeper understanding of particular sectors within tourism and hospitality.

The safety and health concerns caused by the COVID-19 pandemic and developments in AI technologies have made robots available in many areas of our lives. The use of robots in the tourism sector is a topic of academic interest. However, it is understood from the study's findings that the knowledge and understanding in the field needs to be expanded. When the related literature is examined, it is seen that the studies focus on the acceptance and adoption of HRI and service robots from the consumer perspective. These issues are frequently addressed in the literature through anthropomorphism and trust factors. These two factors are among the main heuristic factors examined in the context of HRI (Gursoy et al., 2019). Studies examining heuristic factors generally adopt a "people-centred" approach to examine consumers' attitudes and behaviours. However, given the complexity of the acceptance and adoption process, it is essential to address these processes more comprehensively. In this context, different approaches (human-centred, robot-centred, and cognition-centred) need to be brought together, integrating heuristic factors with other factors (e.g., privacy, confidentiality, and ethics) and individual factors (e.g., personal innovativeness, self-efficacy, age, gender, and cultural differences). Such a multidimensional approach will expand theoretical and practical knowledge and enable the development of models and theories capable of explaining the issue. In addition, "robot-oriented" and "cognition-oriented" approaches that focus on the technical and cognitive characteristics of robots will support the design and implementation processes by contributing to the configuration management processes of robots. In this framework, studies involving researchers from different disciplines will provide more holistic and in-depth information on the adoption processes of robots.

On the other hand, it is seen that research is focused on the hospitality sector. Tourism consists of many sectors. In these sectors, robots are employed in different jobs and tasks (Çetinsöz et al., 2022). These jobs and functions are performed in various environments and require different levels of interaction. Interaction with robots providing guidance services at the airport is simple and speed-oriented; customers expect basic service. Interaction with robots taking orders to the room in a hotel is more extended, personalised, and based on privacy and trust. Therefore, these can change people's behaviour, attitudes, and expectations towards robots. This hinders the validation, generalisation, and comparative analyses of the intellectual knowledge in the field and the models and theories created across tourism. Therefore, studies should focus on other sectors such as restaurants, transport, tour operators, and travel agencies.

The study's findings show that the literature is vastly devoted to addressing HRI from the consumer perspective. However, this issue is not limited to consumer acceptance but is essential for managers and employees. For example, the integration of robots into the service environment and the concern of replacing human jobs may create job insecurity in employees, affecting their job autonomy, job satisfaction, and commitment to work (Horpynich et al., 2024; Koo et al., 2021; Li et al., 2024; Vatan & Dogan, 2021). However, the issue of whether robots will be a threat or support to workers, as well as managers and other industry representatives' perceptions of them, is still largely unclear, and studies are limited (Ali et al., 2023; Çetinsöz et al., 2022; Xu et al., 2023). Moreover, managers still need information on integrating such technologies and their consequences (Nam et al., 2021; Zhong et al., 2021). In this context, problems such as how managers and employees perceive robots as co-workers, their acceptance or rejection, and their impact on cooperation and performance should be further investigated in future research. In addition, it is essential to prioritise research topics to guide decision-makers and managers on how and where robots should be implemented.

Another study finding is that the literature on robots focuses on physical service robots. Virtual robots (e.g., chatbots and virtual assistants) also interact socially with humans like physical robots. However, the nature of consumers' interaction with and adoption of virtual robots and the process of integrating virtual robots into service may differ from that of physical robots. Therefore, future research should address these issues.

According to the findings of the study, AI and robotics technologies continue to spread and be researched rapidly in the tourism sector. However, the establishment of comprehensive legal frameworks to regulate and guide critical issues such as ethics, data security, and privacy in HRI are important issues (Dogan et al., 2024). Although no specific theme emerged in the study, these issues stand out as an important area of research in the tourism sector. In the future, it is critical to address these issues in detail to ensure the integration of AI and robotics sustainably and responsibly.

As a result, the literature on robots in tourism is at the beginning level, where issues such as acceptance and adoption occupy a large space. The literature on robots needs to expand and deepen to include all sector components. Increasing research on this need plays a critical role in understanding and guiding the process of integrating robots into tourism.

Peer Review: Externally peer-reviewed.
Authorship Contribution: Conception/Design of study: F.E., V.G.; Data Acquisition: F.E, V.G.; Data Analysis/Interpretation: F.E, V.G., M.A.; Drafting Manuscript: F.E, V.G., M.A.; Critical Revision of Manuscript: F.E, V.G., M.A.; Final Approval and Accountability: F.E, V.G., M.A.; Technical or Material Support: F.E, V.G., M.A.; Supervision: F.E, V.G., M.A.
Conflict of Interest: The authors have no conflict of interest to declare.
Grant Support: The authors declared that this study has received no financial support.

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