

## AREAS AND SCOPES OF ARTIFICIAL INTELLIGENCE AND THE METAVERSE APPLICATION IN BUILDING CUSTOMER EXPERIENCES FOR THE TOURISM AND HOSPITALITY INDUSTRY

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**Purpose:** In recent years, new technologies have been reshaping the tourism and hospitality sectors, representing a powerful catalyst for new approaches in the industry. These new perspectives are key drivers of market growth and business dynamics, and are a vital source of prosperity for many countries and destinations. This article aims to identify the areas and scopes of AI and Metaverse applications in tourism and hospitality as a part of the customer experience process.

**Design/methodology/approach:** This paper provides a comprehensive discussion on the potential applications of AI and the Metaverse they pose to the hospitality and tourism industry. The meaning and use of AI and the Metaverse in different travel stages and decision-making processes are also discussed. A literature scoping analysis and bibliometric analysis were conducted using the VOSviewer software to achieve the aim. Two research questions address the identified research gap: (RQ1) How can AI and the Metaverse enhance the customer experience more broadly in the tourism and hospitality industry, and (RQ2) At which stages of tourists' experiences has this new technology been applied? The empirical part of the article presents the exploratory, qualitative research conducted using descriptive research methods and a multiple-case study, which was subjected to comparative analysis.

**Findings:** In the tourism and hospitality sector, AI and Metaverse applications have become a hot topic in society and, consequently, a theme of scientific research worldwide. We identified the main areas and scopes of application for these technologies as valuable resources that enhance the travel experience at every stage—before, during, and after the trip by offering personalized recommendations and assistance to travelers. AI is already evident in tourism and hospitality at every stage of the customer experience. However, the Metaverse is more applicable before or during the trip. Analyzing the industries adopting these new technologies, we noted that travel portals, hotels, and airlines are the main ones. However, the adoption is still weaker in tourist destinations and their attractions.

**Originality/value:** The main contribution is the identification of repeatable decision-making areas that hold future potential for Artificial Intelligence and the Metaverse as tools to enhance the customer experience.

**Keywords:** AI, Metaverse, Customer Experience, Tourism, and Hospitality.

**Category of the paper:** Viewpoint, Case study.

## 1. Introduction

Tourism is a highly experience-driven industry, where the quality of customer interactions plays a decisive role in shaping satisfaction, loyalty, and overall competitiveness. Recent technological advancements, particularly Artificial Intelligence (AI) and the Metaverse, are transforming the way destinations, travel agencies, and hospitality organizations engage with their customers. AI enables personalization, predictive analytics, and automation, while the Metaverse introduces immersive, interactive, and persistent virtual environments that allow customers to explore destinations and experiences beyond the limitations of the physical world.

The tourism and hospitality industry faces significant challenges and is undergoing significant transitions. New technologies are reshaping tourism and represent a powerful catalyst for innovation in the sector, which is a key driver of growth, job creation, and business dynamics, and a vital source of prosperity for many local communities (OECD, 2024). The adoption of new technologies will result in substantial changes throughout the hospitality and tourism industry by disrupting how customers search for information, make decisions, and how businesses produce, deliver, and customize services and experiences.

The extent to which AI ultimately impacts and transforms the tourism sector, with its unique characteristics and reliance on in-person, high-touch experiences, remains uncertain; however, it is a growing topic of attention and debate in scientific articles and industry reports. We present this paper to inform this discussion, as there is a need, in the first instance, for destination policymakers and businesses to understand the potential of AI and the Metaverse to enhance innovation in tourism. This includes developing a better understanding of the complex digital environment for tourism and hospitality, and of the key components of AI and the Metaverse's potential to improve the tourist experience.

From a marketing perspective, consumers want more than just the delivery and consumption of products and services. Instead, they seek unique consumption encounters to accompany the products and services that create memorable experiences (Walls et al., 2011). Therefore, the researchers directed long ago that businesses need to shift their focus from a “delivery-focused” service economy to one that emphasizes high-quality products and services and “staged” experiences that create memorable consumer experiences (Pine, Gilmore, 1999). In a hospitality and tourism setting, practically everything a tourist goes through at a destination is an experience, be it behavioral or perceptual, cognitive or emotional, expressed or implied (Oh et al., 2007).

This article aims to identify the areas and scopes of AI and Metaverse applications in tourism and hospitality as a part of the customer experience process, both theoretically and practically. A literature scoping analysis and bibliometric analysis were conducted using the VOSviewer software to achieve this aim. Two research questions related to the identified research gap were developed: (RQ1) How can AI and the Metaverse enhance the customer

experience more broadly in the tourism and hospitality industry, and (RQ2) At which stages of tourists' experiences has this new technology been applied? The empirical part of the article presents the exploratory, qualitative research conducted using descriptive research methods and a multiple-case study, which was subjected to comparative analysis.

The cross-sectional case study and comparison of existing examples of using AI and the Metaverse in Tourism and hospitality as part of the customer decision process provided valuable insights into the challenges of creating and improving the tourist experience. The main contribution is the identification of repeatable decision-making areas that become future potential applications of Artificial Intelligence and the Metaverse as tools to enhance the customer experience. The article concludes by proposing a potential future research agenda.

## **2. Artificial Intelligence (AI) and Metaverse in Tourism and hospitality - theoretical background**

In the technology-driven era, Artificial Intelligence is one of the most innovative inventions that has revolutionized various industries worldwide. Artificial Intelligence (AI) can be referred to as the development of computer systems that can perform tasks and activities that require human intelligence (Russell, Norvig, 2016, p. 4).

Nowadays, Artificial Intelligence (AI) has a transformative impact on economies and societies and pervasive effects across all sectors and industries. The application of AI is already prevalent in many aspects of daily life and can profoundly transform how businesses operate and innovate, and this will have implications for what is an increasingly complex digital environment for tourism (OECD, 2024).

AI refers to a system's ability to learn from external data and automatically apply the learned knowledge to accomplish specific objectives and tasks through adaptation (Haenlein, Kaplan, 2019). AI has four specialized areas: computer vision, natural language processing (NLP), robotic process automation (RPA), and expert systems (Huang et al., 2022). Modern AI applications may combine multiple specialized AI domains to perform tasks that typically require human intelligence (Huang, 2024). Artificial Intelligence is broadly defined as "the study of agents that receive percepts from the environment and perform actions" (Russell, Norvig, 2021, p. 3). AI is a machine-based system that mimics human intelligence to learn, adapt to changing environments, and perform tasks. It is defined as "a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments" (OECD, 2024). AI can reason, recognize patterns, and make predictions or decisions; create images, text, videos, and other content; control smart, connected devices and robots; and engage in basic conversations (OECD, 2022). It is not one technology but

a mix of technologies that operate with other complementary technologies, such as robotics and Internet of Things (IoT), to dramatically augment capacity for image/face recognition, natural (human) language processing, predictive capacity, automation, and, more recently, content generation. AI is data-driven and operates with (intangible) resources such as data, algorithms, and skills, as well as (tangible) assets that make up the AI computing infrastructure (OECD, 2024). The most common AI applications include: a) chatbots and virtual assistants, primarily used for customer service; b) recommendation systems, which analyze customer data to provide personalized suggestions; c) personalization engines, such as machine learning and Natural Language Processing (NLP), which are techniques used to enhance the customer experience (Della Corte, 2025).

In the tourism and hospitality sector, AI manifests in applications such as chatbots, recommendation engines, virtual assistants, and service robots (Ivanov, Webster, 2019). AI-powered personalization has become a hallmark of modern travel platforms, offering real-time suggestions based on customer preferences, purchase histories, and contextual data (Buhalis, Leung, 2018). Many AI-related applications have already been adopted in the tourism sector, with further scope for innovation to support sustainable and inclusive tourism development. Analysis of existing applications and the potential of AI in tourism shows the variety of implemented and planned AI applications in place, with the potential to (OECD, 2024):

- Enhance the visitor experience with more interactive, personalized experiences and seamless travel, while increasing responsiveness to demand with 24/7 and more personalized services.
- Improve accessibility and audience engagement with greater accessibility of content and a diversified offer of culture and recreation services.
- Enhance market intelligence and data use, as well as capacity for market segmentation and customer profiling.
- Optimize visitor flows and traffic management with real-time data and automated decision-making.
- Support price/cost optimization through predictive maintenance, resource use, and procurement.
- Automate internal processes and basic customer services.

A good example of an AI application is the use of robots in the tourism sector, which illustrates the advancement of AI in the tourism industry, providing innovative customer services. These robots not only streamline the check-in and check-out process at hotels and airports but also act as concierges, enhancing guest interaction with immediate responses and personalized assistance (6 Examples of How AI is Used..., 2021).

On the practical front, customers typically do not distinguish the types of AI technologies but rather view AI as one holistic concept in service provision and delivery (Li et al., 2021). For example, recognizing the value of customer insights to improve brand equity, hotel businesses have begun offering intelligent robot concierges powered by AI to serve customers across various hotel areas (e.g., lobby, front desk, luggage storage, room service deliveries, outdoor pools, hotel restaurants). These service robots can provide instant answers to customer questions, assist with check-ins and check-outs, and engage with customers through speech recognition capabilities. Some can even learn and adapt to prior interactions to improve the accuracy of their responses to customers' inquiries and become smarter (Hueng, 2024).

Another important and even spectacular technological solution that is already being used in business is the Metaverse. The Metaverse is defined as “a persistent, immersive, and interconnected three-dimensional virtual environment where users interact with each other and with digital objects in real time” (Dionisio, Burns, Gilbert, 2013; Lee et al., 2021).

In this paper, the Metaverse is defined as the convergence of physical and digital universes, where users can seamlessly transition between them for work, education, training, health, exploring interests, and socializing with others. The metaverse is still largely conceptual and not yet clearly executed. Only in gaming is there already clear evidence of mainstream adoption by gamers (Katz, 2022). Academics from different disciplines work closely together to define, structure, organize, and visualize the future of the Metaverse (Dwivedi et al., 2022, 2023; Koohang et al., 2023).

In tourism, it offers an experiential layer that extends beyond physical boundaries. Virtual reality (VR), augmented reality (AR), and mixed reality (MR) enable tourists to preview destinations, experience cultural heritage virtually, and participate in immersive simulations before committing to physical travel (Guttentag, 2010).

**Table 1.**

*Metaverse hospitality services before, during, and after a physical visit*

The moment/stage	The Metaverse hospitality services
<b>BEFORE</b> a physical visit	<ul style="list-style-type: none"> <li>• Experience hospitality services virtually when real travel is not possible.</li> <li>• Enjoy ambience and atmosphere through realistic gamification.</li> <li>• Information collection and fact-finding before visiting.</li> <li>• Assessment of suitability and fitness of services to needs and requirements.</li> </ul>
<b>DURING</b> a physical visit	<ul style="list-style-type: none"> <li>• Planning of daily itineraries.</li> <li>• Explore local resources for visiting.</li> <li>• Use AR for interpretation and understanding.</li> <li>• Engage with additional knowledge sources to appreciate history or nature.</li> </ul>
<b>AFTER</b> a physical visit	<ul style="list-style-type: none"> <li>• Re-experience places and recharge their memories.</li> <li>• Re-engage with people, places, resources, cultures.</li> <li>• Reconnect with service providers and also fellow customers.</li> <li>• Demonstrate destinations and organization and show them to others.</li> <li>• Plan further trips and exploration.</li> </ul>

Source: own elaboration based on Buhalis (2022).

With the support of the Metaverse, people can stay at home or in other places but experience some of the intangible elements of hospitality virtually. These intangible consumer experiences can be accessed at any time and from anywhere. Virtual hospitality experiences can only simulate the real physical experience, and therefore cannot be considered as an attractive replacement. According to Buhalis (2023), Travelers will be using the Metaverse extensively before, during, and after visiting hospitality organizations to undertake a range of functions, as illustrated in Table 1. The use of new technologies in the tourism and hospitality sector, however, cannot be separated from the customer, the tourist. Therefore, a significant research issue currently is the adaptation of technology, but taking into account the context of the customer experience.

### 3. Customer Experience in Tourism

Tourism offers complex experiences and memories related to a place (Hosany, Sthapit, Björk, 2022). According to Carù and Cova (2003), an experience is "mainly a type of offering to be added to merchandise (or commodities), goods, to give the fourth type of offering which is particularly suited to the needs of the postmodern consumer" (p. 272). As an offering, experience has become closely related to a trip, journey, or even the attraction itself (Volo, 2009). Admittedly, an experience is created when "a company intentionally uses services as the stage and goods as props, to engage individual customers in a way that creates a memorable event" (Pine, Gilmore, 1999, p. 11).

Despite the enthusiastic movement toward the experience economy and its particular relevance to the hospitality and tourism industry (Gilmore, Pine, 2002; Titz, 2007), the literature has demonstrated a wide-ranging and perplexing set of definitions and theoretical meanings (Walls et al., 2011). Tourist Experience is a complex and wide-ranging construct arising from broader interactions with actors, stakeholders, and other tourists (Jaakola et al., 2015; Verhoef et al., 2009; Packer, Ballantyne, 2016; Kandampully et al., 2018; Meyer, Schwager, 2007). In light of the above discussion, many studies refer to the tourism experience as cumulative of each moment experienced by tourists during their journey, i.e., before the experience occurs, during the travel destination, and long after the tourist returns to their home environment. This ongoing process influences tourists' future behavior and expectations of the next trip. Lewis and Chambers (2000) defined consumer experience as - the total outcome to the customer from the combination of the environment, goods, and services purchased. Lashley (2008) discusses tourism experiences from the perspective of creating hospitable relationships between hosts and guests; these experiences engage emotions, which are essential to creating lasting memories. From a consumer's perspective, according to Oh et al. (2007), experiences are enjoyable, engaging, and memorable encounters for those participating in these events.

Andersson (2007) proposed the tourist experience as the moment when tourism consumption and tourism production meet. The tourist experience is still depicted as an obscure and diverse phenomenon, which the individual consumer mainly constitutes (Uriely, 2005).

While most definitions of tourism experience refer to the experience at the destination, the tourism experience encompasses multiple distinct yet interacting stages (Bernaki, Marso, 2023). It begins with the planning and preparation phases (anticipation), continues during the trip when tourists are physically present at the location (on-site), and extends beyond the trip by capturing moments to remember (recollection) and reflecting on the journey (reflection) (Cutler, Carmichael, 2010). In other words, the entire process, from planning to reminiscing, contributes to the overall tourism experience (Godovykh, Tasci, 2020). To illustrate, Tung and Ritchie (2011) define an experience as “an individual’s subjective evaluation and undergoing (i.e., affective, cognitive, and behavioral) of events related to their tourist activities that begin before (i.e., planning and preparation), during (i.e., at the destination), and after the trip (i.e., recollection)” (p. 1369). Thus, different factors influencing tourist behavior can be illuminated during each stage of the experience process (Chen et al., 2014). Still, no prior holistic conceptual model exists in the literature that has examined all the elements that form the tourist experience.

We can agree with Buhalis & Sinarta (2019) that Customer Experience (CX) in tourism is the holistic perception of a customer’s interaction with tourism organizations across multiple touchpoints, encompassing cognitive, emotional, behavioral, sensory, and social responses. To sum up, customer experience in tourism and hospitality is multidimensional and experiential, influenced by pre-trip information search, the service encounter, and post-trip sharing (Walls et al., 2011).

To identify the areas and scope of AI and Metaverse applications in tourism and hospitality within the customer experience process, we employed VOSviewer bibliometric analysis to support the exploration of the literature. This method is commonly used in works on the state of the art in a wide variety of areas. For the purposes of the analysis, techniques such as citation analysis, word co-occurrence analysis, and cluster mapping were used. The data obtained from the Scopus database were subjected to bibliometric analysis. The keywords (presented in Table 2) were used to search for titles, abstracts, and keywords (searches were conducted in September 2025). The electronic database was searched using Boolean operators. Only reviewed records covering documents published in scientific journals and books written in English were analyzed. No publication timeframe was specified, and no limits were applied to the subject areas in which publications were classified.

The co-occurrence analysis, as employed in VOSviewer, focuses on identifying relationships based on the frequency of item co-occurrence within the same context. The co-occurrence maps serve as a valuable starting point to identify prominent relationships between items, such as keywords. These visualizations offer a high-level overview of the

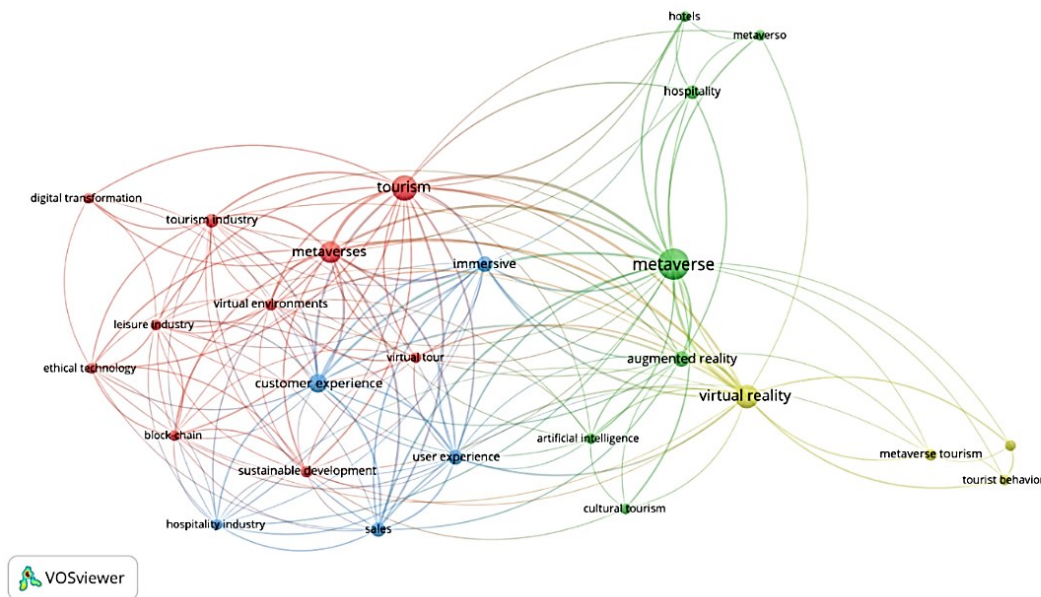
interconnectedness among items, helping this study to identify relevant themes and clusters within the dataset (Bukara, 2023).

**Table 2.**  
*The co-occurrence analysis - Keyword analysis*

Key words combination	Question/Search String	Number of articles (Scopus TITLE-ABS-KEY)	The co-occurrence analysis of Terms
<b>1. Metaverse, Customer Experience, Hospitality, Tourism Industry</b>	(( metaverse OR "social VR" ) AND ( "customer experience*" OR "guest experience*" OR "tourist experience*" ) AND ( "hospitality industr*" OR hotel* OR resort* OR restaurant* OR "tourism industr*" OR tourism OR "travel industr*" ))	53	Total keywords: <b>266</b> Minimum number of occurrences – <b>3</b> Meets the conditions: <b>26</b>
<b>2. AI, Customer Experience, Hospitality, Tourism Industry</b>	((“artificial intelligence” OR AI) AND (“customer experience*” OR “guest experience*” OR “service experience*”) AND (hospitality OR “hospitality industry*”) AND (tourism* OR “tourism industry*”))	105	Total keywords: <b>514</b> Minimum number of occurrences – <b>5</b> Meets the conditions: <b>27</b>

Source: own work based on VOSviewer.

To identify the areas of research on which AI and the Metaverse in tourism and hospitality articles focus, a map of link intensity among the most frequent keywords was developed. The maps are presented in Figures 1 and 2.



**Figure 1.** Map of the Intensity of Links between Keywords - combination 1 – clusters recognition.

Source: own work based on VOSviewer.

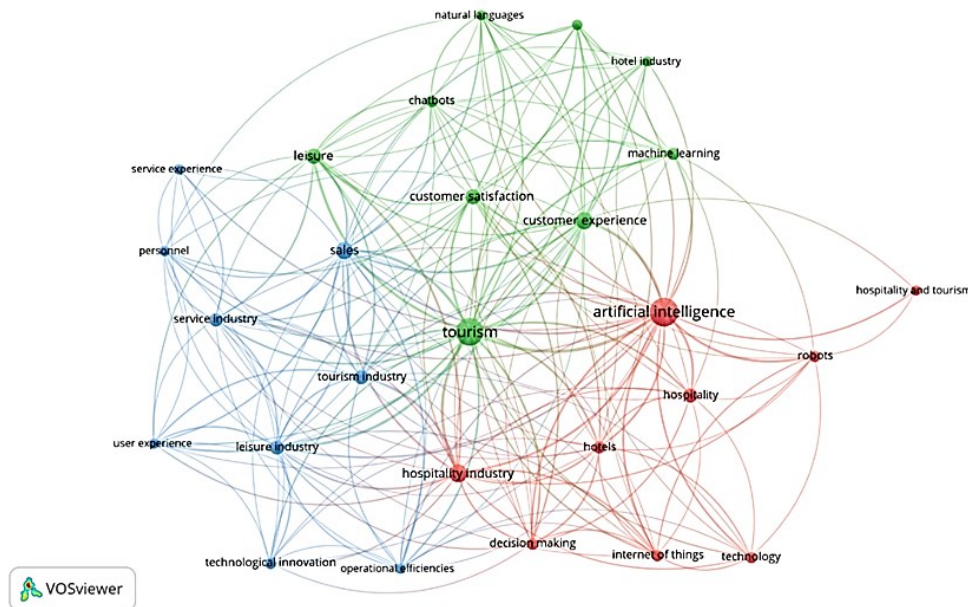
The network visualization and density visualization features of VOSViewer make it an exceptional tool for mapping scientific knowledge (Bukar et al., 2023). The visualization map of term occurrence depicts the frequency of occurrence of specific key terms, hence called the occurrence metric (Xu et al., 2021). The terms are represented as nodes of varying sizes,

proportional to the terms' recorded frequency. Additionally, the analysis indicates the frequency with which the terms appear in close proximity to one another. According to Bukara (2023), the co-occurrence of terms within a text network substantially affects the construction of text clusters, also known as communities of terms. The term "community of terms" refers to a group of terms that cluster collectively in the text network. Multiple instances of communities can exist on a text network. The VOSviewer's textual clustering method was used to determine the primary cluster prevalent for each text. This strategy aims to produce a number of clusters, each representing a distinct AI and Customer experience or Metaverse and Tourism and hospitality-related topic.

To isolate thematic areas covered in the articles, we visualized the relationships between keywords in the titles and abstracts of the publications. Figure 1 shows that the main research areas (combination 1 related to the metaverse) revolve around four main clusters, represented by the largest circles and marked with different colors: "Tourism" (red cluster – 10 items), "Metaverse" (green cluster – 7 items), "Customer Experience" (blue cluster – 5 items), and "Virtual Reality" (yellow cluster – 4 items). The "Tourism" cluster includes publications focusing on the evolution and use of new technologies in the *tourism* and *leisure industries*, as well as on *digital transformation*, *blockchain technologies*, the *virtual environment*, and the *ethical aspects* of these technologies. The second cluster addresses the use of "Metaverse", *artificial intelligence*, and *augmented reality*. Publications primarily focus on *hotels*, *hospitality*, and *cultural tourism*. The third research area, "Customer/user Experience", focuses on aspects related to the *sales* process and its *immersive* nature, which occurs in the *hospitality industry*. The fourth and final research area concerns "Virtual reality", tourism development, and *tourist behavior*, although it remains poorly defined. It should also be noted that the clusters are not homogeneous; the areas are still weakly connected to each other. The largest circle is the "Metaverse" area (red cluster), but "Customer Experience", the smallest research area, belongs to the blue cluster and is located further away from it. The same situation can be observed for "Tourism", which belongs to the red cluster. This identification indicates a still unexplored area for research in the use of the metaverse as a new technology shaping the tourist experience.

In comparison, Figure 2, which shows the research areas for combination 2 (related to the AI), shows three clusters: "Artificial Intelligence" (red cluster – 9 items), "Tourism" (green cluster – 9 items), and "Sales" (blue cluster – 9 items). The red cluster concerns the connections and use of "Artificial Intelligence" in the *hospitality and tourism industry* in the context of operational *decision making*, i.e., the use of the *Internet of Things*, *robots*, and *technology*. A second cluster, "Tourism", combines *customer experience* with *chatbots*, *machine learning*, and *natural languages* to achieve *customer satisfaction*. The third, blue cluster, focuses on "Sales" and its improvement in the *leisure* and *tourism industry* through *operational efficiencies*, *personnel*, and *technological innovation*. Publications indicate the need to utilize theories regarding *user experience* and *service experience*. The highlighted clusters have the

same number of items, and the dense connections suggest they are more homogeneous than in combination 1.



**Figure 2.** Map of the Intensity of Links between Keywords - combination 2 – clusters recognition.

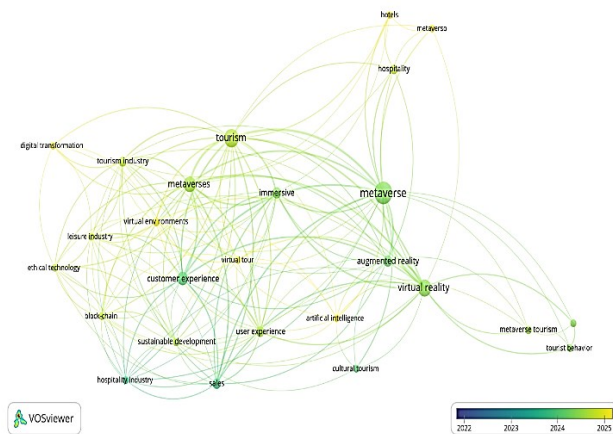
Source: own work based on VOSviewer.

Although no clear connection between AI-Customer Experience-Tourism industry has been identified, we can see that the distances between the individual dominant areas are significantly smaller. This allows for the interpretation that this area of AI research is already being explored more frequently by researchers, although the context of customer experience still seems untapped.

To identify recent trends in knowledge development, a map (overlay visualization) was created (Figures 3 and 4). Such maps are useful for verifying trends in research, as they make it possible to classify scientific papers using a time scale (Shvindina, 2019).

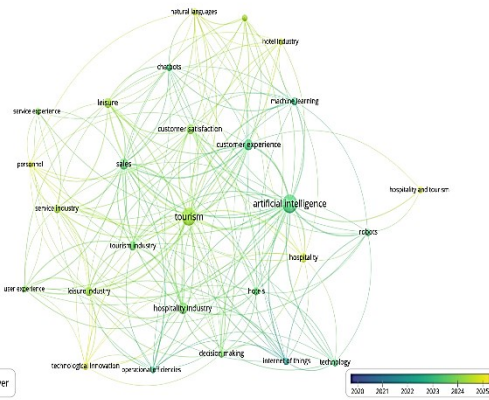
The overlay visualization for Keyword combination 1 and 2, which is presented in Figures 3 and 4, shows that the individual keywords take on a certain color depending on the year of publication.

According to the timescale assumptions, where dark colors indicate older publications and light colors indicate recent publications, we can conclude that the keyword combinations examined indicate a still young field of knowledge that is in the process of development. This offers significant potential for scientific research. Comparing the previous achievements, we can see a slightly greater maturity of AI research than the metaverse.



**Figure 3.** Overlay visualization for Keywords combination 1.

Source: own work based on VOSviewer.



**Figure 4.** Overlay visualization for Keywords combination 2.

Source: own work based on VOSviewer.

**Table 3.**  
*The most cited articles*

Key words	No.	Journal	Cited by	Authors/year	Title
<b>Metaverse, Customer Experience, Hospitality, Tourism Industry</b>	1	International Journal of Contemporary Hospitality Management	383	D., Buhalis, Dimitrios; M.S., Lin, Michael S.; D.H., Leung, Daniel Hee/2023	Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing
	2	International Journal of Geoheritage and Parks	80	D., Wei, Dongying/2022	Gemiverse: The blockchain-based professional certification and tourism platform with its own ecosystem in the metaverse
	3	Journal of Hospitality and Tourism Research	71	F.X., Yang, Fiona Xi; Y., Wang, Ye/2025	Rethinking Metaverse Tourism: A Taxonomy and an Agenda for Future Research
<b>AI, Customer Experience, Hospitality, Tourism Industry</b>	1	Journal of Service Management	774	D., Buhalis, Dimitrios; T.G., Harwood, Tracy Gaynor; V., Bogicevic, Vanja; G., Viglia, Giampaolo; S., Beldona, Srikanth; C.F., Hofacker, Charles Frederick/2019	Technological disruptions in services: lessons from tourism and hospitality
	2	International Journal of Hospitality Management	275	M., Li, Minglong; D., Yin, Dexiang; H., Qiu, Hailian; B., Bai, Billy/2021	A systematic review of AI technology-based service encounters: Implications for hospitality and tourism operations
	3	Journal of Hospitality Marketing and Management	268	D., Gursoy, Dogan; Y., Li, Yu; H., Song, Hakjun	ChatGPT and the hospitality and tourism industry: an overview of current trends and future research directions

Source: own elaboration based on VOSviewer.

This study also examined which articles are most frequently cited, as shown in Table 3. Articles on AI were cited more frequently again. However, given that the topic has only been developing in the last few years, this analysis is only a supporting identification.

The state of the art demonstrates the impact of AI tools and the development of the Metaverse in various fields of tourism and hospitality. Still, there is a relative lack of research exploring the path of AI and Metaverse as part of tourists' decision stages – the research gap. This research context, related to customer experience as a research subject, seems exciting and has excellent scientific potential.

## **4. The potential of AI and Metaverse in shaping the customer experience**

### **4.1. Research context and research method**

The World Economic Forum (2022) acknowledged that tourism is one of the key areas that can benefit from the Metaverse. The Metaverse enables travelers to experience immersion in virtual tourism destinations and organizations before they arrive (Buhalis et al., 2022). Metaverse tours are built on existing virtual tours that use 360-degree or 3D media modality technologies. They allow avatar embodiment as well as psychological and physiological immersion by facilitating synchronous interaction with other agents and objects in a virtual destination (Chen, Yao, 2022; Tsai, 2022). We can also state that AI, particularly its innovation characteristics, will change the way customers seek information about products or services and will have a major impact on various industries, including hospitality and tourism (Zhang, Prebensen, 2024).

The tourists' behavioral aspects, such as customer experience, are vital outcomes resulting from customers' assessments of innovation characteristics and adoption factors, and such evaluations can drive the acceptance and integration of innovative AI technologies and the Metaverse. In this study context, an exploratory research approach was used. The research questions we want to answer are:

- (RQ1) How can AI and the Metaverse enhance the customer experience more broadly in the tourism and hospitality industry?
- (RQ2) At which stages of tourists' experiences has this new technology been applied?

To answer those questions and fulfill the paper's aim, exploratory, qualitative research was conducted. As the method we used, descriptive research and a content analysis based on multiple case studies. We also used comparative analysis of theory and practice. The cross-sectional case study and comparison of existing examples of using AI and Metaverse in Tourism and hospitality as part of the customer decision process provided valuable insights into challenges in creating and improving the tourist experience. We used secondary sources of

information on various activities in the tourism and hospitality sectors. The main task of this empirical comparison was to identify at what stages of consumers’ decision-making regarding their experiences before, during, and after a tourist visit, AI and Metaverse solutions are used.

#### 4.2. Results and discussion

The growing reliance on AI and the Metaverse in the tourism sector raises several possibilities about the quality and inclusivity of tourist experiences. The potential applications can increase the experience quality by streamlining the customer journey, using real-time communication systems, or offering personalized offers. The practical examples presented in Table 4 refer to case studies from industries such as hotels, airlines, restaurants, tourist attractions, and travel portals.

**Table 4.**  
*The exploration of using AI tools and the Metaverse in Tourism and hospitality for enhancing customer experience – the comparative analysis*

		Before visit	During visit	After visit
Artificial Intelligence	<b>Theoretical possibilities of using AI in tourism and hospitality</b>	<ul style="list-style-type: none"> <li>• Improves the booking experience.</li> <li>• Improves the overall match between traveler preferences and offerings.</li> <li>• Improves risk management and responsiveness.</li> <li>• Increases market reach and personalization, fostering sustainable marketing practices through tailored and efficient customer engagement.</li> </ul>	<ul style="list-style-type: none"> <li>• Improves customer engagement.</li> <li>• Optimizes visitor flows and transport management by reducing congestion and waiting times through automated vehicle routing and seamless connections between sites and hubs, ensuring no delays.</li> <li>• Mass customization (“segment of ONE”), and big data-optimized offerings.</li> <li>• Robots For Face-to-Face Customer Services.</li> </ul>	<ul style="list-style-type: none"> <li>• Improves customer satisfaction.</li> <li>• AI assistants and Intelligent chatbots are deployed in social media sites like Facebook Messenger, Skype, WhatsApp, and Viber to offer users a more personalized booking experience based on their previous experience.</li> <li>• Data Analytics To Identify Valuable Insights.</li> <li>• Sentiment Analysis Through Social Media.</li> </ul>
	<b>Practical application - case study examples</b>	<ul style="list-style-type: none"> <li>• <b>Tourism Toronto</b> - use AI to analyze social media activity, booking trends, and spend patterns to develop more effective marketing and tailor offerings.</li> <li>• <b>Mindtrip</b> is a collaborative travel planner that uses AI to analyze various sources of inspiration (pictures, social media links) from multiple users and</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Destination British Columbia</b>, BC Travel Genius, an AI-powered chatbot that answers questions about destinations, suggests itineraries, and provides information on local attractions.</li> <li>• <b>Tokyo Haneda Airport</b> uses AI-powered translation devices to assist travellers through real-time translation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Expedia</b> uses an AI assistant (Romie) to analyze user preferences and past behaviors to suggest tailored travel options and streamline booking processes.</li> <li>• <b>The Dorchester Collection hotel</b> has processed and analyzed customer feedback surveys, customer reviews, and online polls using its AI platform Metis to determine its</li> </ul>

		<p>generate customized itineraries and tailored</p> <ul style="list-style-type: none"> <li>• The travel reservation giants like <b>Booking.com</b>, <b>Skyscanner</b>, and <b>Expedia</b> are utilizing such chatbots in their operations. Usually, customers are prompted to start a conversation with a chatbot by entering details of their intended journey recommendations.</li> <li>• <b>Booking and Microsoft</b>, AI assistant, developed an AI-powered chatbot and virtual assistants to handle routine tasks and customer service, providing instant responses to queries and assisting with booking processes.</li> <li>• <b>SmartGuide</b>, AI-generated guides, use an AI model to generate destination guides adapted to each tourist.</li> <li>• <b>Atout France</b>, MarlAnne, use generative AI to generate hyperpersonalised travel recommendations and encourage eco-friendly choices.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Airports</b> (e.g. Paris, Los Angeles, Vancouver, and San Jose ) use AI-powered facial recognition systems at checkpoints instead of boarding pass or passport controls.</li> <li>• <b>Barcelona Zoo</b> uses an AI-enhanced Chatbot designed for people with visual, auditory, and cognitive disabilities, or mental health disorders.</li> <li>• A robot at <b>London Heathrow Airport</b> that guides passengers in the terminals.</li> <li>• <b>The Henn-na Hotel</b> in Nagasaki is the world's first hotel fully staffed by multi-lingual robots primarily used for check-in and checkout processing. --Another innovative AI solution is '<b>Connie</b>,' the robot deployed in the hotel <b>Hilton McLean</b> in Virginia.</li> <li>• <b>Disneyland Parks, Management of crowd flows:</b> Disneyland Parks is harnessing advanced data collection and artificial intelligence to enhance visitor experience and manage crowd flow more effectively. By utilizing data from wristbands issued to hotel guests, along with numerous IoT sensors and cameras throughout the resort, the parks can monitor and analyze real-time visitor movement and identify overcrowded areas. Through the My Disney Experience mobile app, visitors can access up-to-date information on crowd levels and receive guidance on less congested areas to explore.</li> </ul>	<p>overall performance. They have discovered through such analysis that there is a lack of loyalty to their hotels. Businesses get the opportunity to devise better solutions that fulfill customer needs by identifying such trends of customers.</p> <ul style="list-style-type: none"> <li>• <b>Mindtree's PaxPulse</b> is a social Intelligence and Recommendation Platform designed for the airline industry. It uses Mindtree's pre-built classifiers, algorithms, and machine learning frameworks. When a particular passenger posts on social media about his travel partner, its smart algorithms process this sentiment and provide a certain recommendation to resolve passenger concerns.</li> <li>• <b>Analysing traveller surveys in Fukui, Japan:</b> The Fukui Prefecture Tourism Federation uses a data management platform that collects traveller surveys and consumption data, leading to a total of over 50000 cases and 90 facilities. A system has been built in which AI performs analysis according to the region and selected period, and displays the summary of results and suggestions. This supports the development of improvement plans together with local commercial facilities and the Chamber of Commerce and Industry for better management and more consumption.</li> </ul>
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Metaverse	<b>Theoretical possibilities of using the Metaverse in tourism and hospitality</b>	<ul style="list-style-type: none"> <li>• The metaverse boosts bookings by offering immersive previews of destinations, transport, and accommodation.</li> <li>• Metaverse support trip planning with virtual tours, realistic hotel walkthroughs, and interactive route previews.</li> <li>• The metaverse can facilitate the purchasing decision for travelers.</li> <li>• 5G development can have an answer to multi-sensory experiences.</li> <li>• The metaverse can help inspire tourists and encourage them to book or travel based on personal experience pre-travel.</li> </ul>	<ul style="list-style-type: none"> <li>• The time-travel experiences, smart destination shopping via VR, virtual attendance at trade shows with real-time interaction, and AR-guided tours providing on-demand destination details.</li> </ul>	<ul style="list-style-type: none"> <li>• Post-trip, the real potential of the metaverse lies in the capacity to inspire further travel.</li> </ul>
	<b>Practical application - case study examples</b>	<ul style="list-style-type: none"> <li>• <b>Emirates Airline,</b> Emirates has developed its own VR app, allowing users to explore Airbus A380 and Boeing 777 aircraft interiors. Finally, an interactive 3D seat map lets customers better understand what their seat will be like, and they can even book their preferred seat within that virtual environment.</li> <li>• <b>Travelers</b> can use the metaverse to explore destinations as if they were there themselves.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Machu Picchu with the Incas,</b> the journey to the lost city. Machu Picchu is a wonderful immersive experience and journey. Tourists will be transported back 450 years to the heart of the ancient Inca Empire in stunning virtual reality.</li> <li>• <b>The BCB Group—</b> a leading crypto banking group—has created a metaverse city that includes representations of some of the most visited destinations in the world, such as the Great</li> </ul>	No data

		<p>They can even engage in travel to discover how long it takes to go to the destination or find out the most exciting route to take from one sight to another.</p> <ul style="list-style-type: none"> <li>• The tourist can stand at the base of Egypt’s Great Pyramids, overlook Pompeii ruins, or tour a luxurious hotel room before paying for it. He can do what he likes from the comforts of your own home. It’s fully immersive, merging digital and physical realms. The expansion of 5G technology allows for full multisensory experiences. For tourists, it means smelling fresh coffee being brewed in street cafes in Paris, or getting a whiff of freshly baked bread at Italian restaurants.</li> </ul>	<p>Wall of China and the Statue of Liberty, the Taj Mahal, the Eiffel Tower, and the Colosseum of Rome. According to BCB, the total cost of flights, transfers, and entry for all these landmarks would come to \$7600—while a virtual trip would cost just over \$2.</p> <ul style="list-style-type: none"> <li>• <b>Saudi Arabia’s Royal Commission</b> for AIUla (RCU) announced that the ancient city of Hegra had entered the metaverse.</li> </ul>	
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Source: Own elaboration based on literature, websites, and industry reports.

Analysis of the factual material allowed us to present three main conclusions: (1) the use of artificial intelligence is already visible in tourism and hospitality at all stages of the customer experience. However, the Metaverse is more applicable before or during the trip. There is no information on how to apply the Metaverse after the visit. (2) Analyzing the individual stages of the customer experience, the most significant number of examples concern the phase during the visit, which seems obvious. It is also the easiest for service providers due to technological capabilities. (3) Analyzing the industries adopting these new technologies, it should be noted that these include travel portals, hotels, and airlines. However, the adoption is still weaker in tourist destinations and their attractions.

We can also conclude that for travelers, AI tools and Metaverse applications offer personalized recommendations and assistance. These technologies are often seen as valuable resources that enhance the travel experience at every stage—before, during, and after the trip.

## 5. Conclusions and future research

In an era characterized by escalating service demands, the integration of advanced technologies within the tourism and hospitality industry has surged, profoundly reshaping the dynamics of host-guest interaction (Della Corte, 2025). Traditionally grounded in human-to-human exchanges, these industries have progressively transitioned towards a landscape marked by machine-human engagement (Bowen, Whalen, 2017). This study examined how Artificial Intelligence (AI) and the Metaverse transform customer experiences in tourism. AI applications, ranging from chatbots and recommendation engines to service robots, facilitate personalization and operational efficiency. The Metaverse, through immersive VR and AR environments, provides new forms of cultural engagement, destination marketing, and pre-travel exploration. Together, these technologies reshape how customers perceive, interact with, and evaluate tourism experiences.

Using AI to develop personalized tourist experience interactions will require robust data protection and consumer safeguarding measures. AI applications offer highly personalized travel experiences through customized recommendations and virtual assistant services, analyzing individual preferences to tailor suggestions for each traveler.

Despite promising developments, several future research directions remain. First, there is a need for still longitudinal studies that trace the evolving influence of AI and the Metaverse on customer experience across time. Second, cross-cultural comparisons are necessary, as technology adoption is shaped by cultural and socio-economic factors. Third, ethical and privacy considerations require deeper investigation, particularly regarding customer data use, surveillance, and digital inclusion. Overall, the application of AI and the Metaverse can offer tourism opportunities to enhance customer experiences and address challenges related to ethics, inclusivity, and authenticity. Addressing these dimensions remains a priority for both scholars and practitioners.

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