Ivana Veljović[1]
Marijana Seočanac[1]

DOI 10.7251/ZJF2514410V

KAKO VEŠTAČKA INTELIGENCIJA TRANSFORMIŠE TURISTIČKU DELATNOST: PREGLED LITERATURE

Apstrakt: Kao i u mnogim drugim delatnostima, veštačka inteligencija se sve više primenjuje u turizmu, koji je veoma osetljiv na tržišnu dinamiku i tehnološki napredak. Ovaj rad ima za cilj da istraži primenu veštačke inteligencije u turističkoj delatnosti, sa posebnim fokusom na upotrebu robota i četbotova. Na osnovu stvarnih primera, identifikovane su tri vrste robota: mehanoidi, humanoidi i androidi. Takođe su analizirani načini na koje kompanije, poput turističkih agencija i hotela, koriste četbotove. Kroz pregled dostupne literature, ovaj rad identifikuje prednosti korišćenja tehnologija zasnovanih na veštačkoj inteligenciji, izazove koje one donose i moguća rešenja za njihovo prevazilaženje.

Ključne reči: veštačka inteligencija, turizam, ugostiteljstvo, nove tehnologije

HOW ARTIFICIAL INTELLIGENCE IS TRANSFORMING THE TOURISM INDUSTRY: A LITERATURE REVIEW

Abstract: As in many other industries, artificial intelligence is increasingly being integrated into tourism, which is highly responsive to market dynamics and technological advancements. This paper aims to explore the implementation of artificial intelligence (AI) in this industry, with a particular focus on the use of robots and chatbots. Based on real-world examples, three types of robots are identified: mechanoids, humanoids and androids. The ways in which companies such as travel agencies and hotels utilize chatbots are analyzed as well. Through a review of available literature, this paper identifies the benefits of using these AI-driven technologies, the challenges they bring, and possible solutions for overcoming them.

Keywords: artificial intelligence, tourism, hospitality, new technologies

1 Faculty of Hotel Management and Tourism in Vrnjačka Banja, University of Kragujevac; ivanaveljovic01@yahoo.com, marijana.seocanac@kg.ac.rs

1. INTRODUCTION

Tourism is one of the most important sectors of the global economy. It represents a key component of economic growth in many developing countries (Ekanayake & Long, 2012) and is equally important for both developed and less developed nations (Pjanić, 2019). According to preliminary estimates by UN Tourism (2025), total export revenues from tourism are projected to reach a record USD 1.9 trillion in 2024. However, tourism is a complex phenomenon, as it is closely linked to the progress and expansion of other industries (Bunghez, 2016). Technological innovations are of particular importance as they have a consistently transformative impact on tourism operations, driving growth and improving the competitiveness of the sector (Buhalis, 2020; Gáll, 2023).

Artificial intelligence in particular has emerged as an important technology that is reshaping many industries nowadays, including tourism (Bhaskar & Sharma, 2022). Moreover, tourists show a willingness and positive attitude towards the use of AI when traveling and staying in hotels (Buhalis & Moldavska, 2022). Given consumer's ever-growing expectations, it is essential to adapt to changing demand in order to maintain a competitive advantage and ensure customer satisfaction (Rawal et al., 2023). In this context, AI is predicted to have a major influence on both consumers and businesses, especially in tourism (Koo et al., 2021).

This paper aims to assess the current state of artificial intelligence implementation in the tourism industry. The aim is not to empirically investigate or solve a specific research problem, but rather to systematically review the existing literature. Through the analysis of various case studies, it attempts to identify the key benefits and challenges and provide practical insights that can support industry professionals in decision-making and future developments.

To achieve the defined objective, this paper is structured into several key sections. It begins with an overview of the basic principles of artificial intelligence. Next, the applications of artificial intelligence in tourism, underpinned by relevant case studies, are presented. Finally, based on a comprehensive literature review and case studies, the key benefits and challenges associated with the adoption of artificial intelligence in the tourism industry are highlighted.

2. CORE CHARACTERISTICS OF ARTIFICIAL INTELLIGENCE

There is currently no universally accepted definition of artificial intelligence, as the existing definitions depend, among other things, on the research objectives (Wang, 2019). First and foremost, defining intelligence itself is a challenge. In addition, behaviors that were once considered signs of machine intelligence are quickly becoming unremarkable due to the rapid development in the field of AI (Kaplan & Haenlein, 2019). However, most definitions include the explanation that it is the use of machines that exhibit characteristics of human intelligence (Huang & Rust, 2018). Current explanations of AI do not differ significantly from the original one introduced at Dartmouth College in 1956. Back then, AI was similarly defined as „making a machine behave in ways that would be called intelligent if seen in a human" (Hutson, 2017, p. 19).

In order to function and perform tasks that were previously done by humans, an AI solution requires a large amount of data and a strategy for continuous data generation to enable continuous learning. In addition, a clearly defined task structure is required for the development of the system. Machine learning algorithms are then used to recognize patterns and make predictions from unstructured data. However, true learning and improvement comes from dealing with real-world business situations (Taddy, 2018). Previous research suggests that artificial intelligence will become an integral part of everyday life, not only affecting individuals but also fundamentally changing the way businesses operate, make decisions and communicate with key stakeholders. The question is not "whether AI will play a role in these elements, but rather what role it will play and, more importantly, how AI systems and humans can peacefully coexist" (Haenlein & Kaplan, 2019, p. 9).

3. ARTIFICIAL INTELLIGENCE IN THE TOURISM INDUSTRY

3.1 Key trends and applications

Artificial intelligence is becoming increasingly important in the tourism industry (Fouad et al., 2024), as evidenced by the continuous increase in scientific papers whose most common topics are related to the use of AI, such as the use of big data for demand forecasting and customer satisfaction measurement, augmented reality (AR) and virtual reality (VR) in the value co-creation process, the impact of the COVID-19 pandemic on the adoption of service robots and emerging trends in smart tourism (Nannelli et al., 2023, p. 1326). According to Huang et al. (2022), AI can be found in the tourism industry in the form of "search/booking engines, virtual agents/chatbots, robots and autonomous vehicles, kiosks/self-service screens and AR/VR devices" (p. 1085).

Bulchand-Gidumal et al. (2023) conducted a study on the impact of AI on hotel's marketing functions, and concluded that there are ten trends related to AI's contribution to hospitality and tourism marketing (Figure 1). Although the ten identified trends are categorized into four main groups, most of them influence all groups.

Figure 1: AI trends for tourism industry

Source: Bulchand-Gidumal et al. (2023, p. 2353), adapted by the authors

For example, AI can leverage demographic data and consumer habits to create personalized offers (Soni-Silva, 2024). Such offers make travel more cost-effective by guaranteeing that reservations are perfectly tailored to individual preferences (Zsarnoczky, 2017). In this way, AI solves one of the leading challenges of matching supply and demand. Once tourists are in a destination, AI support can become even more important. For example, language translation applications, voice recognition, and natural language processing systems can be useful tools for overcoming language barriers (Bulchand-Gidumal, 2022). In general, the application of artificial intelligence in the tourism industry can significantly impact customer experience, increasing their satisfaction, which in turn leads to positive economic effects. Additionally, employee productivity is enhanced as they can focus on priority tasks (Adaobi et al., 2024).

Industry representatives who participated in the study by Bulchand-Gidumal et al. (2023) stated that AI enhances employee's abilities, such as vision and hearing, allowing them to better understand and anticipate customer needs both proactively and reactively. As a result, they highlighted the importance of employees being able to integrate technology into operational processes to complement human capabilities effectively. Employees are expected to adapt to new technologies and the same applies to customers. Additionally, the characteristics of the artificial intelligence system and service characteristics have been identified as two key elements that are anticipated to influence consumer behavior in the future (Flavián & Casaló, 2021).

3.2 Case studies

Human-robot interaction and intelligent agents like chatbots stand out as the most frequently researched topics in the field of AI applications within the tourism industry (Cain et al., 2019). This focus is also reflected in a global survey of hotel chains from 2024, in which rule-based AI tools – such as process optimization and recommendation engines – are named as the most important innovation focus for the next two years (Statista, 2025). For this reason, these two areas are elaborated on below, with specific examples provided.

3.2.1 Robotics

The majority of research regarding robotics in the tourism industry was concentrated on specific environments such as restaurants, hotels and bars (with significantly less attention given to other tourism sectors like airports, events, theme parks etc.) (Ivanov et al., 2019). Recent studies are focused on anthropomorphism, which involves assigning human traits, characteristics or behaviors to nonhuman entities, shaping how people perceive, engage with and accept things like robots. Anthropomorphism-based physical AI robots can be categorized into three groups: mechanoid, humanoid, and android robots (Saputra et al., 2024).

Mechanoid or machine-like robots (De Jong et al., 2021) lack both human traits and a human-like appearance (Kang et al., 2023). Some of the key reasons for their implementation within service industry are enhanced efficiency through speed and durability, as well as ensuring consistency. A good example of this group is *Cafe X robotic barista*, capable of making 120 cups of coffee per hour (Tussyadiah, 2020). Although

Cafe X is the first kiosk in the United States to be fully automated, it is not the only business of its kind. On the contrary, the use of robotic baristas has been on the rise, a trend that became especially evident during the Covid-19 pandemic (Sung & Jeon, 2020). Employee-free coffee shops have become an integral part of daily life in South Korea as well. In these automated cafés, robot baristas prepare beverages based on customer orders, which can be placed at self-service kiosks or in advance via a mobile app to optimize efficiency and reduce wait times. The system is highly efficient, with the robot capable of producing 90 cups in a single hour and 14 simultaneously (Hwang et al., 2021). Mechanoid robots, primarily resembling those used in industrial settings, are utilized not only for preparing coffee and cocktails but also in kitchen operations. And here, they are most commonly employed in the form of a robotic arm (Bendel & Peier, 2023). Additionally, in the Fly Zoo Hotel, the world's first fully automated hotel that uses facial recognition, such robots are not only used for making drinks and food (e.g., ice cream) but also for guiding guests and delivering meals and other items (Luo & Pan, 2021).

Humanoid service robots are distinguished by their human-like design, which typically includes a head, extremities, and the ability to mimic human movement. However, it is not uncommon for these robots to have human-like features simplified, making them only partially resemble humans (Huang & Liu, 2022). *Pepper* is an example of carefully designed humanoid robot with smooth curves to enhance both appeal and safety in human surroundings. Introduced in 2014 for B2B needs, it was later adapted to serve B2C purposes. This is a mobile robot enabled to move via three wheels. Additionally, it is equipped with various sensors, cameras, microphones, loudspeakers, LEDs and a tablet (Pandey & Gelin, 2018), featuring a touch-sensitive screen, which provides an alternative for interaction if voice recognition fails (Barakeh et al., 2019). In Tokyo's Pepper Parlor café, Pepper humanoid robots are not only used for brewing coffee but also for handling orders, engaging with customers and maintaining cleanliness (Yoo et al., 2022). It has been proven that these robots, with certain adjustments, can also be used as museum guides. In such a setting, dialogue is adapted based on the visitor's age by integrating explicit questions posed by the robot during interaction with observations of user behavior. Based on that, Pepper has the ability to suggest what to visit next in the museum (Castellano et al., 2020).

Android robots are the most sophisticated type of anthropomorphic robots, designed to project human-like appearance and behavior at the highest level (Jia et al., 2021). Androids are commonly used in customer service, reception, entertainment and research. A distinguished example is *Aura*, a robot that interacts with visitors in the Las Vegas Sphere. The adoption of this group of robots in the hospitality industry has been limited due to high costs associated with both hardware and training (Saputra et al., 2024). In addition, androids, also known as realistic robots, elicit more negative attitudes compared to the other two categories of robots (Akdim et al., 2023). Historically, the significance of developing androids, as opposed to humanoid robots, was not fully recognized within the robotics community (Mac Dorman & Ishiguro, 2006).

3.2.2 Chatbots

Chatbots are "computer programs designed to simulate human communication through text or voice interaction". This type of AI technology uses machine learning algorithms and natural language processing to understand user questions and provide adequate answers (Wang, 2024, p. 57). *Eliza*, chatbot from the 60s, is assumed to be the first of its kind known publicly. This chatbot, which worked within a specific domain and did not understand the conversation, only recognized patterns along with intelligent formulations and provided responses based on that. Nevertheless, many users initially thought they were conversing with a human (Shum et al., 2018).

Nowadays, chatbots are widely applied in various fields (Caldarini et al., 2022) such as e-commerce (Skrebeca et al., 2021), education and research (Kooli, 2023), public transport (Zumstein & Hundertmark, 2018), healthcare (Laymouna et al., 2024) etc. Overall, they are highly beneficial in the domain of customer service, particularly for handling simple inquiries efficiently (Følstad & Skjuve, 2019). The simplest and most widely used types of chatbots on the market are those presented in the form of buttons and drop-down menus. Users are expected to make choices to reach a final answer, following the principles of decision trees (Gupta et al., 2020).

Along with the demonstrated potential and continued growth in the market, chatbots have begun to be applied to a greater extent in tourism industry as well (Zlatanov & Popesku, 2019). The use of chatbots is particularly important for travel agencies, as it helps them reduce operational costs by eliminating the need to hire travel advisors. Based on customer feedback, agencies observe that users are highly satisfied with the ability to receive reliable and useful information from AI chatbots. However, research shows that some customers still prefer travel support from human travel agents (Pillai & Sivathanu, 2020).

Hotels are also showing growing interest in using chatbots. Their primary goal is to encourage direct bookings by offering instant responses through chatbots on their websites. This approach would reduce commission costs for external sales, which usually account for 15% to 30% of hotel revenue (Buhalis & Cheng, 2020). In this way, booking rooms is available for Marriot Hotels (Ukpabi et al., 2019). This hotel chain is certainly not the only one using such AI tools: Hilton, Radisson Blue, KLM and Edwardian Hotels are just some of the other examples (Ukpabi et al., 2018). Besides official websites, chatbots are also widely used on social media platforms like Facebook (Ukpabi et al., 2019).

4. BENEFITS AND CHALLENGES OF AI IMPLEMENTATION IN TOURISM

Artificial intelligence brings numerous benefits to companies, with one of the most important advantages being operational cost savings. Artificial intelligence can be more efficient than humans, which can be seen in the use of chatbots for gathering information and reaching a broad audience (Adamopoulou & Moussiades, 2020). For example, Booking.com's chatbot automatically resolves 30% of customer inquiries in under five minutes (Calvaresi et al., 2023). However, many consumers still prefer contact with human employees rather than artificial intelligence chatbots. To enhance the acceptance of AI technologies like chatbots, it is recommended that they be im-

proved by incorporating humanistic qualities. Advancements in artificial intelligence and machine learning are expected to make it harder to distinguish whether customer interactions are occurring with a chatbot or a human (Adamopoulou & Moussiades, 2020). Additionally, it would be crucial to raise public awareness of the features of AI chatbots through mass media and educational campaigns (Kelly et al., 2022).

Despite many advantages, the use of artificial intelligence brings with it numerous challenges. Finding the right balance between human and digital interaction stands out as one of the main difficulties of applying artificial intelligence in tourism, as well as other service industries (Limna, 2023). Also, there is a noticeable increase in people's fear regarding ethics in AI, which has led to the rise of standardization bodies that are beginning to address these concerns and integrate them into established standards (Jan et al., 2023). It is considered necessary to anticipate future ethical obstacles related to the application of artificial intelligence in the tourism industry now, as there is a fear that it will be too late to resolve them when they arise (Belk, 2021). In addition, the future is expected to bring new complexities, thus tourism industry must consider challenges such as space and design adjustments for accommodating service robots in hotels, restaurants and other venues, used whether for direct or indirect guest services (Ivanov & Webster, 2017).

Highly realistic robots often create discomfort in consumers, who also may feel judged due to the robot's strong social presence. Therefore, managers are advised to choose solutions with a more mechanical appearance or minimal human-like features, which will consequently positively affect the overall experience and customer satisfaction (Holthöwer & Van Doorn, 2023). The discomfort people experience about humanlike robots, known as "uncanny valley", stems from attributing emotional and sensory experiences to these machines, rather than from their ability to perform actions (Gray & Wegner, 2012). By emphasizing the fact that a robot is just a machine, the consumer's sense of discomfort can be reduced. For instance, instead of giving a robot human name, it is preferable to refer to it by its model number (Mende et al., 2019).

Additionally, robots like Pepper are capable of performing tasks that require mechanical or analytical intelligence, but they lack intuition and empathy. Therefore, they should be viewed only as an interactive implement and not as a complete replacement for human staff (Tuomi et al., 2021). A study conducted by Kim et al. (2023), which focused on examining the impact of robot's visual features and service autonomy on customer acceptance in a café setting, found that the intention to use the service was lowest when the robot had a high level of visual human-like features, regardless of its level of autonomy. This further supports the fact that, although many companies in the tourism industry have decided to incorporate robots into frontline roles, very few have been successful in doing so (Rosete et al., 2020).

As hospitality companies integrate service robots to enhance customer experiences, human-robot interaction (HRI) guidelines and standards will become increasingly important in ensuring service quality. Henn-na Hotel in Japan learned this in 2019 when it retired half of its 243 robots after they proved unreliable in performing tasks usually done by humans in other hotels – from carrying luggage to answering simple questions and engaging in conversations with guests (Collins, 2020).

5. CONCLUSION

Artificial intelligence is becoming increasingly important in the transformation of the tourism industry. As the literature review and the practical examples analyzed in this paper show, AI-driven tools and applications, especially chatbots and robots, are very promising in areas such as cost reduction, operational efficiency, speed and reliability of basic customer interactions and personalization of services, which is why organizations in the tourism industry are increasingly adopting these technologies.

Despite these benefits, there are still many challenges that need to be addressed. One of the main challenges identified in the literature is finding an appropriate balance between these digital solutions and human interaction. For example, overly humanoid robots, although technologically impressive, often cause discomfort among guests. Therefore, the importance of choosing a robot design based on guest perception and comfort is particularly emphasized. Chatbots have also emerged as important AI tools in tourism, proving their ability to handle customer queries quickly and efficiently. However, despite the benefits they offer, many customers still prefer human interaction. It will therefore be crucial to design AI in such a way that it complements, rather than replaces, human employees.

Overall, the integration of artificial intelligence in tourism remains promising and offers significant opportunities for innovation and competitive differentiation. However, to remain competitive in this rapidly evolving industry, it is crucial to find a balance between using artificial intelligence to enhance the guest's experience and maintaining human hospitality.

ACKNOWLEDGEMENTS

This research is supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia by the Decision on the scientific research funding for teaching staff at the accredited higher education institutions in 2025 (No. 451-03-137/2025-03/200375 of February 4, 2025) and by the Decision on realization and funding of scientific research of Scientific Research Organizations in 2025 (No. 451-03-136/2025-03/200375 of February 4, 2025).

REFERENCES

1. Adamopoulou, E., & Moussiades, L. (2020). An overview of chatbot technology. In I. Maglogiannis, L. Iliadis, & E. Pimenidis (Eds.), *IFIP advances in information and communication technology* (pp. 373–383). Springer. https://doi.org/10.1007/978-3-030-49186-4_31
2. Adaobi, M. M., Nyangu, M., & Fook, H. S. (2024). The role of artificial intelligence in transforming customer experience in the service industry in Nigeria. *International Journal of Academic Research in Business and Social Sciences*, *14*(11), 625–637. https://doi.org/10.6007/ijarbss/v14-i11/23532
3. Akdim, K., Belanche, D., &Flavián, M. (2023). Attitudes toward service robots: Analyses of explicit and implicit attitudes based on anthropomorphism and construal level theory. *International Journal of Contemporary Hospitality Management*, *35*(8), 2816–2837. https://doi.org/10.1108/ijchm-12-2020-1406

4. Barakeh, Z. A., Alkork, S., Karar, A. S., Said, S., & Beyrouthy, T. (2019). Pepper humanoid robot as a service robot: A customer approach. *3rd International Conference on Bio-engineering for Smart Technologies (BioSMART)* (pp. 1–4). Institute of Electrical and Electronics Engineers. https://doi.org/10.1109/biosmart.2019.8734250
5. Belk, R. (2021). Ethical issues in service robotics and artificial intelligence. *Service Industries Journal*, *41*(13–14), 860–876. https://doi.org/10.1080/02642069.2020.1727892
6. Bendel, O., & Peier, L. K. (2023). How can bar robots enhance the well-being of guests? *arXiv (Cornell University)*. https://doi.org/10.48550/arxiv.2304.14410
7. Bhaskar, P., & Sharma, K. D. (2022). A critical insight into the role of artificial intelligence (AI) in tourism and hospitality industries. *Pacific Business Review International*, *15*(3), 76–85.
8. Buhalis, D. (2020). Technology in tourism-from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: A perspective article. *Tourism Review*, *75*(1), 267–272. https://doi.org/10.1108/TR-06-2019-0258
9. Buhalis, D., & Cheng, E. S. Y. (2020). Exploring the use of chatbots in hotels: Technology providers' perspective. In J. Neidhardt, & W. Wörndl (Eds.), *Information and Communication Technologies in Tourism 2020* (pp. 231–242). Springer, Cham. https://doi.org/10.1007/978-3-030-36737-4_19
10. Buhalis, D., & Moldavska, I. (2022). Voice assistants in hospitality: Using artificial intelligence for customer service. *Journal of Hospitality and Tourism Technology*, *13*(3), 386–403. https://doi.org/10.1108/JHTT-03-2021-0104
11. Bulchand-Gidumal, J. (2022). Impact of artificial intelligence in travel, tourism, and hospitality. In Z. Xiang, M. Fuchs, U. Gretzel, & W. Höpken (Eds.), *Handbook of e-Tourism* (pp. 1943–1962). Springer, Cham. https://doi.org/10.1007/978-3-030-48652-5_110
12. Bulchand-Gidumal, J., Secin, E. W., O'Connor, P., & Buhalis, D. (2023). Artificial intelligence's impact on hospitality and tourism marketing: Exploring key themes and addressing challenges. *Current Issues in Tourism*, *27*(14), 2345–2362. https://doi.org/10.1080/13683500.2023.2229480
13. Bunghez, C. L. (2016). The importance of tourism to a destination's economy. *Journal of Eastern Europe Research in Business & Economics*, 143495. https://doi.org/10.5171/2016.143495
14. Cain, L. N., Thomas, J. H., & Alonso, M., Jr. (2019). From sci-fi to sci-fact: The state of robotics and AI in the hospitality industry. *Journal of Hospitality and Tourism Technology*, *10*(4), 624–650. https://doi.org/10.1108/jhtt-07-2018-0066
15. Caldarini, G., Jaf, S., & McGarry, K. (2022). A literature survey of recent advances in chatbots. *Information*, *13*(1), 41. https://doi.org/10.3390/info13010041
16. Calvaresi, D., Ibrahim, A., Calbimonte, J., Fragniere, E., Schegg, R., & Schumacher, M. I. (2023). Leveraging inter-tourists interactions via chatbots to bridge academia, tourism industries and future societies. *Journal of Tourism Futures*, *9*(3), 311–337. https://doi.org/10.1108/jtf-01-2021-0009
17. Castellano, G., De Carolis, B., Macchiarulo, N., & Vessio, G. (2020). Pepper4Museum: Towards a human-like museum guide. In A. Antoniou, B. De Carolis, A. Dix, C. Gena, T. Kuflik, G. Lepouras, A. Origlia, G. E. Raptis (Eds.), *AVI2CH 2020: Advanced Visual Interfaces and Interactions in Cultural Heritage* (pp. 1–5). Island of Ischia, Italy.
18. Collins, G. R. (2020). Improving human–robot interactions in hospitality settings. *International Hospitality Review*, *34*(1), 61–79. https://doi.org/10.1108/ihr-09-2019-0019
19. De Jong, D., Hortensius, R., Hsieh, T., & Cross, E. S. (2021). Empathy and schadenfreude in human–robot teams. *Journal of Cognition*, *4*(1), 35. https://doi.org/10.5334/joc.177
20. Ekanayake, E. M., & Long, A. E. (2012). Tourism development and economic growth in developing countries. *The International Journal of Business and Finance Research*, *6*(1), 51–63.
21. Flavián, C., & Casaló, L. V. (2021). Artificial intelligence in services: Current trends, benefits and challenges. *Service Industries Journal*, *41*(13–14), 853–859. https://doi.org/10.1080/02642069.2021.1989177
22. Følstad, A., & Skjuve, M. (2019). Chatbots for customer service. In B. R. Cowan, & L.

Clark (Eds.), *CUI'19: Proceedings of the 1st International Conference on Conversational User Interfaces* (pp. 1–9). Association for Computing Machinery, New York. https://doi.org/10.1145/3342775.3342784
23. Fouad, A. M., Salem, I. E., & Fathy, E. A. (2024). Generative AI insights in tourism and hospitality: A comprehensive review and strategic research roadmap. *Tourism and Hospitality Research*. https://doi.org/10.1177/14673584241293125
24. Gáll, J. (2023). Artificial intelligence in the hotel industry in Slovakia. *Hotel and Tourism Management*, *11*(2), 117–128. https://doi.org/10.5937/menhottur2302117G
25. Gray, K., & Wegner, D. M. (2012). Feeling robots and human zombies: Mind perception and the uncanny valley. *Cognition*, *125*(1), 125–130. https://doi.org/10.1016/j.cognition.2012.06.007
26. Gupta, A., Hathwar, D., & Vijayakumar, A. (2020). Introduction to AI chatbots. *International Journal of Engineering Research and Technology*, *9*(7), 255–258. https://doi.org/10.17577/ijertv9is070143
27. Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. *California management review*, *61*(4), 5–14. https://doi.org/10.1177/0008125619864925
28. Holthöwer, J., & Van Doorn, J. (2023). Robots do not judge: Service robots can alleviate embarrassment in service encounters. *Journal of the Academy of Marketing Science*, *51*(4), 767–784. https://doi.org/10.1007/s11747-022-00862-x
29. Huang, A., Chao, Y., De La Mora Velasco, E., Bilgihan, A., & Wei, W. (2022). When artificial intelligence meets the hospitality and tourism industry: An assessment framework to inform theory and management. *Journal of Hospitality and Tourism Insights*, *5*(5), 1080–1100. https://doi.org/10.1108/jhti-01-2021-0021
30. Huang, H., & Liu, S. Q. (2022). Are consumers more attracted to restaurants featuring humanoid or non-humanoid service robots? *International Journal of Hospitality Management*, *107*, 103310. https://doi.org/10.1016/j.ijhm.2022.103310
31. Huang, M., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research*, *21*(2), 155–172. https://doi.org/10.1177/1094670517752459
32. Hutson, M. (2017). AI Glossary: Artificial intelligence, in so many words. *Science*, 357(6346), 19. https://doi.org/10.1126/science.357.6346.19
33. Hwang, J., Choe, J. Y., Kim, H. M., & Kim, J. J. (2021). Human baristas and robot baristas: How does brand experience affect brand satisfaction, brand attitude, brand attachment, and brand loyalty? *International Journal of Hospitality Management*, *99*, 103050. https://doi.org/10.1016/j.ijhm.2021.103050
34. Ivanov, S., & Webster, C. (2017). Designing robot-friendly hospitality facilities. In *Proceedings of the scientific conference "Tourism. Innovations. Strategies"* (pp. 74–81). Burgas, Bulgaria.
35. Ivanov, S., Gretzel, U., Berezina, K., Sigala, M., & Webster, C. (2019). Progress on robotics in hospitality and tourism: A review of the literature. *Journal of Hospitality and Tourism Technology*, *10*(4), 489–521. https://doi.org/10.1108/JHTT-08-2018-0087
36. Jan, Z., Ahamed, F., Mayer, W., Patel, N., Grossmann, G., Stumptner, M., & Kuusk, A. (2023). Artificial intelligence for industry 4.0: Systematic review of applications, challenges, and opportunities. *Expert Systems with Applications*, *216*, 119456. https://doi.org/10.1016/j.eswa.2022.119456
37. Jia, J. W., Chung, N., & Hwang, J. (2021). Assessing the hotel service robot interaction on tourists' behaviour: The role of anthropomorphism. *Industrial Management & Data Systems*, *121*(6), 1457–1478. https://doi.org/10.1108/imds-11-2020-0664
38. Kang, S., Koo, C., & Chung, N. (2023). Creepy vs. cool: Switching from human staff to service robots in the hospitality industry. *International Journal of Hospitality Management*, *111*, 103479. https://doi.org/10.1016/j.ijhm.2023.103479
39. Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, *62*(1), 15–25. https://doi.org/10.1016/j.bushor.2018.08.004

40. Kelly, S., Kaye, S-A., & Oviedo-Trespalacios, O. (2022). A multi-industry analysis of the future use of AI chatbots. *Human Behavior and Emerging Technologies*, *1*, 2552099. https://doi.org/10.1155/2022/2552099
41. Kim, T., Lee, O. D., & Kang, J. (2023). Is it the best for barista robots to serve like humans? A multidimensional anthropomorphism perspective. *International Journal of Hospitality Management*, *108*, 103358. https://doi.org/10.1016/j.ijhm.2022.103358
42. Koo, C., Xiang, Z., Gretzel, U., & Sigala, M. (2021). Artificial intelligence (AI) and robotics in travel, hospitality and leisure. *Electronic Markets*, *31*, 473–476. https://doi.org/10.1007/s12525-021-00494-z
43. Kooli, C. (2023). Chatbots in education and research: A Critical examination of ethical implications and solutions. *Sustainability*, *15*(7), 5614. https://doi.org/10.3390/su15075614
44. Laymouna, M., Ma, Y., Lessard, D., Schuster, T., Engler, K., & Lebouché, B. (2024). Roles, users, benefits, and limitations of chatbots in health care: Rapid review. *Journal of Medical Internet Research*, *26*, e56930. https://doi.org/10.2196/56930
45. Limna, P. (2023). Artificial Intelligence (AI) in the hospitality industry: A review article. *International Journal of Computing SciencesResearch*, *7*, 1306–1317. https://doi.org/10.25147/ijcsr.2017.001.1.103
46. Luo, X., & Pan, Y. (2021). A study on the customer experience design through analyzing smart hotels in China. *Journal of the Korean Chemical Society*, *12*(3), 115–124. https://doi.org/10.15207/jkcs.2021.12.3.115
47. MacDorman, K. F., & Ishiguro, H. (2006). The uncanny advantage of using androids in cognitive and social science research. *Interaction Studies*, *7*(3), 297–337.
48. Mende, M., Scott, M. L., Van Doorn, J., Grewal, D., & Shanks, I. (2019). Service robots rising: How humanoid robots influence service experiences and elicit compensatory consumer responses. *Journal of Marketing Research*, *56*(4), 535–556. https://doi.org/10.1177/0022243718822827
49. Nannelli, M., Capone, F., & Lazzeretti, L. (2023). Artificial intelligence in hospitality and tourism. State of the art and future research avenues. *European Planning Studies*, *31*(7), 1325–1344. https://doi.org/10.1080/09654313.2023.2180321
50. Pandey, A. K., & Gelin, R. (2018). A mass-produced sociable humanoid robot: Pepper: The first machine of its kind. *IEEE Robotics & Automation Magazine*, *25*(3), 40–48. https://doi.org/10.1109/mra.2018.2833157
51. Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. *International Journal of Contemporary Hospitality Management*, *32*(10), 3199–3226. https://doi.org/10.1108/ijchm-04-2020-0259
52. Pjanić, M. (2019). Economics effects of tourism on world economy. In V. Bevanda, & S. Štetić (Eds.), *4th International Thematic Monograph: Modern Management Tools and Economy of Tourism Sector in Present Era* (pp. 291–307). SKRIPTA International.
53. Rawal, Y. S., Soni, H., Dani, R., & Bagchi, P. (2023). A review on service delivery in tourism and hospitality industry through artificial intelligence. In P. K. Singh, S. T. Wierzchoń, S. Tanwar, J. J. Rodrigues, M. & Ganzha (Eds.), *Proceedings of Third International Conference on Computing, Communications, and Cyber-Security: IC4S 2021* (pp. 427–436). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-1142-2_34
54. Rosete, A., Soares, B., Salvadorinho, J., Reis, J., & Amorim, M. (2020). Service robots in the hospitality industry: An exploratory literature review. In H. Nóvoa, M. Drăgoicea, N. Kühl (Eds.), *Exploring service science (IESS 2020)* (pp. 174–186). Springer, Cham. https://doi.org/10.1007/978-3-030-38724-2_13
55. Saputra, F. E., Buhalis, D., Augustyn, M. M., & Marangos, S. (2024). Anthropomorphism-based artificial intelligence (AI) robots typology in hospitality and tourism. *Journal of Hospitality and Tourism Technology*, *15*(5), 790–807. https://doi.org/10.1108/jhtt-03-2024-0171
56. Shum, H-y., He, X-d., & Li, D. (2018). From Eliza to XiaoIce: Challenges and opportunities with social chatbots. *Frontiers of Information Technology & Electronic Engineering*, *19*, 10–26. https://doi.org/10.1631/FITEE.1700826

57. Skrebeca, J., Kalniete, P., Goldbergs, J., Pitkevica, L., Tihomirova, D., & Romanovs, A. (2021). Modern development trends of chatbots using artificial intelligence (AI). InJ. Grabis, A. Romanovs, & G. Kulesova (Eds.), *62nd International Scientific Conference on Information Technology and Management Science of Riga Technical University (ITMS)* (pp. 1–6). Institute of Electrical and Electronics Engineers. https://doi.org/10.1109/ITMS52826.2021.9615258
58. Soni – Silva, V. (2024). AI - current landscape and future predictions. *International Journal of Innovative Science and Research Technology*, *9*(4), 2314–2321. https://doi.org/10.38124/ijisrt/IJISRT24APR2293
59. Statista. (2025). *Hotel chain areas with the most innovations arising in the next two years worldwide in 2024*. Retrieved February 19, 2025 from https://www.statista.com/statistics/1453944/hotel-chains-most-innovative-services-worldwide/
60. Sung, H. J., & Jeon, H. M. (2020). Untact: Customer's acceptance intention toward robot barista in coffee shop. *Sustainability*, *12*(20), 8598. https://doi.org/10.3390/su12208598
61. Taddy, M. (2018). *The technological elements of artificial intelligence*. NBER Working Paper No. 24301.
62. Tuomi, A., Tussyadiah, I. P., & Hanna, P. (2021). Spicing up hospitality service encounters: The case of Pepper™. *International Journal of Contemporary Hospitality Management*, *33*(11), 3906–3925. https://doi.org/10.1108/ijchm-07-2020-0739
63. Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the Annals of tourism research curated collection on artificial intelligence and robotics in tourism. *Annals of Tourism Research*, *81*, 102883. https://doi.org/10.1016/j.annals.2020.102883
64. Ukpabi, D. C., Aslam, B., & Karjaluoto, H. (2019). Chatbot adoption in tourism services: A conceptual exploration. In S. Ivanov, & C. Webster (Eds.), *Robots, artificial intelligence, and service automation in travel, tourism and hospitality* (pp. 105–121). Emerald Publishing Limited. https://doi.org/10.1108/978-1-78756-687-320191006
65. Ukpabi, D., Karjaluoto, H., Olaleye, S. A., & Mogaji, E. (2018). Dual perspectives on the role of artificially intelligent robotic virtual agents in the tourism, travel and hospitality industries. In D. Vrontis, Y. Weber, & E. Tsoukatos (Eds.), *Proceedings of the 11th Annual Conference of the EuroMed Academy of Business (EMAB)* (pp. 1339–1351). EuroMed Press.
66. UN Tourism. (2025, January 20). *International tourism recovers pre-pandemic levels in 2024*. Retrieved February 21, 2025 from https://www.unwto.org/news/international-tourism-recovers-pre-pandemic-levels-in-2024
67. Wang, K. (2024). From ELIZA to ChatGPT: A brief history of chatbots and their evolution. *Applied and Computational Engineering*, *39*(1), 57–62. https://doi.org/10.54254/2755-2721/39/20230579
68. Wang, P. (2019). On defining artificial intelligence. *Journal of Artificial General Intelligence*, *10*(2), 1–37. https://doi.org/10.2478/jagi-2019-0002
69. Yoo, S., Kim, S., & Jeon, H. (2022). How does experiential value toward robot barista service affect emotions, storytelling, and behavioral intention in the context of COVID-19? *Sustainability*, *14*(1), 450. https://doi.org/10.3390/su14010450
70. Zlatanov, S., & Popesku, J. (2019). Current applications of artificial intelligence in tourism and hospitality. In M. Stanišić (Ed.), *Sinteza 2019 – International Scientific Conference on Information Technology and Data Related Research* (pp. 84–90). Singidunum University, Belgrade.
71. Zsarnoczky, M. (2017). How does artificial intelligence affect the tourism industry?. *Vadyba*, *31*(2), 85–90.
72. Zumstein, D., & Hundertmark, S. (2018). Chatbots: An interactive technology for personalized communication and transaction. *IADIS International Journal on WWW/Internet*, *15*(1), 96–109.