

THE EFFECTS OF ARTIFICIAL INTELLIGENCE ON TOURISM INDUSTRY

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Abstract

Artificial Intelligence (AI) is transforming the tourism industry, improving the user experience, streamlining operational processes and creating new business models. This article examines the applications of AI in tourism, its benefits and challenges, and future prospects. The results show that AI has the potential to increase efficiency and reduce costs, but at the same time raises questions about data privacy and ethics. Forecasts predict that the global use of AI in the tourism sector will grow significantly, with spending on AI-related technologies expected to reach \$340 billion by 2024 alone.

Keywords: artificial intelligence, tourism, services, industry, innovation.

JEL Classification: Z3, L8, O3

INTRODUCTION

The tourism industry is one of the fastest growing sectors in the global economy. According to the World Tourism Organization (UNWTO, 2023), the sector contributes over 10% of global gross domestic product (GDP) and generates millions of jobs.

Despite its significant contributions, the industry faces a number of challenges, including efforts to achieve sustainable development, adapt to new technologies, and respond to changing consumer preferences. In order to benefit from the technological development, the industry has to adapt and transform the business models and operations.

Artificial intelligence (AI) has completely transformed the tourism industry, penetrating all aspects from management to customer interaction. Through innovation and new technologies, AI offers incredible opportunities for optimization, improving customer experience and increasing revenue. By adapting its business model and strategically integrating AI, the tourism industry will not only meet the growing expectations of customers, but will also contribute to a more sustainable and economically profitable future. With the development of technology and the increasing adoption of AI, the tourism sector will continue to enter new horizons. We expect innovations in the way companies interact with customers and manage their resources. Creating smart destinations that offer unique experiences will become the new standard.

The aim of the paper is to analyze the effects of the artificial intelligence on the tourism industry. The first section consists of a literature review of the contemporary scientific papers regarding the use of artificial intelligence in the tourism sector. In the

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second one, the methodology and data used have been described. The third section is dedicated to the results and discussion.

1. LITERATURE REVIEW

The adoption of AI in tourism industry has increased in the last years which caused a growing scientific interest to the topic. The use of AI in tourism industry have been largely researched (Brown A. et al., 2019; Buhalis D. et al., 2019; Gupta, S. et al., 2023; Kim, S., 2021; Limna, P., 2023; Parvez, 2021; Ruel and Njoku, 2021; Samala et al., 2020; Yallop and Seraphin, 2020). Machine learning, one of the methods applied, uses statistical data and computer science concepts to create mathematical models that are used for future predictions and to recognize data trends (Alpaydin, 2020).

AI affects all fields of life and tourism is not an exception, since it efficiently collects and retrieves huge quantities of customer data, integrate visitors' information, analyzes preferences and personalize customers' experiences (Shubhendu and Vijay, 2013).

AI's impact on improving customer service and sales in tourism has been explored (Smith, J., 2020), as well as the potential of AI applications (e.g. check-in kiosks, personalized services, and energy management) to enhance hotel services and improve guest experience and operational efficiency (Zhang, Y. et. al., 2021). A study of the effects of AI on demand forecasting and security has been made (Brown A. et al., 2019). As a result of a conducted AI trends survey and interviews with industry experts, the potential impact of the AI-powered technologies has been identified (Kim, S., 2021).

The ethical issues are one of the concerns regarding the use of AI in tourism and related bias and job displacement (Garcia, M. et al., 2022).

The fast-growing application of virtual reality and augmented reality in tourism has been explored through a systematic literature review (Yung, R., Khoo-Lattimore, C., 2019).

The use of AI-driven marketing campaigns and consumer responses leads to targeting the right audience with personalized content and higher engagement and conversion rates (Li, M. et al., 2020).

Sustainable tourism is an emerging subsector that will grow exponentially in the future. By using the data analytics for conservation, the new technologies contribute for reducing environmental impact in tourism operations. The role of AI in sustainable tourism is to minimize resource consumption and enhance conservation efforts (Turner, L. et. al, 2018).

Various researchers have studied the advantages and challenges of the automation and robotic technology implementation in tourism industry (Buhalis et al., 2019; Cain et al., 2019; Ivanov, Webster, 2019; Kong et al., 2021; Murphy et al., 2017; Samara et al., 2020; Tung, Au, 2018; Tung, Law, 2017; Tussyadiah, 2020).

The vast research and scientific interest in the field of AI application in tourism and hospitality is a reflection of the growing importance of the new technologies in the sector and the rapid development.

2. DATA AND METHODOLOGY

The aim of the paper is to analyze the effects of the artificial intelligence on the tourism industry. In order to achieve our goal, the main AI implications in tourism and hospitality were identified and analyzed. Along with this, the advantages and challenges that face the tourism industry were reviewed, as well as the future trends.

The methodology used is based on a systematic review, using qualitative data. According to various studies, global travel spending related to AI is growing by about 20% per year. Studies show that over 1.4 billion tourists traveled around the world in 2020, and forecasts predict that the number will reach 1.8 billion by 2025 (Statista, 2024). These figures highlight how important advances in technology are for the development of the tourism industry. On the basis of the reviewed data, the AI implications in tourism industry, could be summarized as follows:

- **Personalized travel.** AI plays a key role in offering personalized services, analyzing data on consumer preferences to generate specific recommendations. “Tourists provide data before, during, and after their trip in five ways: online activities, offline activities, biometric and emotional data, wearables, and user-generated content” (Bulchand-Gidumal, J., 2020). The collected data is analyzed using AI tools and personalized services are offered. Some of the examples include Kayak platform using AI to provide personalized flight and hotel suggestions based on users’ previous searches. Through algorithms that learn from search and booking history, Kayak can offer significantly improved and adapted offers optimized for the specific user. Another example is Airbnb, which implements AI tools to analyze customer preferences and offer unique accommodation options, thus providing personalized experiences. Based on previous reservations, the system can identify preferences for accommodation type, location, and even specific amenities that the customer would like.
- **Chatbots and virtual assistants.** AI-based chatbots are significantly impacting service in the tourism sector, providing immediate assistance and information to customers (Ivanov S. et al., 2017; Nam, K. et al., 2021). A chatbot or voice assistant may be used to conduct the conversation with the user (Ade et al., 2023). One successful example is “Maya”, the chatbot of the travel company “Travel Leaders”. “Maya” is designed to help users with reservations, provide information about destinations, and even offer travel tips. Chatbots can interact with multiple users at once, which improves customer service efficiency and reduces waiting times. Chatbots also manage customer service on channels like Facebook Messenger, which is especially convenient for the younger demographic. They often offer quick answers to frequently asked questions, and for more complex inquiries, customers are redirected to live agents.
- **Dynamic Pricing.** Dynamic pricing is a strategy in which AI analyzes market demand and consumer behavior, allowing hotels and airlines to adjust prices in real time. Experts from Hilton and Marriott confirm that implementing dynamic pricing has increased their revenues by up to 10%. By carefully analyzing real-time data,

these companies are able to quickly adapt their prices depending on seasonality, location, and demand, which maximizes profits.

- **Predictive Analytics.** Predictive analytics powered by AI plays an important role in travel forecasting and resource management. The process of forecasting involves analyzing historical booking and travel data. For example, airlines can predict how many seats will be filled on certain flights and adjust their pricing strategies based on occupancy. At the same time, travel agencies can predict periods of increased demand, allowing them to offer attractive offers in advance.
- **Virtual and Augmented Reality.** Virtual and Augmented Reality (VR and AR) play an important role in improving the user experience, offering new ways to present destinations and services. For example, the company Thomas Cook offers virtual tours of famous destinations, allowing customers to “visit” the place before booking. These technologies increase customer interest and engagement, which helps increase bookings. Other examples of successful integration of VR and AR include museum tours and talks about unique natural landmarks, allowing users to have a glimpse of what they will see before they travel. For example, applications that provide AR information about historical landmarks in real time as the user visits them are also gaining popularity.

In the modern world there are many examples of effective AI integration in tourism activities. Some of the successful examples include companies such as Lufthansa, which uses AI to optimize its booking and flight management platform. Through data analysis, Lufthansa is able to identify peak times to optimize and plan its resources, which ultimately leads to greater efficiency and financial sustainability.

Hotel chains, such as Marriott and Hilton, are actively integrating AI into their operations, using reservation management and customer service technologies. Marriott, for example, has implemented AI solutions that analyze historical booking data and search patterns to offer personalized offers to customers. The result is increased customer satisfaction, as well as increased turnover.

Another example is the company Booking.com, which invests significant resources in the implementation of AI and machine learning to improve its customer service. By analyzing the flow of data related to consumer behavior and the market, Booking.com increases the opportunities to improve the services offered, gaining loyal customers. With the successful implementation of AI, tourism companies will have the opportunity to adapt to new challenges and offer customers unique and unforgettable experiences. Both customers and companies will benefit from technological innovations that will make the process of planning and executing trips easier, more efficient and exciting.

The growing use of AI tools in tourism industry brings advantages for both customers and companies. At the same time there are certain challenges that the industry still needs to overcome.

3. RESULTS AND DISCUSSION

The use of AI in the tourism industry brings significant benefits that paint a picture of

the future of travel experiences. Some of the advantages of the adoption of AI tools in tourism and hospitality have been identified:

- **Improved User Experience.** Optimizing user experiences through AI has high added value for the industry. Personalized offers and instant responses to inquiries improve customer satisfaction and loyalty. For example, companies using AI have been able to identify the right time to interact with customers – before, during and after a trip. Studies show that customers who receive personalized offers are 60% more likely to repeat bookings. Platforms that offer easy access to information and quick problem solving, such as Airbnb, demonstrate how AI can be the foundation of a successful customer experience.
- **Cost optimization.** According to researchers, integrating AI can lead to a reduction in operating costs by up to 25%. Implementing automated solutions helps companies reduce labor costs and increase the efficiency of internal processes (Ivanov, S., Webster, C., 2017; Ivanov, S., Webster, C., 2019). AI applications in reservation management, data analysis and even virtual assistants allow employees to focus on strategic activities and improve customer service.
- **Increase Revenue.** The existence of dynamic pricing and predictive analytics allows companies to operate effectively in real time and significantly increase their revenues. Studies show that companies that have implemented AI in their strategies increase their revenues by 10-30%.
- **Attract new customers.** AI provides opportunities to target new customer segments by analyzing customer data and industry trends. By analyzing demographic data and consumer behavior, travel companies can adapt their marketing strategies to attract younger audiences or successful niches that were previously unserved.

Despite the many advantages of implementing AI, there are a number of challenges and risks that should not be ignored. Some of the identified drawbacks have been listed:

- **Data Privacy.** One of the main challenges is data management and ensuring its confidentiality. The rise of AI has brought to the fore the need to collect, analyze, and store vast amounts of consumer data. According to Harvard Business Review (2023), 60% of consumers are concerned about how companies use their personal data. The implementation of the European General Data Protection Regulation (GDPR) is of particular importance for travel companies that operate internationally. Compliance with legal requirements and the care of personal data are necessary to build trust between the customer and the company.
- **Ethical Issues.** The use of AI in the travel industry raises important ethical issues related to bias in algorithms and potential discrimination based on analytical data. Garcia, M. et al. (2022) address the impact of AI on employment in tourism and the ethical concerns surrounding AI bias and job displacement. When AI systems are trained on historical data, there is a risk that new algorithms will reflect and reproduce existing prejudices. Another ethical issue is related to the algorithmic bias based on previous data and stereotypes. Examples of algorithmic bias include

situations where certain destinations or services are offered to customers based on previous bookings that have been distorted by stereotypes. For example, if the algorithm only considers certain data from a certain demographic group, it suddenly creates a distorted view of customer needs, which limits the variety of services offered.

- Lack of expertise. The lack of sufficient AI specialists is another significant challenge. Many companies in the travel industry are giving up on implementing AI technologies due to a shortage of qualified personnel to design, implement and manage such systems. Companies need to invest in training their staff to develop the necessary skills to work with AI technologies. Identifying and training the next generation of AI specialists is essential for the development of the industry.
- Infrastructure constraints. Infrastructural shortcomings, including a lack of high-speed internet in certain areas, also pose barriers to the adoption of AI in tourism. It is relatively difficult for small companies to implement AI solutions without the necessary technological infrastructure. To overcome these challenges, companies need to invest in technological infrastructure, including software and hardware, as well as in training employees to deal with new technologies.

As already noted, the challenges facing the tourism industry are significant. Through in-depth analysis, we can identify approaches that companies can use to overcome these barriers.

- Data Protection. To address data protection concerns, companies need to develop clear data governance policies. Transparency strategies that explain how and why data is collected will strengthen consumer trust.
- Data Encryption. The implementation of encryption technologies and protection mechanisms is also important, especially when it comes to storing personal data. Cybersecurity needs to be integrated into business models to minimize risks.
- Ethical Algorithms. To avoid bias, companies need to evaluate and regulate their algorithms. A process of regular review of the AI's input data and its algorithms is necessary to improve fairness and avoid discrimination.

With the advancement of technology and the increasing adoption of AI by companies, the future of the tourism industry looks promising. The future perspectives of the AI application in tourism industry are summarized in Table 1.

Table 1. Future perspectives for the use of AI in tourism industry.

Field	Future perspective
Virtual and Augmented Reality	According to the researchers the interest towards the Virtual and Augmented Reality (VR and AR) in tourism is growing (Yung, R., Khoo-Lattimore, C., 2019). With the continued development of VR and AR, customers will be given new and engaging ways to explore destinations before making their trips. The ability to “visit” holiday destinations before booking is becoming increasingly important. An example of a successful integration of these technologies is Google Earth

	<p>VR, which allows users to explore real places in 3D. This form of interaction pushes the boundaries of traditional travel, offering users an experience that is not only innovative but also educational.</p>
Internet of Things (IoT)	<p>Combining AI with the Internet of Things (IoT) will lead to the creation of "smart hotels". Through IoT devices, hotels will be able to offer improved services, such as automated adjustment of lighting and temperature in rooms based on customer preferences. This integration will also contribute to the sustainable management. For example, smart energy management systems will be able to reduce electricity costs, protecting the environment.</p>
Ethical Standards	<p>With the continuous increase in the use of AI in the tourism industry, the creation of ethical standards becomes essential. Companies should actively work to ensure transparency and accountability in the use of AI, especially with regard to the protection of customer personal data. The development of codes of ethics and standards for working with AI is necessary to build trust among consumers. As part of these efforts, companies should commit to informing customers about how their data is collected and used.</p>
Business Model	<p>The integration of AI is transforming traditional business models. New data-driven approaches allow travel companies to offer more accurate and innovative solutions adapted to customer needs. AI systems can offer adaptive booking platforms that not only manage reservations, but also analyze customer trends in real time. By constantly analyzing user data, companies can optimize their offerings and identify potential new services.</p>
Business Process	<p>The combination of AI and business process automation will help increase operational efficiency in the tourism industry. Smarter and more flexible management systems will allow companies to respond quickly to changes in consumer demand and unforeseen circumstances.</p>
Education and training	<p>Education and training of specialists in the sector add significant value to the success of innovation. The main emphasis should be on developing new skills to meet the new challenges arising from AI. Universities and educational institutions should offer programs and courses that prepare students to work with new technologies.</p>
Innovation capacity	<p>By strategically investing in innovation and new technologies, the tourism sector can become more flexible and resilient. Through private and public partnerships, the industry can develop new business models that offer not only profit, but also socially responsible and sustainable solutions that meet customer needs.</p>

Artificial intelligence is an important element transforming the tourism industry, providing new opportunities and innovations. Companies that adapt their strategies to integrate AI will be able to better serve their customers, optimize processes and achieve significant competitive advantages.

Regarding the innovation process in the industry and future trends, one of the emerging fields of interest is the sustainable tourism. According to Tussyadiah et al., (2020), artificial intelligence is anticipated to sustain more environmentally friendly travels by leading consumers to view the world more socially. More and more companies are aware of the need to protect the environment and strive to offer solutions that reduce their carbon footprint. Through AI, travel companies can analyze data on their environmental impact and develop sustainable management strategies. Examples of sustainable practices include companies that offer "green" transportation and accommodation options. Booking.com provides filters that allow users to discover

environmentally friendly hotels and hostels. Such initiatives not only raise customer awareness, but also send a strong message about the companies' commitment to sustainability.

With the growing focus on sustainability, AI can be a catalyst for sustainable practices in the tourism industry. By analyzing data related to environmental and social aspects, companies can identify and implement strategies that reduce their environmental impact. Investments in green technologies, resource management and innovation based on the principles of sustainable development will be critically important.

Investment in technology is another important factor and mandatory to remain competitive. As data from various studies show, companies that invest in AI and new technologies report significant revenue growth and cost reduction.

With the introduction of new technologies, risk management also becomes more important. Through AI, it is possible to identify risks at an early stage, allowing companies to react quickly to adverse conditions.

Along with the growing popularity of social media, AI is playing an important role in analyzing public opinion and reviews of destinations and services.

Through analytics tools, companies can monitor public opinion in real time and quickly respond to negative comments or trends, which is crucial for maintaining a positive image. Using AI to automate social media marketing campaigns can offer personalized content that is tailored to users' interests, increasing engagement and generating greater interest in the offered services.

With the increased use of AI, the need for regulations and ethical management of technology becomes increasingly urgent. Governments and regulators will need to create a framework that protects consumers and encourages innovation. Without the right regulatory environment, technological progress risks being slowed down by public concerns and legal barriers.

CONCLUSION

Artificial intelligence is a key element that is having a profound impact on the tourism industry, providing significant benefits, including improved customer experiences, cost optimization and new opportunities for growth. However, along with these opportunities, the industry must also face a number of risks related to data privacy and ethical norms.

In the coming years, AI will continue to be a driver of innovation and transformation in the sector. Company founders and managers will need to be agile and able to adapt their strategies to respond to rapidly changing market conditions and consumer expectations.

Looking ahead, the importance of AI will continue to grow, and companies that adopt and implement new technologies will be in the best position to succeed. With the right planning and preparation, the industry has the opportunity to transform into a more innovative, efficient and responsible economic sphere.

In conclusion, artificial intelligence is not just a technology that will change the way the tourism industry operates; it is a state of mind for innovation and continuous

improvement. The integration of new technologies and adaptation to social and cultural changes in the future of the global market will be key to the success of companies in this sector.

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