Teresa Guarda
Filipe Portela
Maria Fernanda Augusto (Eds.)

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Teresa Guarda · Filipe Portela ·
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Editors

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Editors
Teresa Guarda
Universidad Estatal Peninsula de Santa Elena
La Libertad, Ecuador

Filipe Portela
University of Minho
Guimarães, Portugal

Maria Fernanda Augusto
BITrum Research Group
León, Spain

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Innovation in Tourism: The Role of Artificial Intelligence in Personalizing the Traveler Experience

Isabel Maria Lopes[1,2,3](✉) and João Paulo Pereira[1,2]

[1] Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal
{isalopes,jprp}@ipb.pt
[2] UNIAG, Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal
[3] Algoritmi, Universidade do Minho, Largo do Paço, 4704-553 Braga, Portugal

Abstract. Tourism is considered the sector that has benefited most from technological innovation. In the last decade, a good example of this innovation is Artificial Intelligence (AI), which has emerged as a fundamental tool, capable of significantly transforming visitors' experience. From chatbots that offer 24/7 customer service to personalized recommendation systems that suggest destinations, activities to do, and places to visit, AI is redefining how tourists plan, book and experience their trips. AI is equally present before, during and after the trip. This paper aims to explore the impact of AI on personalizing the traveler experience, investigating current technologies, their benefits and challenges, and the results of their implementation in the tourism industry. These results are achieved not only by the state of the art, but also by carrying out a questionnaire to travelers, thus obtaining a concrete quantitative answer. In addition, limitations of the present study are mentioned, as well as future work proposed.

Keywords: Innovation in Tourism · Tourism · Artificial Intelligence · Traveler Experience

1 Introduction

The insertion of AI in tourism dates back to the first uses of the automated reservation system. In recent years, great progress has been seen, with the introduction of machine learning algorithms and natural language processing enabling the development of more complex tools, such as chatbots and recommendation systems [1].

Chatbots in customer service: Chatbots are computer programs that simulate human conversations and are used to provide real-time customer service. Studies show that chatbots can resolve a wide range of customer queries, from basic questions about check-in times to resolving more complex issues, increasing efficiency and customer satisfaction.

Personalized Recommendation Systems: Recommendation systems use user data to suggest relevant products and services. In tourism, these systems analyze information

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such as travel history, declared preferences and online behavior to offer recommendations for destinations, accommodations and activities that best suit the tourist's profile.

AI is transforming traditional practices and creating new opportunities in the tourism sector. Companies that adopt AI are better positioned to offer personalized and efficient experiences, increasing their competitiveness.

This evolution, which is reflected in the introduction of this article, continues in the following session, where digital transformation and AI in the tourism sector is discussed in more detail, followed by the research methodology, which in this case was carrying out a questionnaire for tourists. After the methodology, the results are presented and finally the conclusions that also include the limitations of the present study and the proposal for future work.

2 Digital Transition and Artificial Intelligence in Tourism

With increasing competition in the tourism sector, personalizing traveler experiences has become a necessity. AI offers innovative solutions that meet this demand.

The scientific literature "in tourism acknowledges the widespread adoption of AI across various market applications, such as demand forecasting, big data analysis, and automation and robotics in the hotel industry" [2].

With the advancement and prevalence of digital technologies, the hospitality industry is evolving into a smarter era [3–5]. Against this backdrop, digital transformation has become increasingly crucial for hospitality firms to improve customer experiences and gain competitive advantages [6]. The number of studies on hospitality digital transformation is rapidly expanding.

But how can we define digital transition:

> "change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm" [7].
>
> "involves the integration of digital technologies across all sectors of an organization to improve efficiency and foster innovation." [8].
>
> "involves leveraging information, communication, and computing technologies to drive significant cultural and organizational changes" [9].
>
> "successful digital transition requires a shift in mindset, attitudes, and culture, and the strategic positioning of organizations to exploit new technologies" [10].
>
> "for small and medium-sized enterprises, digital transition presents both challenges, such as resource scarcity and strategic misalignment, and opportunities, including the use of social networks and digital services" [11].

We can describe the drivers, phases or levels and imperatives of digital transformation through Fig. 1, which serves as a visual representation that helps to understand the key elements involved in the digital transformation process. It highlights the external drivers that motivate digital transformation, the different phases that organizations go through during this process, and the strategic imperatives that emerge as a result of digital transformation.

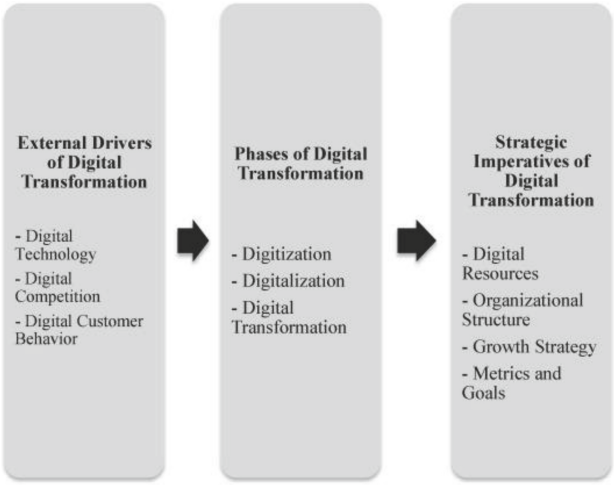

Fig. 1. Flow Model for Discussion on Digital Transformation [7].

The previous figure provides a structured and visually accessible overview of the essential aspects related to digital transformation, facilitating the understanding and analysis of these key elements.

Therefore, we can conclude that the digital transition requires the implementation and use of digital technological tools and resources in all areas and processes of an organization. The aim is to improve operational efficiency, optimize workflows and promote innovation within the company, allowing it to adapt and excel in an increasingly digitalized environment.

The connection between the digital transition and artificial intelligence is essential for driving innovation and efficiency in organizations. Artificial intelligence plays a crucial role in process automation, advanced data analysis and personalization of experiences, contributing significantly to digital transformation.

By integrating artificial intelligence into the digital transition, it is possible to optimize operations, anticipate trends, improve efficiency and automate tasks, resulting in greater adaptability and competitiveness in a constantly evolving digital environment.

Therefore, artificial intelligence is key to extracting valuable insights from data, identifying complex patterns and making informed decisions, empowering organizations to deliver personalized and efficient customer experiences, driving innovation and success in today's digital landscape [7].

The integration of digital transformation and artificial intelligence in the tourism industry has brought about significant opportunities and challenges [12]. AI has been utilized for administrative tasks and customer support, enhancing productivity and customer satisfaction [13]. It has also been identified as a tool for public management, particularly in the regulation of tourism, through the use of neural networks and machine learning algorithms [14]. The combination of AI and big data analytics has the potential to drive innovation and improve business performance in the tourism industry [15, 16].

However, the replacement of the human factor with AI in certain situations is still considered impossible and undesirable [13]. The digital transformation in tourism, including the use of AI, presents both opportunities and challenges, requiring innovation and the creation of new technological solutions [17, 18].

3 Methodology

The rapid advancement of digitalization and artificial intelligence in the tourism sector presents both opportunities and challenges. Although these technologies offer numerous advantages, there are limitations in their applicability for people with limited technical knowledge. Concerns about privacy and data security also pose significant challenges in adopting new digital technologies in tourism. Small tourism businesses may face obstacles in acquiring these technologies due to the substantial investments required. Furthermore, while digital technologies are efficient at handling simple queries, they can struggle to resolve complex problems that often require human intervention. Therefore, despite the advantages of digital technologies in tourism, more research is essential, focusing mainly on the practical application of artificial intelligence in the industry [13].

Conducting research and developing strategies to overcome these challenges will be key to maximizing the benefits of digitalization and artificial intelligence in tourism. So this study adopts a descriptive and exploratory approach, combining qualitative and quantitative methods to gain a comprehensive understanding of the impact of AI on personalizing the tourist experience.

Questionnaires were distributed to tourists who used AI services, collecting data about their experience and satisfaction.

The questionnaires were distributed in hotels to tourists between September 4th and October 2nd, 2023 in the city of Bragança, Portugal. The total number of responses was 156.

The questionnaire was divided into 4 parts:

1 - Demographic information.

2 - Experience with AI services in tourism.

3 - Satisfaction and impact of AI services.

4 - Perceptions and future expectations.

This range of questions managed to provide effective answers to achieve the objectives of this investigation.

4 Results

As mentioned in the previous session, 156 responses were obtained to the question. In the first part where demographic information was collected, it was found that of the 10 they were under 18 years old, 20 between 18 and 24 years old, 47 between 25 and 34 years old, 53 between 35 and 44 years old, 21 between 45 and 54 years old, 3 between 55 and 64 years old and 2 aged 65 or over. Which leads us to conclude that the age group of respondents is relatively young.

Of the respondents, 103 (66%) were male, 46 (29%) were female and 7 (5%) said they did not say.

Regarding nationality, 84 are Portuguese, 29 Spanish, 15 from the United Kingdom, 14 French, 12 Brazilians and 2 Germans.

The second part of the questionnaire focused on the experience with AI services in Tourism and the first question was about what type of AI services you used during your trip, the answers can be seen in Fig. 2 below.

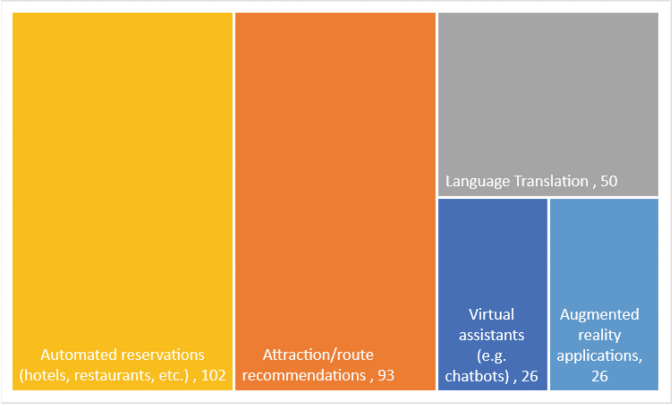

Fig. 2. Type of AI services used during the trip.

In this question, respondents could choose more than one option, as can be seen in Fig. 2, in descending order, the results were as follows: automatic reservations I had 102 choices, recommendations of attractions/routes 93, language translation 50, and in an equal number of responses is the use of virtual assistants and augmented reality applications.

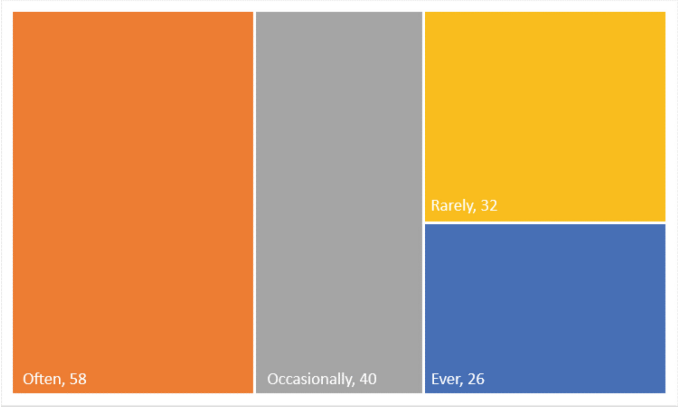

Fig. 3. How often do you use AI services when traveling.

When asked how often they use AI services on their trips, the answers can be seen in Fig. 3. Noting that of the 156 respondents, 58 responded that they use AI services on

their trips frequently, 40 responded occasionally, 32 rarely and 26 responded that they always use these services.

The third part of this questionnaire focused on satisfaction and Impact of AI Services. When asked how they evaluate the level of personalization provided by the AI services they used, the answers can be seen in Fig. 4 below.

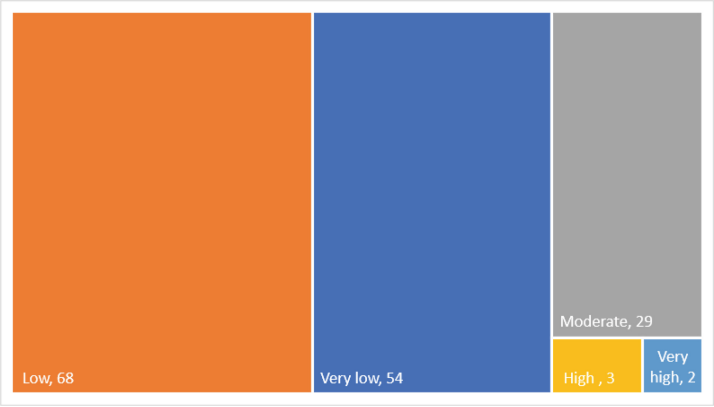

Fig. 4. Level of personalization provided by the AI services you used.

As can be seen in the figure, when respondents were asked about the level of personalization provided by AI services, the answers were not very positive in relation to this question. 68 of the respondents responded that the level of personalization was low, 54 very low, 29 moderate, 3 high and 2 responded that it was very high.

When asked how they evaluate the accuracy of AI services, we can see the answers in Fig. 5. Noting that the majority consider these services to be accurate or very accurate.

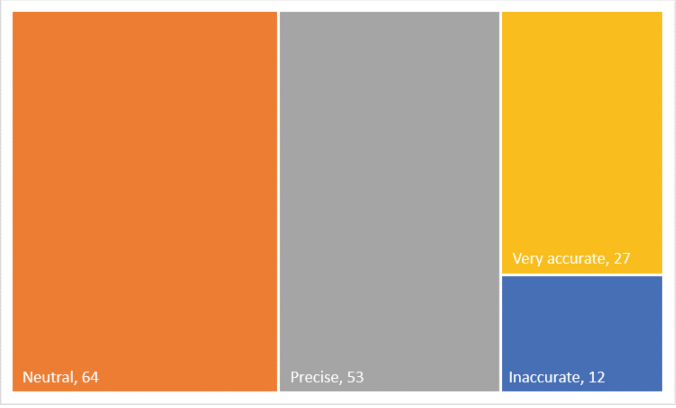

Fig. 5. Evaluates the accuracy of recommendations made by AI services.

When asked to what extent AI services improve their travel experience, the answers can be seen in Fig. 6. It can be seen that the majority of responses are very positive, resulting in 98 respondents who responded that the improvements were significant and 50 who considered that the improvement in their trip with this service improved a lot. Only 8 of those surveyed responded that their experience had improved little.

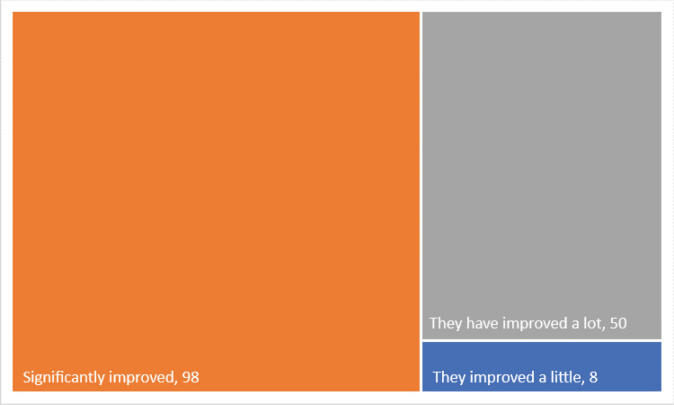

Fig. 6. How have AI services improved your travel experience.

When asked about the degree of satisfaction with the AI services used, the answer was even clearer, with 133 respondents responding that they were very satisfied and the remaining 23 responding to the satisfied option (See Fig. 7).

Fig. 7. General level of satisfaction with the AI services used.

The fourth and final part of the questionnaire addresses future perceptions and expectations, in the first question which asked whether the use of AI in tourism will become more common in the near future, the answers can be seen in Fig. 8.

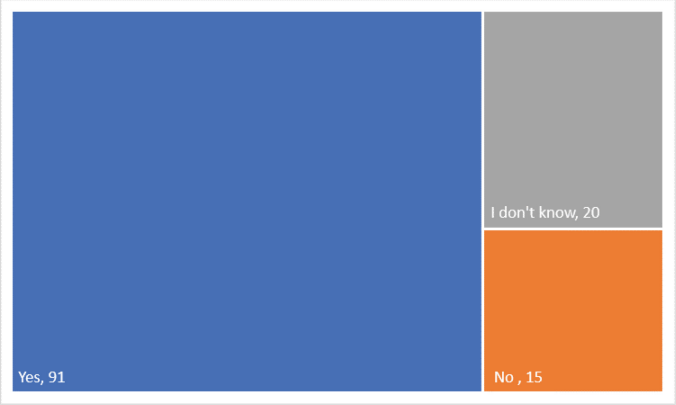

Fig. 8. Will the use of AI in tourism become more common in the future.

In addition to the previous answers showing that respondents are really considering AI services to be very important in travel planning, the question whether this importance will become more evident in the future, received 91 positive answers, 15 that do not consider this evidence and 20 who have no opinion.

Lastly, what improvements would you like to see in AI services for tourism? There were several responses and can be seen in Table 1.

Table 1. Improvements you would like to see in AI services in tourism

Personalized itineraries and trips	76
Different itineraries depending on the traveler's budget	28
Itineraries according to the interests of travelers	20
Traveler assistance	16
Price and Offer Optimization	12
Complaints management	4

Complaints management Personalization and direct assistance are priorities for travelers, followed by adaptation to budget and specific interests.

In more detail and by decreasing number of responses, we have:

- Personalized itineraries and trips (76) - Personalization is fundamental in today's tourism. Travelers value that their itineraries are adapted to their individual preferences, maximizing satisfaction and enjoyment of the trip.
- Budget-friendly itineraries (28) - Budget is crucial for travelers. Offering itineraries adapted to different price ranges ensures that more people can enjoy trips according to their economic possibilities.

- Itineraries according to specific interests (20) - Travelers seek experiences that are aligned with their personal interests (culture, gastronomy, sports, etc.), enriching their travel experience.
- Traveler Assistance (16) - Real-time assistance reduces stress and hassle while traveling, improving service perception.
- Price and offer optimization (12) - Travelers value getting the best offers and competitive prices, which also benefits companies in terms of revenue and occupancy.
- Complaints management (4) - Although voted least, efficient complaints management is important to maintain customer satisfaction and loyalty.

5 Conclusions

The results of using Chatbots in Customer Service indicate that tourists are largely satisfied with chatbot services, with a high rate of problem resolution without the need for human intervention. It was also found that customer satisfaction increased significantly in companies that implemented effective chatbots.

The results in the use of Personalized Recommendation Systems proved to be highly accurate and relevant, with a notable increase in user engagement. Tourists who used these recommendations reported a more personalized and satisfying travel experience.

AI brings numerous benefits, including personalization, operational efficiency and deep insights into tourist behavior. However, it faces challenges such as privacy concerns, the need for large volumes of accurate data, and the complexity in implementing sophisticated systems.

Limitations of the study were found during the research, such as the sample size and possible biases in the respondents' responses.

Future research can explore the impact of AI on different segments of tourists, as well as the development of new technologies and their applications in tourism.

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