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THE IMPACT OF USING AI ON TOURISM: OPPORTUNITIES AND CHALLENGES

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Abstract. *In this paper, the authors investigate the benefits and opportunities, as well as the barriers, challenges, risks, shortcomings, and potential threats associated with the implementation of Artificial Intelligence (AI) in the tourism industry. The study adopts a stakeholder-oriented perspective, examining how the integration of AI technologies influences three major groups: tourists, local residents, and tourism businesses. Particular attention is given to understanding the extent to which AI creates opportunities for improving tourism experiences, optimizing business operations, and supporting service innovation, while also generating challenges related to technological dependence, privacy, ethical considerations, and the transformation of traditional tourism practices. The research aims to provide a comprehensive overview of the implications of AI adoption and to identify differences in how its benefits and limitations are distributed among the stakeholders involved.*

The results indicate that the challenges associated with AI implementation in tourism outnumber the identified opportunities, suggesting that technological advancement also introduces significant concerns for the industry. Tourists appear to be equally affected by the opportunities and challenges generated by AI, reflecting a balance between improved accessibility, personalization, and service efficiency on the one hand, and potential risks on the other. Tourism businesses experience a greater impact from challenges than tourists, highlighting the difficulties associated with technological integration and adaptation. In contrast, local residents appear to be minimally affected by both the opportunities and challenges identified. These findings emphasize the need for a balanced and stakeholder-sensitive approach to AI adoption in tourism.

Keywords*: AI, tourism, opportunities, challenges, tourists, residents, tourism businesses*

INTRODUCTION

Approaching the opportunities and challenges of using AI in tourism means conducting a multi-layered analysis across several dimensions – culture, law, symbol, and technology.

Thus, from an opportunity perspective, AI reshapes the experiential, ritualic, and symbolical aspects of tourism:

- At *experiential level*: AI enables hyper-personalised experiences by curating routes, narratives, and sensory experiences tailored to each tourist through adaptive hospitality interfaces, dynamic itineraries, and personalized cultural storytelling; AI enhances the growth of bio-tourism and blue tourism by supporting agri-biotech visitor experiences, biotech-driven wellness tourism, marine ecosystem monitoring, and sustainable resource management.
- At *ritualic level*: Ai enables smart hospitality by optimizing check-in rituals, predictive maintenance, room environments, and service personalization; AI supports sustainability and resource optimization by helping manage energy use, overtourism, transportation flows, and waste systems.

- At *symbolical level*: AI enables an intelligent interpretation of heritage by reconstructing architectural symbolism, historical layers, mythological routes, and ritual functions of spaces; AI enhances tourism media by improving content creation, immersive storytelling, nonverbal cue analysis, and translation.

From a challenge perspective, AI introduces cultural, ethical, legal, and symbolical tensions:

- At *cultural level*: AI causes loss of authenticity because AI-generated narratives risk creating algorithmic clichés, staged authenticity, and synthetic folklore.
- At *ethical level*: AI causes digital divide by deepening inequalities such as global platforms dominating narrative production, regions without digital infrastructure falling behind, and small cultural communities losing visibility; AI causes workforce displacement by affecting cultural interpreters, guides, hospitality workers, and travel agents.
- At *legal level*: AI creates ethical and legal ambiguities by including cross-border data governance, liability in AI-guided experiences, protection of intangible heritage, and rights over AI-generated cultural content; AI is a threat to data privacy and surveillance by turning tourists into algorithmically-filtered subjects, quantified identities, and tracked bodies.
- At *symbolical level*: AI causes algorithmic bias by reinforcing cultural hierarchies, stereotypes, and unequal visibility of destinations.

MATERIAL AND METHODS

The materials used in this paper consist of recent scientific articles, academic publications, and relevant research studies addressing the application of Artificial Intelligence (AI) in the tourism industry and its implications for the sector's main stakeholders: tourists, local residents, and tourism businesses. The selected literature examines the growing role of AI-based technologies in transforming tourism services, influencing consumer behaviour, supporting business management, and reshaping interactions between visitors and destination communities. Particular attention is given to the opportunities provided by AI, including service personalization, improved operational efficiency, enhanced customer experiences, and more effective decision-making. At the same time, the reviewed publications explore the challenges and risks associated with AI adoption, such as data privacy concerns, ethical issues, technological dependence, implementation costs, and potential changes in employment and stakeholder relationships.

The research method employed is the bibliographical method, which involves identifying, selecting, reviewing, and analyzing relevant scientific literature on the subject. This approach allows for the synthesis of existing knowledge and the comparison of different perspectives regarding the benefits and limitations of AI in tourism. By examining the findings presented in recent studies, the paper aims to identify the main opportunities and challenges associated with AI implementation and assess their implications for tourists, residents, and tourism businesses. The bibliographical analysis also provides a foundation for understanding how the effects of AI may differ among these stakeholder groups and for highlighting the importance of responsible, balanced, and inclusive technological development within the tourism industry.

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RESULTS AND DISCUSSIONS

1. Opportunities

AZIZ et al. (2013), GEISLER (2018), DUARTE et al. (2020), FILIERI & RAGUSEO (2021), BULCHAND-GIDUMAL et al. (2023), GARCIA-MADURGA & GRILLO-MENDEZ (2023), FLORIDO-BENITEZ & ALCAZAR MARTINEZ (2024), ILIEVA, YANKOVA & LISAROVA-BELCHEVA (2024), KASIAN (2023), KIM et al. (2024), AGAPITOU et al. (2025), ANTCZAK (2025), ERDOS et al. (2025), GOMEZ RODRIGUEZ (2025), GÖSSLING & MEI (2025), LOPEZ-NARANJO et al. (2025), LUCAS et al. (2025), TO & YU (2025), WANG et al. (2025) have identified the following categories of **benefits / opportunities of using AI in tourism** (28): *augmenting human capabilities*; *avoiding waiting in a phone line to reach a free agent*; *boosting tourist loyalty*; *building community capacity*; *buying a travel product via a modern sales channel*; *capturing consumer preferences*; *creating jobs for residents*; *creating value for tourists*; *delivering a much more personalized tourist lifetime value*; *differentiating in the competitive environment*; *engaging with tourist's travel interests* by exploring new resources, participating in related activities, or planning future travels to enrich their experiences; *enhancing tourist experiences*; *enhancing residents' quality of life*; *expanding tourism firms' operations*; *forecasting in actual and real time* tourism flow and demand, loyalty, and revenue; *growing total revenue*; *identifying market's trends*; *individualising tourism firms' offerings*; *informing decision making*; *overlaying digital content onto tourists' real environment*; *predicting new tourism values based on previous experiences*; *producing positive economic effects*; *providing artificial personal assistants*; *providing cross-selling services*; *providing greater efficiency*; *providing insight of a given landmark or object* to destination finder in a point of interest or on tourist's mobile device; *servicing all around the clock*; and *streamlining operations*.

These **opportunities** aim at three different yet interlacing tourism actors / players:

Tourists (14): *augmenting human capabilities*; *avoiding waiting in a phone line to reach a free agent*; *buying a travel product via a modern sales channel*; *boosting tourist loyalty*; *capturing consumer preferences*; *creating value for tourists*; *delivering a much more personalized tourist lifetime value*; *differentiating in the competitive environment*; *engaging with tourist's travel interests* by exploring new resources, participating in related activities, or planning future travels to enrich their experiences; *enhancing tourist experiences*; *informing decision making*; *overlaying digital content onto tourists' real environment*; *providing insight of a given landmark or object* to destination finder in a point of interest or on tourist's mobile device; and *servicing all around the clock*.

Residents (3): *building community capacity*; *creating jobs for residents*; and *enhancing / improving residents' quality of life*.

Tourism business (11): *expanding tourism firms' operations*; *forecasting in actual and real time* tourism flow and demand, loyalty, and revenue; and *growing total revenue*; *identifying market's trends*; *individualising tourism firms' offerings*; *predicting new tourism values based on previous experiences*; *producing positive economic effects*; *providing artificial personal assistants*; *providing cross-selling services*; *providing greater efficiency*; and *streamlining operations*.

2. Challenges

AZIZ et al. (2013), GEISLER (2018), THOMAS (2019, IN KIRTIL & AŞKUN, 2021), BULCHAND-GIDUMAL (2020), SAMARA, MAGNISALIS & PERISTERAS (2020), FILIERI & RAGUSEO (2021), BULCHAND-GIDUMAL et al. (2023), GARCÍA-MADURGA & GRILLÓ-MÉNDEZ (2023), ILIEVA, YANKOVA & LISAROVA-BELCHEVA (2024), KASIAN (2023), DEL VASTO & ARCO CASTRO (2024), FLORIDO-BENÍTEZ & ALCÁZAR MARTÍNEZ (2024), HENRIQUES,

ALMEIDA & RAMOS (2024), KIM et al. (2024), AGAPITOU et al. (2025), ANTCZAK (2025), ERDŐS et al. (2025), GÓMEZ RODRÍGUEZ (2025), GÖSSLING & MEI (2025), LÓPEZ-NARANJO et al. (2025), LUCAS et al. (2025), TO & YU (2025), WANG et al. (2025) reviewed AI in tourism and identified the following categories of **barriers / challenges / dangers / gaps / risks / shortcomings / threats of using AI in tourism** (51): *adopting and using AI*; *being reluctant to use new technologies*; *causing algorithmic biases*; *causing environmental challenges*; *challenging culture and business model change* because ai enables deduction from unstructured vast amount of data; *changing tourism trends* to face environmental sustainability and climate change; *complying with data complexity, privacy and security*; *controlling resource consumption* (e.g., water, energy); *creating anti-competitive conditions*; *creating business and financial challenges*; *creating ethical guidelines / issues* for the development and application of ai-powered marketing tactics; *eliminating human touch*; *facing disconnection, incomprehensibility, and vulnerability*; *facing language barriers*; *facing moral challenges* (in data capture, data analysis, data privacy, and data reliability); *facing regulatory challenges*, which imply the way data is collected and processed, and refer to the role of governments regarding the safety and privacy of tourism businesses Big Data; *facing sustainability challenges*; *facing technical challenges*, which refer to *cost concerns*, *data accuracy and quality*, and *ensuring lack of bias*; *facing trust challenge*: AI recommendations or decisions should be traceable and transparent in order to ensure businesses to see what their AI is doing and avoid the risks of bias; *fearing technology*; *finding an appropriate fit between AI systems and human employees*; *forming "filter bubbles" where tourists only see offers that match their previous choices*; *generating biased or misleading information* if trained on prejudiced or inaccurate data, leading to poor recommendations or incorrect details; *getting a handle on data challenge* because lack of data, too much data, or bad data are constraints for businesses in integrating their workflow to AI; *having ethical dilemmas*; *having privacy issues*; *increasing financial costs* (acquisition, installation, maintenance, software updates, adaptations to premises for robot mobility, hiring specialists, and staff training); *lacking computational expertise and resources*; *lacking popularity in consumer interactions*; *lacking relevant skills*: skills needed for AI experts and programmers are utterly different than current software engineers; *lacking sufficient amounts of quality data for training models*; *lacking understanding*: businesses should carefully analyse their needs and problems by checking the applicability of AI because it cannot fix any kind of problem as suggested by its spreading popularity; *lacking willingness to pay for high-tech services*; *losing knowledge and information*; *managing human resources*; *manipulating chatbot responses* by inputting deceptive information; *manipulating consumers' behaviour*; *needing high quality data*; *perceiving high-tech service as inferior*; *preference of human-delivered services*; *preserving personalized service* in an increasingly automated environment; *raising environmental and operational cost concerns*; *relying on employee quality*; *resisting to change*; *socio-ethical challenges*, which are comprised of acceptance of AI in routine of tourism and fear of job losses; *subjecting to digital exclusion*; *substituting humans*; *threatening culture and language*; *threatening human survival*; *using inefficient and failing systems*; and *using technologies like Big Data and intelligent robots* to continuously stimulate service innovation.

These **challenges** aim at three different yet interlacing tourism actors / players:

- ***Tourists*** (14): *adopting and using AI*; *being reluctant to use new technologies*; *causing algorithmic biases*; *causing environmental challenges*; *eliminating human touch*; *facing disconnection, incomprehensibility, and vulnerability*; *facing language barriers*; *fearing technology*; *having privacy issues*; *lacking willingness*

to pay for high-tech services; *losing knowledge and information*; *needing high quality data*; *perceiving high-tech service as inferior*; *preference of human-delivered and services*;

- ***Residents*** (0);
- ***Tourism business*** (37): *challenging culture and business model change* because AI enables deduction from unstructured vast amount of data; *changing tourism trends* to face environmental sustainability and climate change; *complying with data complexity, privacy and security*; *controlling resource consumption* (e.g., water, energy); *creating anti-competitive conditions*; *creating business and financial challenges*; *creating ethical guidelines / issues* for the development and application of AI-powered marketing tactics; *facing moral challenges* (in data capture, data analysis, data privacy, and data reliability); *facing regulatory challenges*, which imply the way data is collected and processed, and refer to the role of governments regarding the safety and privacy of tourism businesses Big Data; *facing sustainability challenges*; *facing technical challenges*, which refer to *cost concerns*, *data accuracy and quality*, and *ensuring lack of bias*; *facing trust challenge*: AI recommendations or decisions should be traceable and transparent in order to ensure businesses to see what their AI is doing and avoid the risks of bias; *finding an appropriate fit between AI systems and human employees*; *forming "filter bubbles" where tourists only see offers that match their previous choices*; *generating biased or misleading information* if trained on prejudiced or inaccurate data, leading to poor recommendations or incorrect details; *getting a handle on data challenge* because lack of data, too much data, or bad data are constraints for businesses in integrating their workflow to AI; *having ethical dilemmas*; *increasing financial costs* (acquisition, installation, maintenance, software updates, adaptations to premises for robot mobility, hiring specialists, and staff training); *lacking computational expertise and resources*; *lacking popularity in consumer interactions*; *lacking relevant skills*: skills needed for AI experts and programmers are utterly different than current software engineers; *lacking sufficient amounts of quality data for training models*; *lacking understanding*: businesses should carefully analyse their needs and problems by checking the applicability of AI because it cannot fix any kind of problem as suggested by its spreading popularity; *managing human resources*; *manipulating chatbot responses* by inputting deceptive information; *manipulating consumers' behaviour*; *preserving personalized service* in an increasingly automated environment; *raising environmental and operational cost concerns*; *relying on employee quality*; *resisting to change*; *socio-ethical challenges*, which are comprised of acceptance of AI in routine of tourism and fear of job losses; *subjecting to digital exclusion*; *substituting humans*; *threatening culture and language*; *threatening human survival*; *using inefficient and failing systems*; and *using technologies like Big Data and intelligent robots* to continuously stimulate service innovation.

Figure 1 below renders in graphical form the differences between opportunities and challenges depending on their focus (tourists, residents, tourism businesses).

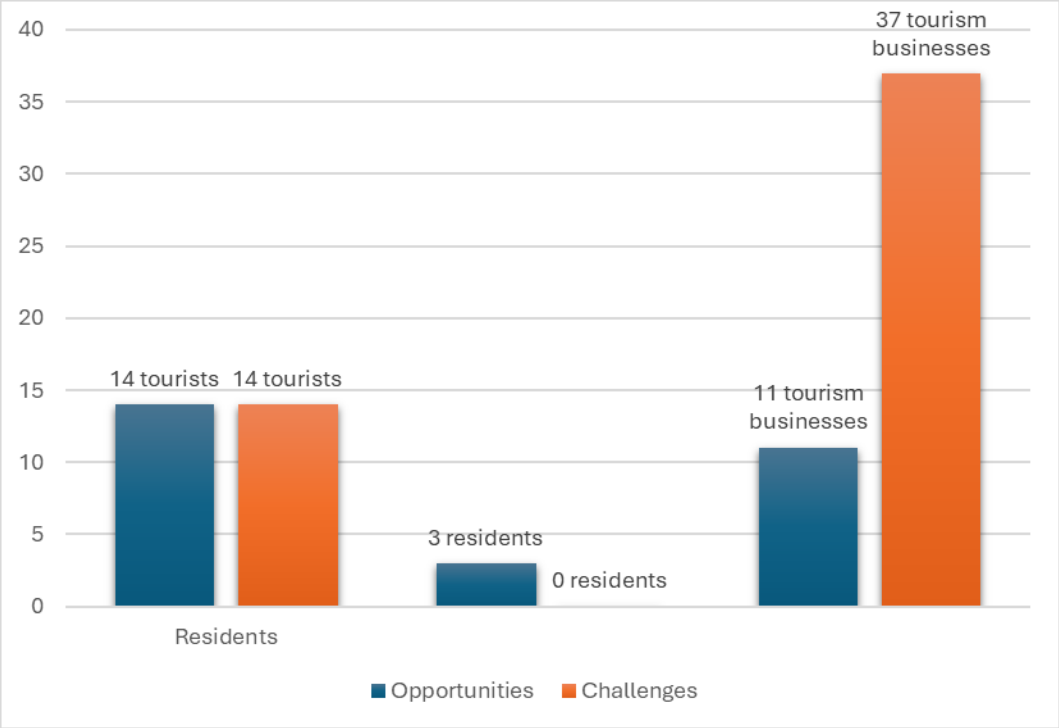


Figure 1. Differences between opportunities and challenges depending on focus (tourists, residents, tourism businesses)

CONCLUSIONS

The findings of the study highlight several relevant differences in the distribution of opportunities and challenges associated with the use of Artificial Intelligence (AI) in tourism. The results indicate that the identified opportunities are slightly fewer than the challenges (28 compared with 31), suggesting that although AI offers considerable potential for improving tourism services and business operations, its implementation also raises important concerns that require further attention. This relatively small numerical difference indicates that the effects of AI adoption should be assessed not only in terms of technological progress but also in relation to its practical implications for the stakeholders involved.

Regarding the distribution of opportunities, tourists and tourism businesses appear to benefit to a relatively similar extent, with 14 opportunities identified for tourists and 11 for businesses. These findings suggest that AI can contribute to improving tourists' experiences through personalized recommendations, easier access to information, and more efficient service delivery, while also supporting tourism businesses through process automation, customer relationship management, and operational optimization. In comparison, residents are associated with only three identified opportunities, indicating that the benefits of AI adoption may not sufficiently extend to local communities.

The distribution of challenges reveals a more pronounced imbalance. Tourism businesses are associated with 37 identified challenges, compared with 14 for tourists, while no

challenges directly affecting residents were identified in the analyzed material. This suggests that businesses face considerable difficulties in integrating AI into their activities, potentially involving implementation costs, employee training, data protection, ethical considerations, and the need to adapt existing organizational processes. Tourists, meanwhile, experience both advantages and disadvantages, with an equal number of opportunities and challenges identified (14 each).

Overall, the findings indicate that tourism businesses are more exposed to the challenges of AI adoption than to its opportunities, with 37 challenges compared with 11 opportunities. This disparity highlights the need for businesses to develop more effective strategies for integrating AI into their operations, ensuring that technological investments generate tangible benefits while minimizing potential risks. Furthermore, tourism stakeholders should pay greater attention to the needs and interests of local residents, who appear to receive relatively limited benefits from AI applications in the analyzed literature. Future AI development in tourism should therefore pursue a more balanced approach, combining business efficiency and improved tourist experiences with initiatives that support local communities and contribute to the sustainable development of tourism destinations.

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