

## The Role of Artificial Intelligence and Big Data in Improving Personalization of Tourism Marketing Campaigns to Maximize Tourist Experience

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### ABSTRACT

This study aims to explore the integration of Artificial Intelligence (AI) and big data in the tourism industry to improve real-time interaction and traveler engagement on digital platforms through a Systematic Literature Review (SLR) approach. This research uses the Technology Acceptance Model (TAM) and the Resource-Based View (RBV) to examine the adoption and strategic use of these technologies. The study was conducted by selecting literature from academic databases such as Google Scholar, Scopus, and DOAJ, using keywords such as "AI," "big data," "tourism," and "real-time interaction" within the time span of 2014-2024. The results showed that AI and big data significantly improved service personalization, accelerated decision-making, and increased operational efficiency in the tourism industry. Although the benefits are great, challenges in terms of data privacy, ethical use of consumer information, and shortage of skilled labor are still major barriers to implementation. This research highlights the gaps related to the integration of AI and big data alongside other technologies such as the Internet of Things (IoT) and robotics, and the importance of strategies to overcome organizational resistance to change. Future research should focus on professional skills development and solutions to data privacy challenges to accelerate the widespread adoption of these technologies in the tourism industry.

**Keywords:** artificial intelligence; big data; tourism; service personalization

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### INTRODUCTION

The advancement of Artificial Intelligence (AI) and Big Data technologies in recent years has had a major impact on various sectors, including tourism. The digital transformation triggered by these technological advancements not only improves operational efficiency, but also opens up new opportunities in data analysis and informed decision-making (Sangadi & Handriana, 2023; Sultanow & Chircu, 2019). In the tourism sector, the use of AI and Big Data is increasingly common in designing more personalized and tailored experiences, creating a new paradigm in the interaction between tourists and destinations (Rafa'al & Sangadji, 2023; Gama et al., 2017). To better understand how these technologies are adopted in tourism, this study uses the Technology Acceptance Model (TAM) and Resource-Based View (RBV) as theoretical frameworks. The TAM framework explains how the adoption of AI and Big Data in tourism marketing is influenced by perceived ease of use and usefulness. On the other

hand, RBV focuses on how tourism businesses leverage technological resources to gain competitive advantages (Hongyun et al., 2023).

Personalization in the context of tourism marketing refers to the ability to deliver content and experiences tailored to the individual preferences of tourists. This concept allows tourist destinations, travel agencies, and tourism service providers to better understand the behavior and needs of tourists through in-depth data analysis (Axsen et al., 2018; Amol, et al., 2024; Iswanto, et al., 2024). By using the TAM framework, this study examines how tourists' perceptions of AI and Big Data influence their willingness to accept and engage with personalized marketing campaigns (Tiwari et al., 2024). With the right personalization strategy, tourists can receive recommendations for destinations, activities, and special offers that are relevant to their interests, thus creating a more emotional and deep attachment between tourists and destinations (Learson, 2019).

Artificial Intelligence (AI) plays an important role in improving the personalization of tourism marketing campaigns through faster and more accurate data analysis capabilities (Saura et al., 2021). AI is capable of processing large amounts of data from multiple sources to identify patterns in traveler behavior and preferences, allowing marketers to develop more targeted campaigns (Grandinetti, 2020). By utilizing predictive algorithms, AI can provide relevant recommendations, automate personalized interactions like chatbots, and customize promotions based on individual preferences, thus enhancing the overall effectiveness of marketing campaigns (Priksat et al., 2023).

Big Data plays an important role in understanding travelers' travel patterns and supporting personalized marketing strategies. By analyzing large datasets, companies can tailor marketing to individual consumer preferences, increasing customer engagement and satisfaction. From an RBV perspective, Big Data serves as a strategic resource for tourism companies, offering insights into consumer behavior that can help gain a competitive edge (Stroumpoulis et al., 2022). Techniques such as machine learning and data mining allow marketers to accurately predict consumer behavior and improve the effectiveness of marketing campaigns (Sakas et al., 2022). Big Data also drives the development of more personalized marketing strategies, such as customized recommendations and dynamic pricing, which are proven to increase loyalty and revenue (Purboyo et al., 2021; Silitonga et al., 2020; Adeleye et al., 2024). Despite the potential, challenges such as data privacy and analytics skills still need to be overcome for ethical and effective implementation (Barbosa et al., 2024).

Personalization of marketing campaigns in the tourism industry offers significant benefits, such as increased traveler loyalty, more satisfying travel experiences, and higher sales conversions (Durahim et al., 2015). Technology, especially artificial intelligence (AI) and machine learning algorithms, plays a key role in achieving this goal by customizing travel experiences according to individual preferences and making trip planning easier (Sun et al., 2020). Research also shows that VR technology can increase traveler engagement by providing more immersive virtual experiences (Hu, 2023). By applying TAM, this study explores how tourists' acceptance of AI-based personalization affects their engagement and decision-making process (Alam et al., 2023). The technology enables more targeted advertising and customer segmentation, increasing sales

conversion through relevant offers (Newswire, 2018). Despite challenges related to data privacy, these technologies offer substantial potential to improve marketing strategies in the tourism industry.

The adoption of artificial intelligence (AI) and Big Data in the tourism industry offers great opportunities to improve efficiency, productivity, and profitability, as well as provide personalized experiences for tourists (Balla, 2016). These technologies enable better decision-making and more effective customer interactions (Navarro & Navarro, 2016). However, challenges include concerns regarding data privacy, high implementation costs (Moreno et al., 2024), and lack of understanding among stakeholders (Mariani & Wirtz, 2023). From the RBV perspective, addressing these challenges requires tourism businesses to invest strategically in technology and develop strong public-private partnerships to manage resources effectively (Litheko, 2022). In addition, the tourism industry experiences difficulties in governance and partnerships between government, communities, and the private sector (Javier & Lacárcel, 2022). Although analytics in tourism is growing, there are still gaps in methodologies, and frameworks that connect business intelligence and Big Data to tourism management are needed (Ashqar & Ramos, 2024).

Based on the research results, there are several gaps in the application of Big Data and artificial intelligence (AI) technologies for personalization of marketing campaigns in the tourism industry. While these technologies offer great benefits, such as increased efficiency and personalized experiences, as well as the development of more effective marketing strategies, more research is needed to overcome challenges related to data privacy and high implementation costs. In addition, a lack of understanding among stakeholders and difficulties in governance and partnerships between the public and private sectors also need to be addressed. These gaps suggest a need for improved methodologies and frameworks that integrate Big Data and AI with tourism management, leveraging the perspectives of TAM and RBV to deepen the understanding and application of these technologies in the tourism industry. This research aims to further explore how the technology can be optimized to improve the personalization of marketing campaigns and identify solutions to overcome the challenges that exist in the application of this technology in the tourism industry.

## **METHOD**

This study aims to examine the role of Artificial Intelligence (AI) and Big Data in improving the personalization of tourism marketing campaigns to maximize the tourist experience. This study uses a Systematic Literature Review approach to analyze how AI and Big Data are used in creating a more personalized and relevant experience for tourists. The study is guided by the theoretical frameworks of the Technology Acceptance Model (TAM), which helps understand how these technologies are adopted by consumers, and the Resource-Based View (RBV), which examines how tourism businesses leverage AI and Big Data as strategic resources to gain a competitive advantage. A literature search was conducted through academic databases such as Scopus, DOAJ, and Google Scholar, using keywords such as “Artificial Intelligence”, “Big Data”, “marketing campaign personalization”, “tourist experience”, and “digital tourism

marketing”. Search results were limited to publications within the last ten years (2014-2024) to maintain relevance with the latest technology trends.

Inclusion criteria included empirical studies that addressed the use of AI and Big Data in tourism marketing campaigns, especially those focused on personalization and enhancing the traveler experience. Studies that were not directly related to AI or Big Data, as well as opinion-based publications without empirical data support, were excluded from the analysis. To evaluate the quality of the included studies, a critical appraisal was conducted by assessing the robustness of the research methodology and the reliability of the findings. A coding framework was applied to categorize the findings of each study, with themes related to personalization, data privacy, and operational efficiency being prioritized. To ensure a transparent thematic synthesis, the data was organized according to key themes identified in the literature, following established protocols such as PRISMA for systematic reviews. To ensure the representativeness of the literature, studies were selected from a wide range of geographical contexts and industry settings to avoid bias. To validate the findings, triangulation was used by cross-referencing the studies with expert interviews and industry reports, providing an additional layer of validation to ensure the reliability of the conclusions drawn. The literature selection process involved examining titles, abstracts, and full texts to ensure the studies were relevant to the research objectives. The extracted data included the research methodology, key findings, as well as implications for personalized tourism marketing strategies. The research procedure can be seen in Figure 1.

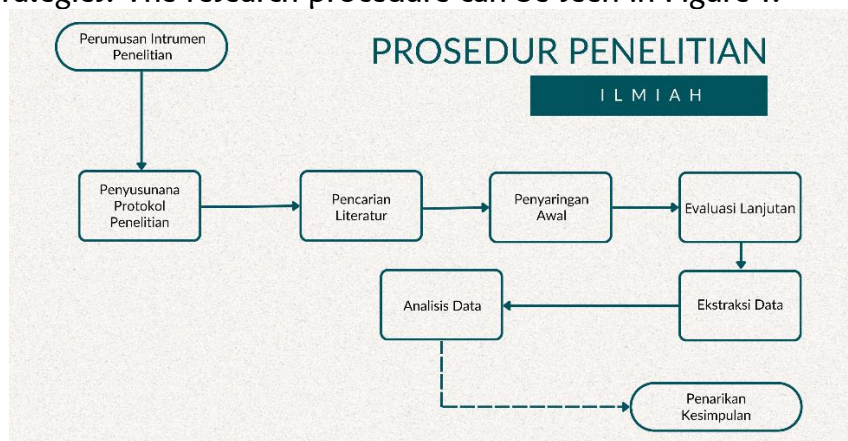


Figure 1. Research Procedure

Figure 1 presents the research procedure that begins with the formulation of a clear and specific research instrument related to the influence of local traditions on visitor engagement in tourist destinations. The next step was the development of a research protocol that included setting inclusion and exclusion criteria and identifying relevant data sources. Then, a systematic literature search was conducted using predetermined keywords on relevant academic databases such as Scopus, DOAJ, and Google Scholar. Search results were filtered by title and abstract to eliminate irrelevant articles. Articles that passed the initial screening were further evaluated through full reading to ensure they met the inclusion criteria. Data from the selected articles were then extracted and analyzed to identify key findings, trends, and research gaps. The conclusions from this

analysis will be used to develop policy recommendations and best practices in the development of culture-based tourism destinations.

## RESULTS AND DISCUSSION

Based on the results of the literature search, several relevant research findings have been identified to support the focus and objectives of this study. Important aspects found include: (1) improved real-time interaction and content personalization through the integration of AI and big data in tourism digital platforms, (2) data privacy and ethical challenges in the use of BDAI for consumer information management, (3) optimization of tourism marketing campaign performance using big data analytics, (4) the role of big data and AI technologies in digital entrepreneurship in the tourism sector, (5) improved operational efficiency through automation and the use of robotics in hospitality, (6) the potential of BDAI in measuring tourism sustainability, and (7) the importance of organizational adaptation to technological change to maximize the benefits of BDAI.

Table 1. Focus and Insight into Research Outcomes according to Eligibility Criteria

No	Focus and Scope	Author	Research Insights or Variables
1	Real-Time Interaction and Personalization	Kamal & Bablu (2022), Reddicharla et al. (2022), Ferrari et al. (2018)	Increased traveler engagement through AI-based personalization of content and services
2	Data Privacy and Ethical Challenges	McCosker & Graham (2018), Newswire (2018), Gidumal et al. (2024)	Data privacy and ethical considerations as key challenges in BDAI adoption in tourism
3	Marketing Campaign Optimization	Okorie et al. (2024), Su & Yin (2023), Lowatcharin (2016)	Big data analytics in support of campaign personalization and performance evaluation through deep learning
4	Digital Entrepreneurship and IoT	Mariani & Wirtz (2023), Wang (2023)	Integration of BDAI with other technologies, such as IoT, in digital entrepreneurship in tourism
5	Operational Efficiency and Automation	Lee (2021), Tandon & Tandon (2020), Mathew et al. (2021)	Improved operational efficiency and adoption of robotics for automation in the hospitality sector
6	Tourism Sustainability	Guilarte & Barreiro Quintáns (2019), Samara et al. (2020)	BDAI in measuring tourism sustainability and its implementation challenges
7	Organization and Skills Adaptation	Rhoda et al. (2024), Murár (2023)	Complexity of technology integration requires skilled manpower and organizational culture adaptation

Table 1 summarizes the research findings that categorize various aspects of BDAI implementation in tourism. The main focus includes the enhancement of real-time interactions and personalization of content, data privacy and ethical challenges, and

optimization of marketing campaigns through big data analytics. In addition, the research highlights the role of BDAI in digital entrepreneurship and IoT, improving operational efficiency through automation, and measuring tourism sustainability. The complexity of organizational adaptation and the need for a skilled workforce are also important concerns in implementing BDAI in the industry. These studies provide comprehensive insights into how BDAI can be effectively integrated to improve competitiveness and efficiency in the tourism sector.

### **The Role of AI and Big Data in Enhancing Real-Time Interaction and Traveler Engagement on Digital Platforms**

The integration of AI and big data significantly improves real-time interactions as well as traveler engagement on digital platforms. These technologies enable personalization of content and services as per travelers' preferences, supported by AI-based analytics (Kamal & Bablu, 2022). Techniques such as A/B testing and gamification also drive community engagement and user retention in the tourism sector (Reddicharla et al., 2022). In addition, real-time data processing through AI and machine learning enables rapid response to travelers' needs, supported by automated data cleansing processes and intelligent governance to maintain data quality (Ferrari et al., 2018). However, the quality of the studies included in this review significantly impacts the conclusions drawn. Studies with weak research methodologies or unclear data quality may lead to biased interpretations of how AI and big data affect real-time interactions and engagement (Abbasi et al., 2016). Strategic utilization of AI and big data can provide a competitive advantage for tourism companies through service innovation and operational efficiency (Lee, 2021). Nonetheless, challenges such as data privacy and ethical considerations remain key concerns in the implementation of these technologies in the tourism industry (McCosker & Graham, 2018; Newswire, 2018).

Big Data and Artificial Intelligence (BDAI) are increasingly transforming the tourism industry by improving real-time interactions and traveler engagement on digital platforms. BDAI adds value through efficiency, productivity, and profitability for service providers, and offers personalized experiences for tourists (Samara et al., 2020). The technology enables better prediction of traveler demand and more efficient decision-making (Blanco et al., 2024). Despite the increasing adoption of BDAI in tourism research, data interpretation challenges still exist, particularly when the studies involved have low methodological rigor (Harley & Cornelissen, 2022). Future research needs to explore the integration of BDAI with other technologies such as IoT and digital entrepreneurship.

Research shows that the use of Artificial Intelligence (AI) and Big Data (BDAI) significantly improves real-time interactions and traveler engagement on digital platforms. AI enables personalization of content and services to individual preferences, while techniques such as A/B testing and gamification drive user engagement and retention. Real-time data processing enables rapid response to traveler needs, with automated data cleansing and governance ensuring high quality. BDAI provides a competitive advantage through service innovation and operational efficiency, although challenges related to data privacy and ethics remain to be addressed. The quality of the

studies used in this analysis directly influences the conclusions drawn regarding the effectiveness and accuracy of big data in marketing campaigns. Further exploration of the relationship between AI-driven personalization and consumer trust is necessary, as personalization can play a pivotal role in building consumer trust, which is crucial for continued engagement and long-term customer loyalty. Future research is recommended to explore the integration of BDAI with other technologies and the potential for digital entrepreneurship within the tourism sector.

### **Challenges of AI and Big Data Implementation in Tourism Marketing**

The implementation of AI and big data in tourism marketing faces key challenges, including data privacy issues and the ethical use of consumer information, which can create mistrust and require legal compliance (Gidumal et al., 2024; Fararni et al., 2021). The integration of these technologies is also complex, requires significant investment and training, and can generate information “noise” that makes it difficult to extract insights (Rhoda et al., 2024). In addition, shortages of skilled professionals and resistance to organizational culture change are additional barriers (Murár, 2023). Nonetheless, the quality of the studies included in this review significantly impacts the understanding of these challenges. Studies with weak research methodologies or unclear data quality may obscure the real issues faced in the implementation of AI and big data (Snyder, 2019). Nonetheless, benefits such as personalization and operational efficiency can be achieved if these challenges are properly addressed.

The integration of AI and big data in tourism marketing offers significant benefits such as personalized experiences, increased efficiency, and better competitiveness for service providers (Beaumont et al., 2022). Big data analytics also has the potential to form a new field in digital entrepreneurship (Wang, 2023). However, its application faces challenges such as data privacy concerns and potential bias (Miller, 2019). In the hospitality sector, human knowledge, service and robotics applications are important factors in the adoption of AI and automation (Tandon & Tandon, 2020). While these technologies promise to revolutionize the industry, successful implementation depends heavily on the quality of the studies considered. Studies with flawed or incomplete data may lead to incomplete understandings of the challenges faced, particularly regarding data management and privacy (Zhang et al., 2019). Successful implementation requires solutions to challenges related to data management, privacy, and the evolving human-AI dynamic (Mathew et al., 2021). Sustainable strategies in the implementation and management of AI will be key for the tourism and hospitality industry (Mishra & Rokade, 2024).

The implementation of AI and big data in tourism marketing faces important challenges. These technologies offer great benefits such as experience personalization and operational efficiency, but key challenges include data privacy concerns, technology integration complexities, and the need for a skilled workforce. While AI and big data have the potential to improve competitiveness and service innovation, successful deployment of these technologies depends heavily on the quality of the studies used to understand the barriers. Studies with methodological weaknesses or biases may fail to accurately depict the extent of these challenges. Additionally, a critical evaluation of the



literature selection process is necessary, as there may be potential biases in the literature pool that could skew the overall understanding of these challenges. Successful deployment depends heavily on the ability to address privacy and integration concerns, as well as addressing existing skills shortages. This evaluation highlights the need for effective solutions to securely manage data and adapt marketing strategies to match technological developments and the dynamics of human-AI interactions.

### **The Impact of Big Data on Tourism Marketing Campaign Effectiveness and Accuracy**

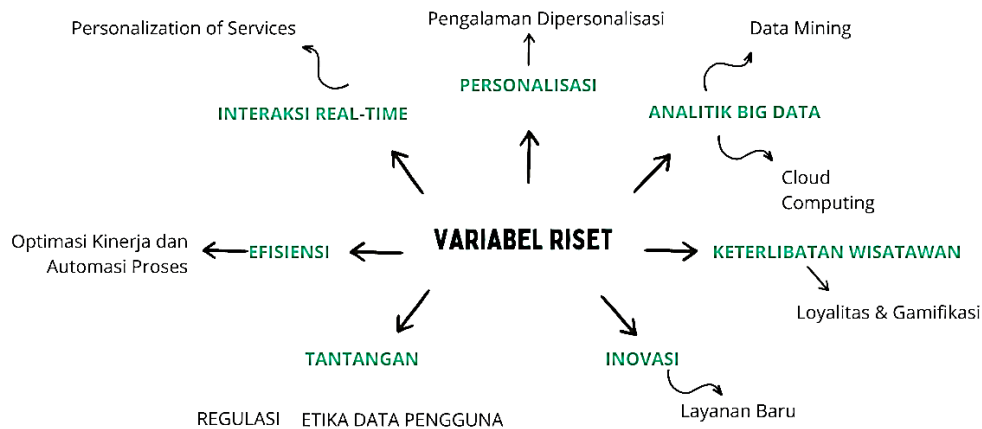
The integration of big data in tourism marketing campaigns significantly increases their effectiveness and accuracy. Using advanced analytics, businesses can customize marketing strategies according to consumer preferences, thereby increasing engagement and satisfaction. Big data analysis enables a deep understanding of consumer behavior, supporting the development of more personalized campaigns (Su & Yin, 2023). Technologies such as data mining and cloud computing help extract important insights, while campaign performance evaluation can be continuously optimized through deep learning (Lowatcharin, 2016). While the benefits are great, challenges such as data privacy and the need for skilled labor still need to be addressed. While the benefits are great, challenges such as data privacy and the need for skilled labor still need to be addressed. The quality of the studies included in this review plays a significant role in understanding the full extent of these challenges, as studies with weak methodologies may overlook key issues in data privacy or fail to evaluate the impact of skilled labor shortages (Hughes et al., 2019).

Big data and artificial intelligence (BDAI) are transforming the tourism industry by improving decision-making, marketing personalization, and operational efficiency (Giraldo, 2016). These technologies help organizations predict tourist demand and manage knowledge more effectively (Cely, 2016). BDAI creates value through projects, production, promotion, and provisioning (Lugo, 2016), and has the potential to measure tourism sustainability, despite challenges in implementation (Samaae, 2016). BDAI strategies are important for the competitiveness and resilience of the tourism sector (Roche, 2016). However, the effectiveness of these strategies and the potential impact of BDAI on tourism marketing depend heavily on the quality of the studies used. Poor methodological quality in the studies could lead to inaccurate assessments of the effectiveness of BDAI, especially in terms of its potential to drive sustainability in tourism (Samara et al., 2020). The quality of these studies can significantly influence the validity of conclusions drawn regarding BDAI's actual impact on tourism marketing campaigns.

Research shows that these technologies have great potential to improve campaign effectiveness and personalize travel experiences. However, implementation challenges, such as data privacy concerns and the need for skilled experts, are significant barriers that need to be overcome. While data mining and cloud computing have improved the ability to analyse consumer behaviour, these results also point to potential 'information overload' that requires more careful evaluation. It is important to remember that big data implementation requires not only technological investment but also cultural adaptation and internal capacity building. The quality of the studies involved in this review affects the understanding of these implementation challenges. Studies with



methodological weaknesses may fail to highlight the full range of barriers, including the need for organizational change and adaptation. This evaluation emphasises the need for a balance between technological benefits and risk management to maximise the positive impact of big data integration in tourism promotion.



**Figure 2:** Development of Research Variables

Figure 2 illustrates the development of research variables focusing on the integration of big data and AI in tourism marketing, especially in improving real-time interactions and traveler engagement. AI technologies enable personalization of content and services tailored to tourist preferences, strengthening tourist engagement on digital platforms through techniques such as A/B testing and gamification. The use of big data analytics helps businesses extract important insights from traveler behavior, supporting the optimization of consumer preference-based marketing strategies. While AI and big data improve operational efficiency by automating business processes and leveraging deep learning for performance evaluation, challenges such as data privacy and ethical use of consumer information remain crucial issues. In addition, resistance to organizational culture change and lack of skilled professionals are slowing down the adoption of these technologies. Continued innovation in the utilization of big data also enables the development of new services that give tourism service providers a competitive edge. AI-based marketing strategies and investments in technology and training are key in ensuring the effective implementation of these technologies in the tourism sector.

## CONCLUSION

The results of this study show that the integration of Artificial Intelligence (AI) and big data in the tourism industry significantly improves real-time interactions as well as tourist engagement on digital platforms through personalization of services tailored to consumer preferences. The use of AI and big data also accelerates decision-making and improves operational efficiency, which gives tourism service providers a competitive advantage. While the benefits of these technologies are considerable, challenges such as data privacy, ethical use of consumer information, as well as a shortage of skilled labor are still major obstacles to their implementation. In addition, resistance to organizational culture change is slowing down the adoption of these technologies in

some sectors. However, it is important to recognize the limitations in the studies reviewed. There is potential bias in the selection of literature, as many studies may focus on specific geographical regions or sectors, which limits the generalizability of the findings. The research gaps found indicate that more studies are needed to explore the integration of AI and big data with other technologies such as the Internet of Things (IoT) and robotics, as well as understanding the dynamics of interaction between humans and AI in the context of tourism. Additionally, the thematic analysis conducted in this review may have overlooked certain nuances, and future research should aim for a more comprehensive evaluation that considers a wider range of studies and methodologies to address these gaps. Future research also needs to focus on strategies that can address data privacy challenges and develop the necessary professional skills, so that the adoption of these technologies can take place faster and more widely. Moreover, the findings of this study have limitations in their applicability to real-world practice. The theoretical insights provided here need to be tested in actual tourism settings to understand their practical relevance and impact on organizational outcomes.

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