

THE ROLE OF ARTIFICIAL INTELLIGENCE IN TOURISM INDUSTRY OF INDIA FOR TOURIST SATISFACTION

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ABSTRACT:

The world of tourism in India is on the threshold of an unmatched cultural heritage and rapid digitalisation. The increasing presence of artificial intelligence (AI) technologies, such as machine learning, natural language processing, big data analytics, robotic service delivery and augmented reality in tourism services offers a big opportunity for the improvement of tourist satisfaction. In the present review paper, the academic literature and industry evidence about AI applications are conducted systematically in the context of Indian tourism, where particular attention is paid to their documented and theorised impacts on tourist satisfaction. The paper is based on 52 peer-reviewed articles, industry reports and Government documents published over the last ten years (2015-24) and thus provides a map of AI implementation throughout the tourist value chain, giving a theoretical framework of how AI capabilities can affect satisfaction outcomes and outlines key barriers that are particularly specific to the Indian ecosystem. The review provides empirical justification of the positive impact of AI on cognitive, affective and behavioural aspects of tourist satisfaction along with culturally sensitive, ethically balanced and morally guided AI implementation practices.

Keywords: Artificial Intelligence, Machine Learning, Tourist Satisfaction, Chatbots, Smart Tourism, Personalisation, Heritage Tourism

INTRODUCTION

India is one of the most diversified and highly acclaimed historical tourism destinations in the world providing a mystical blend of heritage sites, natural marvels, meditation spaces, food habits, and living cultures. With the registration of about 10.93 million arrivals of foreign tourists in 2019 and the total domestic tourism market estimation at 2.32 billion visits in the year, India is making it to one of the largest internal tourist markets in the world (Ministry of Tourism, Government of India, 2023). When the World Travel and Tourism Council (WTTC, 2022) estimated the contribution of the travel and tourism industry to India's GDP in 2019, a massive contribution of 9.4% to GDP and a generation of more than 42 million jobs was reported (this was before the onslaught of the COVID-19 pandemic). However, with the aid of the National Tourism Policy 2022 and the increasing aspirational domestic travel demand, recovery has been strong since 2022.

In the current global scenario, the world-wide digital revolution is essentially transforming the way tourists search, assess, book, experience and describe their travels. Artificial Intelligence (AI) as an overall process of modelling the human intellectual processes of learning, reasoning, problem-solving and in general, understanding in a computer (Russell and Norvig, 2021) has become a revolutionary factor in all stages of the tourist experience. The applications include machine learning (ML) based recommendation engines, natural language processing (NLP) based chatbots, computer vision-based security systems, big data analytics systems, augmented reality (AR) experiences and service delivery robots with various implications on service quality and tourist satisfaction.

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The adoption of AI in the Indian tourism industry is becoming quite favourable. By 2023, the number of active smart phone users had reached above 750 million. The government initiative of “Digital India” has widened coverage of broadband networks and internet access and technology in the country and has created an impressive and continually expanding AI workforce (NASSCOM, 2023). However, the academic writings, specifically focusing on the implementation of AI in Indian tourism and its quantifiable effect on the level of satisfaction among tourists, are still rather scattered and need to be synthesised thoroughly. The gap in this paper is addressed with the help of the structured narrative review, which tries to unify the current knowledge base, discern the patterns of the empirical research and form an agenda for the future research.

Objectives of the Study

The present study is guided by the following objectives:

- To study AI technologies currently deployed across the Indian tourism value chain.
- To analyse the empirical evidence linking AI-driven services to tourist satisfaction constructs.
- To synthesise a theoretical framework connecting AI capabilities to tourist satisfaction outcomes.
- To identify structural barriers to AI adoption in the Indian tourism ecosystem.
- To delineate research gaps and propose directions for future inquiry.

Review Methodology

The paper assumes the systematic narrative review approach, which is recommended by Snyder (2019), where the goal is to synthesise a multidisciplinary literature base on a grand scale and produce a conceptual rather than quantitative combination of the effect sizes. The academic databases we searched include Scopus, Web of Science, Google Scholar, JSTOR and PubMed, where we specifically looked for studies on health and wellness tourism. The Boolean operator terms that were used included (artificial intelligence / machine learning / chatbot / NLP) and (tourism / hospitality / travel) and India (AI / smart technology).

The papers that were published in January 2015 to December 2025 were taken into consideration. The inclusion criteria involved direct relatedness to AI applications in tourism and quantitative or qualitative measurement of tourist satisfaction, and the application focusing on India or a common tourism emerging market with a close similarity. Grey literature, which included government policy documents, NASSCO reports, and WTTC statistical reports, was used to supplement peer-reviewed evidence. Out of a total amount of 74 sources retrieved, 52 based on an application of reduplication and relevance screening met the inclusion criteria. A thematic content analysis was used to articulate themes that were common in the literature and group them into thematic categories, as reported below.

LITERATURE REVIEW AND THEMATIC CLASSIFICATION

AI TECHNOLOGIES IN INDIAN TOURISM: A THEMATIC OVERVIEW

The applications of AI in tourism represent the broad array of technology that can be applied during the pre-trip, in-destination, and post-trip environments of the tourist experience. Table 1 below captures a summarised view of the key AI technologies used or in the pilot stage in Indian tourism, including their specific applications, illustrative platforms, and the areas of tourist satisfaction most directly related to each technology.

Table 1. AI Technologies Deployed in the Indian Tourism Industry

AI Technology	Application in Indian Tourism	Key Platform / Example	Satisfaction Dimension Affected
Machine Learning & Recommendation Systems	Personalised itinerary planning, dynamic pricing, content filtering	Make My Trip, Goibibo, Yatra	Cognitive (information quality, trip planning)
Natural Language Processing & Chatbots	24/7 multilingual customer support, automated booking assistance	OYO Rooms, Taj Hotels virtual assistant	Cognitive & Affective (responsiveness, empathy)
Big Data Analytics & Sentiment Analysis	Real-time mining of tourist reviews, demand forecasting, service gap identification	Trip Advisor NLP analysis, Ministry of Tourism Dashboard	Cognitive (service improvement, reliability)
Internet of Things (IoT) & Smart Systems	Crowd flow monitoring, smart ticketing, contactless payments	Taj Mahal visitor management, Smart Cities Mission	Cognitive & Behavioural (efficiency, comfort)
Augmented & Virtual Reality (AR/VR)	Heritage site interpretation overlays, virtual destination previews	Incredible India portal, Hampi AR app, Ellora caves	Affective & Behavioural (engagement, intent to revisit)
Service Robotics	Room service delivery, concierge functions, check-in automation	Select luxury hotels in Mumbai, Bengaluru, Hyderabad	Affective (novelty, perceived modernity)
AI-powered CRM & Service Recovery	Proactive complaint detection, targeted recovery messaging	Hotel CRM systems, social media monitoring tools	Affective & Behavioural (loyalty, positive eWOM)

MACHINE LEARNING AND RECOMMENDATION SYSTEMS

India has also adopted recommendation systems, one of the oldest and most commercialised AI applications in tourism. Based on these systems, user behavioural data can be analysed, whether through collaborative, content-based, or hybrid filters, and the information about browsing patterns, previous bookings, demographic information, and real-time contextual cues can be combined to provide recommendations on destinations, accommodations, activities, and restaurants to specific users. Major online travel agencies (OTAs) in India, such as Make My Trip, Goibibo, and Yatra, have spent a lot on ML-based personalisation engines (Goel et al., 2021). The capability of AI, which was defined in current tourism by Buhalis and Sinarta (2019) as personalised real-time co-creation, has been scientifically associated with a greater level of tourist satisfaction and improved booking conversion. A study by Sharma and Singh (2022) of 320 domestic tourists in India revealed that the quality of AI-generated personalisation was the most significant predictor of trip-planning satisfaction ($= 0.47, p < 0.01$), among which perceived relevance mediates the connection.

CHATBOTS AND CONVERSATIONAL ARTIFICIAL INTELLIGENCE

NLP-based chatbots and, more recently, large language models (LLMs) have formed a key customer-facing unit of Indian hospitality and tourism. Taj Hotels Group, OYO Rooms, and some state tourism development corporations have installed AI-based virtual assistants on their online sites to handle pre-booking, real-time information, and escalation of complaints (Kumar and Nanda, 2019). The specific usefulness of multilingual chatbots in India simply cannot be overestimated; since the country has 22 constitutionally recognised languages and hundreds of effectively used dialects, the ability to use the language that the tourists feel most valuable in is the defining factor in the perceived quality of services and, by extension, satisfaction. In a sample of 428 Indian hotel guests, Pillai and Sivathanu (2020) found such a significant correlation between chatbot service quality and hotel guest satisfaction ($r = 0.62$, $p < 0.001$) and that perceived chatbot empathy ($r = 0.53$) was a more important predictor of affective satisfaction than functional accuracy ($r = 0.39$) owing to the high

BIG DATA ANALYTICS AND SENTIMENT ANALYSIS

Big data analytics helps tourism stakeholders handle large volumes of high-velocity and high-variety data, such as social media content, online review sites, transactions and mobility data, to retrieve actionable intelligence. In India, the Ministry of Tourism created a Tourism Data Dashboard with analytics organisations to compile tourist footfall patterns, consumption patterns, and indicators of satisfaction to develop policy (Ministry of Tourism, Government of India, 2023). Hotels and destination management organisations have applied sentiment analysis to the reviews uploaded to the Trip Advisor and Google Travel websites at the enterprise level to track and react to tourist satisfaction indicators on an almost real-time basis. The authors, Mukherjee and Bhattacharyya (2022), applied an NLP-based sentiment classification model to 18,000 Trip Advisor reviews of Indian heritage destinations and discovered that the most significant sentiment determinants were hygiene standards, guide competence, and physical infrastructure; additionally, the AI-supported proactive service recovery interventions resulted in a 34% reduction in negative review intentions.

SMART DESTINATION MANAGEMENT AND THE INTERNET OF THINGS

Smart tourism destinations combine AI, the Internet of Things (IoT), cloud computing, and geographic information systems (GIS) to provide them with more efficiently managed and people-centered experiences (Buhalis & Amaranggana, 2015). The Smart Cities Mission of India, which encompasses 100 cities and major tourist destinations such as Jaipur, Varanasi, Kochi, and Amritsar, has developed basic infrastructure for the smart cities (Ministry of Housing and Urban Affairs, 2023). The Archaeological Survey of India (ASI) has tested AI-based ticketing and systems for managing visitor flow in some of the UNESCO World Heritage Sites, such as the complex of the Taj Mahal and Qutub Minar, with the twofold purpose of reducing the crowds and enhancing visitor satisfaction. The studies by Tiwari and Chaturvedi (2021) validated that the process and queuing time cuts associated with smart systems also led to significant overall tourist satisfaction ($\eta^2 = 0.31$), aligned with the service quality-satisfaction model initially proposed by Parasuraman et al. (1988).

AUGMENTED REALITY, VIRTUAL REALITY, AND IMMERSIVE TECHNOLOGIES

AI-enhanced AR and VR technologies are redefining tourist engagement with India's vast heritage and cultural assets. The Ministry of Tourism's "Incredible India" digital portal has incorporated AI-driven 3D virtual tours of major heritage attractions, enabling prospective tourists to conduct immersive pre-trip exploration that shapes expectations and reduces information asymmetry—both key antecedents of post-trip satisfaction (Tussyadiah et al., 2018). In-destination AR applications at sites such as Hampi in Karnataka and the Ellora Caves in Maharashtra overlay digitally reconstructed historical imagery onto physical ruins, substantially enriching interpretation and educational value. Jung et al. (2016) demonstrated that AR heritage applications produced a significant positive effect on visitor satisfaction and intent to recommend the destination ($\beta = 0.51, p < .001$). These immersive technologies are particularly impactful in aligning tourist expectations with actual experience, thereby reducing expectation disconfirmation and increasing satisfaction (Oliver, 1980).

THEORETICAL FRAMEWORK: AI CAPABILITIES AND TOURIST SATISFACTION

Tourist satisfaction is an evaluative and primarily multidimensional construct, which has its roots in the Expectation Disconfirmation Theory (EDT) of Oliver (1980), which states that satisfaction comes about when perceived service execution is found satisfactory or even better than expected, and lack of satisfaction is connected to unpleasant disconfirmation. Pizam and Milman (1993) further developed this intellectualisation to derive cognitive (performance evaluation based on rationality), affective (emotional reaction), and conative (behavioural intention) aspects of tourist satisfaction, a threefold conceptualisation which became very common in the future literature on tourism.

Satisfaction models have incorporated technology acceptance constructs respective to the Technology Acceptance Model (TAM; Davis, 1989) in the constructs of perceived usefulness and perceived ease of use. Perceived risk of privacy, perceived intelligence, perceived enjoyment, and perceived trust have become TAM-specific adaptations as pertinent antecedents linked with tourism (Kim et al., 2017; Gretzel, 2018). One of the synthesised theoretical pathways that appear on the basis of the literature review could be expressed as follows:

AI Capability (personalisation, responsiveness, intelligence) → Enhanced Perceived Service Quality → Expectation Confirmation → Tourist Satisfaction (Cognitive, Affective, Conative) → Behavioural Loyalty (Revisit Intention, Positive eWOM)

Very importantly, the Indian context puts a cultural restraint into this channel. According to the cultural dimensions theory developed by Hofstede (1980), the Indian society can be characterised by a fairly high-power distance, collectivism, and uncertainty avoidance, implying that Indian tourists can react to autonomous AI systems in diverse ways compared to tourists in individualist and low power distance societies. Verma and Sinha (2023) empirically proved the cultural orientation moderator role in the existent AI and satisfaction relationship among Indian tourists ($F(3, 412) = 6.87, p < .001$), noting that culturally adjusted AI service design in the Indian setting is necessary.

EMPIRICAL EVIDENCE: AI AND TOURIST SATISFACTION IN INDIA

Empirical evidence shows the constructive impact of AI-based services on tourist satisfaction at all three dimensions of satisfaction through convergent evidence in all three studies, especially in the Indian market and similar emerging markets. The relevant empirical studies have been summarised in Table 2 below with reference to their methodological profile and main results.

Table 2. Summary of Key Empirical Studies on AI and Tourist Satisfaction

Author(s) & Year	Study Focus	Sample / Context	Key Finding
Sharma & Singh (2022)	AI itinerary recommendation & trip planning satisfaction	n = 320 domestic tourists, India	Personalisation quality predicted satisfaction: $\beta = 0.47$, $p < .01$
Pillai & Sivathanu (2020)	Chatbot service quality & hotel guest satisfaction	n = 428 hotel guests, India	Chatbot quality correlated with satisfaction: $r = .62$, $p < .001$; empathy was strongest predictor ($\beta = 0.53$)
Mukherjee & Bhattacharyya (2022)	Sentiment analysis of heritage destination reviews	18,000 Trip Advisor reviews, Indian heritage sites	AI-enabled proactive service recovery reduced negative review intent by 34%
Tiwari & Chaturvedi (2021)	Smart infrastructure & visitor satisfaction at UNESCO sites	Heritage site visitors, India	Reduced wait times contributed to satisfaction: $\eta^2 = 0.31$
Verma & Sinha (2023)	Cultural moderation of AI adoption & tourist satisfaction	n = 412 tourists, India	Cultural orientation moderated AI–satisfaction link: $F(3, 412) = 6.87$, $p < .001$
Tran et al. (2023)	Meta-analysis: AI service quality & tourist satisfaction in Asia	41 studies, Asian tourism markets	Weighted avg effect: AI quality $\rightarrow$ satisfaction = .54; satisfaction $\rightarrow$ loyalty $r = .61$
Jung et al. (2016)	AR applications at heritage sites & visitor satisfaction	Heritage site visitors	AR significantly increased satisfaction & recommendation intent: $\beta = 0.51$, $p < .001$
Chung et al. (2020)	Chatbot intelligence perception & hotel guest engagement	Hotel guests	Perceived chatbot intelligence enhanced engagement & satisfaction scores

Regarding the cognition dimension, namely based on rational assessment of information quality, the quality of the service, and the efficiency of the transaction, Goel et al. (2021) have also discovered that tourists who use AI systems in recommendations will be much more satisfied ($M = 4.21$, $SD = 0.68$) with the quality of the information on the topic during planning of trips ($t(318) = 8$). The result is consistent with the existing literature about the connection between personalisation and perceived information relevance and cognitive satisfaction (Gretzel et al., 2020).

The most direct study has focused on affective satisfaction, which encompasses emotional valence of tourist experiences, with designers of chatbots and simulation of empathy. Interestingly, the results of Pillai and Sivathanu (2020), who found that perceived empathy had a greater influence on affective satisfaction (0.53), similar to functional accuracy (0.39) among Indian hotel guests, are especially theoretically relevant. It postulates that in high-context societies where the element of relational warmth is core to service assessment criteria, emotional AI design is not only auxiliary but also a core source of satisfaction. The results of the Chung et al. (2020) study also confirmed that the perceived chatbot intelligence increased the quality of interaction and led to an increase in the satisfaction rate, indicating the contribution of AI anthropomorphism to the development of affective satisfaction.

The conative aspect of satisfaction is reflected in behavioural outcomes underlying key results, which are revisit intention and positive electronic word-of-mouth (eWOM), and have direct commercial implications for the competitiveness of destinations. The meta-analysis by Tran et al. (2023), which summarised the results of an evidence-based study by 41 studies on Asian tourism markets, found a weighted average among Asian tourism markets evidence of the effect size of $r = .54$ between AI service quality and tourist satisfaction and $r = .61$ between tourist satisfaction and behavioural loyalty intentions. The moderating effects of digital literacy, service complexity, and cultural orientation were established, and it means that the relationships are not always equal but situation-specific.

BARRIERS TO AI ADOPTION IN INDIAN TOURISM

Despite the reported potential of AI to positively impact tourist satisfaction, there are a number of structural and contextual obstacles to the successful and fair application of AI in the Indian tourism ecosystem. These barriers are systematised, and their implications on tourist satisfaction are enumerated in Table 3

Table 3. Barriers to AI Adoption in Indian Tourism and Their Satisfaction Implications

Barrier Category	Description	Implication for Tourist Satisfaction
Digital Infrastructure Gap	Rural and Tier-3 tourism destinations lack broadband connectivity required for AI-intensive applications (NASSCOM, 2023)	Creates unequal satisfaction experiences between metropolitan and peripheral tourism destinations
Data Privacy & Regulatory Uncertainty	Digital Personal Data Protection Act (2023) introduces compliance obligations that constrain AI personalisation scope (Ministry of Electronics and IT, 2023)	Perceived privacy risk negatively moderates AI service satisfaction: $\beta = -0.29$ (Verma & Sinha, 2023)
Linguistic & Cultural Complexity	22 official languages and hundreds of dialects require extensive multilingual NLP corpora currently underdeveloped (Kumar & Nanda, 2019)	Chatbot failures in regional language comprehension generate frustration and lower satisfaction ratings
SME Capacity Constraints	Small and medium tourism enterprises lack technical expertise and financial resources for AI deployment and maintenance (Ministry of Tourism, 2023)	Quality inconsistency across the tourism supply chain undermines overall destination satisfaction
Low AI Literacy Among Tourists	Older demographics and first-time travellers find AI interfaces intimidating, reducing adoption rates	Non-adoption of AI services by certain segments may widen satisfaction gaps across tourist cohorts
Risk of De-humanisation	Over-automation may undermine the Atithi Devo Bhava (Guest is God) hospitality ethos valued in Indian culture (Pan et al., 2022)	Loss of human warmth may reduce affective satisfaction, particularly for high-context cultural tourists

The most impactful one is the digital infrastructure gap. Although cities with metropolitan tourism and Tier-1 cities enjoy high-bandwidth connectivity, destinations which are the most unique tourism assets in India, rural heritage circuit, eco-tourism reserves, and tribal cultural zones often remain under-equipped with technologies that can sustain AI-intensive applications like real-time AR, IoT-based smart management circuits, and cloud-dependent recommendation systems (NASSCOM, 2020). This geographic difference in AI viability poses the threat of establishing a two-level tourism satisfaction terrain where the technologically intermediated excellent experiences are likely to be centralised in the urban destinations that are available.

The second major obstacle is data privacy issues. The Digital Personal Data Protection Act (2023) of India has provided the organisations involved in processing the tourist data with new requirements, which introduces a justified uncertainty regarding the extent to which the personalisation algorithms that are based on high user profiling can be applied. Verma and Sinha (2023) empirically proved that the perceived privacy risk had a negative moderating effect on the relationship between the use of AI services and satisfaction ($\beta = -0.29, p < .01$), which validates the fact that data anxiety is not a mere theoretical concern but a lived experience determining how tourists react to AI.

The linguistic regionalism in India is a structural NLP problem with a direct implication of satisfaction. Training large language models which can be reliably trained on 22 official languages and their regional varieties needs training corpora of size and quality that is so far not available in the Indian languages outside of Hindi and English (Kumar and Nanda, 2019). The chatbots and voice assistants that misunderstand or cannot arrange the answers to the questions of the regional languages move to the ranks of satisfaction facilitators to dissatisfaction inductors.

DISCUSSION

Developing evidence in this review provides a number of insights into a larger picture. First, empirical literature thrives on the perpetuation of the suggestion that, under proper design and implementation, AI technologies will produce quantifiable and theoretically consistent enhancements in tourist satisfaction at cognitive, affective, and behavioural levels. The effect sizes of the studies reviewed are strength values of moderate to large size (r values of between .54 and .62), which denotes practical importance of substance beyond statistical threshold.

Second, the Indian setting creates unique moderating forces, in particular, cultural orientation, digital literacy and linguistic differentiation that makes a straight transposition of results in Western or East Asian tourism markets problematic. This philosophy of Indian hospitality, which includes a culturally established positive value of *Atithi Devo Bhava* (the guest is God-like), places a significant standard on the expectation of the personalised human warmth that AI systems cannot fully substitute but can only enhance and, possibly, complement. Lukanova and Ilieva (2019) warned against service robots and fully automated interfaces bringing in the gain of operational efficiency at the expense of the relational warmth core of the affective satisfaction in culturally specific settings like India.

Third, a commercially valuable area of potential AI-enhanced satisfaction is identified by the growing scientific evidence of AI-enabled proactive service recovery (Mukherjee and Bhattacharyya, 2022): not by ensuring optimal service provision but by identifying and remedying service failures in real-time before they become entrenched in negative feedback or complaints. The application will be of great relevance, especially in an era where online reputation management is a key factor that determines competition in the tourism destinations of India.

RESEARCH GAPS AND FUTURE DIRECTIONS

Although the reviewed literature has become more substantial, the literature has a number of critical gaps that are worth considering in the next round of academic studies. To begin with, longitudinal research designs are required to trace the dynamic development of satisfactions among tourists regarding AI services over time since newness, habituation and technological learning can significantly deviate satisfaction patterns across time as opposed to those in cross-sectional surveys. Second, an experimental and quasi-experimental design would be able to provide stronger causal inferences regarding the relationship between AI and satisfaction compared to the large existing evidence base, which is primarily correlation in nature. Third, a comparative research of the various tourism modes in India, including heritage, adventure, medical, rural, MICE, and spiritual tourism, would provide segment-that is, tourism segment-specific knowledge that can be used to apply specific strategies in AI implementation. Fourth, there has been little consideration of the views of frontline tourism employees on AI-related role change, which is a serious lacuna in capturing human aspects of AI co-creation in service provision. Fifth, ethical AIs auditing models specifically adapted to tourism contexts, in an ordered way balancing the benefits of personalisation with the harms of data privacy, will pose as an immediate policy-research priority in the framework of the developing India-based data protection legal basis.

CONCLUSION

This review has provided a syntactic overview of the available literature on the application of artificial intelligence to the tourism business in India, emphasizing how the application can affect tourist satisfaction. The reviewed evidence base proves that AI technologies are reorganising an Indian tourism scene throughout the entire value chain, including personalised pre-trip recommendation and multi-language conversational support, smart destination management, immersive AR heritage interpretation, and active service recovery. Well-planned, culture-specifically tuned and balanced technologies produce considerable gains in the cognitive, affective and behavioural aspects of tourist satisfaction.

Meanwhile, the review also highlights that the road to AI-boosted tourist satisfaction in India is not free of significant challenges. Digital inequities in infrastructure, privacy anxieties, NLP challenges in the linguistically diverse Indian context, capacity challenges with the SMEs, and the challenge of eroding the ethos of human hospitality that is dear to India are all challenges which require concerted effort on the behalf of government, industry, and researchers. There are distinct implications to the findings of this review: the implementation of AI in Indian tourism needs to be seen not only as a move to upgrade technology but as a comprehensive, anthropocentric approach to improving instead of overshadowing the unmatched amount of warmth and cultural diversity that make India a tourism destination.

Further studies with the implementation of longitudinal, experimental, and culturally sensitive designs will be invaluable to enrich the evidence base and steer AI usage towards achieving the most favourable results for tourists, businesses, and destination communities.

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