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ARTIFICIAL INTELLIGENCE IN ENHANCING TRAVEL ASSISTANCE AND CUSTOMER EXPERIENCE: INSIGHTS FROM THE TOURISM INDUSTRY IN NORTHERN PAKISTAN

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Abstract

The integration of smart technologies is transforming the travel and tourism industry by improving customer experience with innovative solutions. Faster, more convenient, and more satisfying support is now possible through tools such as chatbots, virtual assistants, and tailored processes. This paper examines how these technology-enabled solutions affect visitors to Gilgit, Hunza, and Skardu, three major destinations in northern Pakistan. Using SmartPLS structural equation modelling (SEM), multivariate analysis of 300 tourists investigates the relationship between key factors including personalization, service convenience, trust, real-time assistance, perceived value, customer satisfaction, and intention to adopt technology-driven tools. Guided by the Technology Acceptance Model (TAM), the results highlight the central importance of perceived usefulness and simplicity of use in building trust, improving customer satisfaction, and raising adoption intent. Beyond global trends, this study shows how technology can help overcome local

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challenges such as unstable connectivity, limited infrastructure, and service gaps in remote regions. The paper offers practical recommendations for tourism stakeholders and points to new directions for future research on technology adoption in developing countries.

Keywords: Technology Acceptance Model (TAM), Artificial Intelligence, Tourism in Pakistan, Tourism Experience, AI-Powered Travel Assistance, Customer Satisfaction.

1. Introduction

Fast-moving technology now shapes the way people travel the world, changing everything from booking flights to checking into hotels (Leung, 2020). Among the new tools, artificial intelligence (AI) shines because it turns heaps of customer data into useful, easy-to-read tips for guests and travel professionals alike (Abdulghani et al., 2024). Airports, cruise lines, and resorts that add AI to their systems see smoother operations and a fresh way for visitors to connect with services. Chatbots, virtual concierges, and smart recommendation pages no longer feel like novelties; they are part of the everyday travel toolkit for people who want quick, customized help no matter where they are, day or night (Manohar et al., 2024).

AI is no longer fresh news in business; in fact, its rise has been a steady wave of new ideas (Khan, Gul, et al., 2024). Early on, companies used simple AI to book flights and handle reservations so that people did not have to type the same details over and over. Now, tools like machine learning, natural language processing, and big data allow firms to predict trends, understand customers deeply, and solve questions almost instantly (Nannelli et al., 2023). These breakthroughs fit a global race in tourism, where hotels, airlines, and towns try to stand out by delivering an unforgettable guest experience (Wu et al., 2023). Yet, most existing studies have been conducted in developed economies, leaving a clear research gap about how AI functions in resource-constrained tourism markets like Pakistan. This paper steps in to fill that gap

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by examining how smart technology can enhance trips in Gilgit, Hunza, and Skardu.

In Pakistan, the travel industry has struggled for years due to poor roads, changing politics, and unreliable internet. Now, artificial intelligence could help address these problems and pave the way for steady growth. Most research so far (Abbass et al., 2022; Khawaja et al., 2022; Tafazal Kumail et al., 2023; Rehman et al., 2022) has looked at how AI has shaped tourism around the world, but only a little work has focused on its use in Northern Pakistan. This lack of local empirical evidence represents the novelty of this study, as it responds directly to an underexplored context with high tourism potential but unique structural constraints.

Customer experience is key to success in travel. When companies use AI that quickly learns a passenger's likes and dislikes, the results can feel almost magical (Buhalis & Moldavska, 2022). Behind the scenes, smart algorithms sift through vast data sets and suggest the perfect destination, hotel, or tour. This kind of tailored service not only leaves guests smiling, it also turns first-time buyers into loyal regulars who keep coming back (Abdulghani et al., 2024; Wahbi et al., 2023). Even more importantly, always-on AI answers questions and resolves issues that traditional desks could only handle during office hours. A traveller arriving in a strange city at 2 a.m. still deserves real-time help, and that is exactly what smart bots provide (Dang et al., 2023). By linking these benefits to the remote tourism landscape of northern pakistan, this study contributes significant practical insights for local operators who struggle with service gaps.

In Pakistan's northern valleys, including Gilgit, Hunza, and Skardu, a little extra intelligence could change the whole holiday game. Travellers flock to these regions for glaciers, peaks, and crystal-clear lakes, yet roads often close, buses run late, and connectivity drops out (Baig et al., 2024). AI solutions such as location-sensitive apps and friendly chatbots that report live weather and traffic updates can smooth those bumps. By providing visitors

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with the answers they need before they ask, local tourism could go from frustrating to fantastic in just a few taps.

AI technology is helping travel companies offer smoother, more personal services by adding language guides and local content, even when customers come from different cultures (Dwivedi et al., 2024). Davis's Technology Acceptance Model, or TAM, still works for determining whether people will actually use new tools, so its ideas guide this study (Fouad et al., 2024). For holidaymakers, the "gain" in TAM manifests as saved time and quicker answers that AI apps provide, while "ease of use" points to simple, clean screens that everyone, even those who rarely touch a gadget, can manage (Mollah & Sebata, 2022). Testing tam in this region is significant because it allows a theoretical model, well-established globally, to be validated in a developing country tourism setting.

Yet nobody has looked closely at how Pakistan's travellers feel about AI in airports, hotels, or tour shops. By testing TAM in this context, this project will map local tourists' thoughts, habits, and attitudes towards smart screens and chatbots, while also seeing how trust, strong leadership, and clear structure facilitate or hinder the success of technology within travel firms.

A growing collection of studies explores how artificial intelligence has begun reshaping tourism and hospitality services around the world. In one example, hotel guests report greater trust when booking experiences tailored by AI-driven recommendations (Khan, Gul, et al., 2024). Similarly, virtual travel assistants powered by smart algorithms have been linked to higher customer satisfaction and smoother journeys (Khalaf et al., 2024). Most of this research, however, comes from regions where robust internet infrastructure and clear technology road maps support rapid AI adoption. As Rawal et al. (2023) point out, those same findings demand local adjustments before they can guide operators in less-connected markets. This study therefore responds to a critical research gap by translating global knowledge

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into a developing economy context, making its contribution both academically and practically relevant.

Such contextual hurdles are especially pronounced in Pakistan, where the national economy still grapples with systemic bottlenecks. Karim et al. (2023) have observed that many remote districts lag behind, leaving hotels and small tour companies unable to deploy even basic digital tools, let alone advanced AI. In parallel, Mollah and Sebata highlight a patchwork culture of devices and operating systems, which often forces managers to adopt a cautious, trial-and-error rollout rather than an aggressive national strategy. Because of these barriers, insights drawn from Europe or North America should supplement, not substitute, home-grown research that accounts for Pakistan's unique technological and social landscape.

Pakistan's northern areas - Gilgit, Hunza, and Skardu - rank among the country's busiest travel spots, pulling in thousands of visitors each season (Kumail et al., 2023). Travellers flock here for jaw-dropping scenery, vibrant culture, and non-stop adventure activities. Yet the region's full potential remains untapped, mainly because broken roads, uneven service, and slow access to up-to-date travel info keep tourists on edge (Abbasi et al., 2024).

This is where smart tech steps in. AI-powered gadgets, from chatbots to handheld robots, can fix small-scale issues like guide booking, room occupancy, and even basic first aid on the spot (Abbasi et al., 2024). Weather-predicting tools boost safety by alerting hikers to storms early, so everyone can adjust plans without panic. Perhaps the biggest win is reliability: AI works round-the-clock in valleys and peaks where human help is still hours away (Baig et al., 2024). On top of that, local shops benefit, too, as user data highlight popular products and peak spending times, letting owners meet tourist needs right away. This emphasizes the study’s significance, as it shows how AI can directly improve service reliability and local economic participation.

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Research Objectives and Scope

This study aims to investigate the use of tourism technology in the Northern region of Pakistan and its impact on consumers. It specifically aims to:

a. Identify the key factors influencing the adoption of smart devices by tourists.
b. Analyze the relationship between these factors and overall customer satisfaction.
c. Examine the role of AI-driven solutions in fostering stakeholder collaboration and addressing regional challenges in Pakistan's tourism sector.
d. Provide practical insights to overcome the challenges of artificial intelligence implementation and application in tourist destinations in Pakistan.

Additionally, this work demonstrates the interaction between global technology and local realities, highlighting the need for local processes for smart technology adoption.

2. Literature Review

2.1 Introduction to Artificial Intelligence in Tourism

Artificial Intelligence (AI) sits at the heart of travel innovation today, reshaping how people book trips and how companies serve them (Saydam et al., 2022). Hotels, airlines, and local guides now tap AI to boost guest satisfaction, trim costs, and fine-tune offerings based on real-time traveler behavior. Smart chatbots, virtual concierges, predictive sales reports, and personalized suggestion engines already show how tailored, data-driven services can speed up bookings and sharpen decision-making (Sjukriana et al., 2024). Given these gains, the present study explores AI's role in tourism, the hurdles organizations face when adopting it, and the fresh chances it brings to emerging markets, with Pakistan's landscape as the key example.

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Adding artificial intelligence to travel operations does two big things: it makes customers happier and helps businesses run more smoothly (Abdulghani et al., 2024). Companies use tailored service, smart predictions, and quick responses to turn every journey into a simple and enjoyable adventure (Camilleri et al., 2023). Think of a chatbot that remembers a traveller likes window seats and automatically suggests the best flights; that small touch builds trust and keeps people coming back (Chaturvedi et al., 2023). Such innovations matter even more in Pakistan, where officials want to fix outdated infrastructure and welcome local holidaymakers alongside international guests. Yet, research on using AI in the country's tourism sector, at least for these aims, still lags behind the global picture.

2.2 Theoretical Foundations: Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) helps businesses determine why employees choose or refuse to use new AI tools every day (Bayır et al., 2024). Davis's original framework, introduced back in 1989, attributes most of that choice to two simple ideas: how useful technology feels and how easy it appears to be mastered (I. Ali & Warraich, 2024). More recent tests carried out in tourism (I. Ali & Warraich, 2024; Bayır et al., 2024; Noor, 2024) show that TAM's core ideas still hold and can guide managers rolling out AI across hotels, travel apps, and restaurants.

2.2.1. Perceived Usefulness and Ease of Use

Perceived usefulness (PU) and perceived ease of use (PEOU) play key roles in how travellers welcome artificial intelligence into their journeys (I. Ali & Warraich, 2024). PU looks at whether AI can quickly answer questions, predict travel hiccups, and give tips that feel personal, showing customers that the technology meets their needs. PEOU, on the other hand, asks whether chatbots, voice assistants, and smart apps are simple to access and enjoyable to use, so travellers do not have to struggle just to open the feature (Sjukriana et al., 2024).

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When both PU and PEOU score high, airlines, hotels, and agencies can be sure their AI tools will resonate with different types of passengers. By integrating user-centered design into every step, liberalising booking flows for seniors, allowing business travelers to scan receipts by photo, or providing tourists with real-time language assistance, applied technology can transform cutting-edge ideas into everyday comfort, linking innovation directly to the way people move around the globe (Chaturvedi et al., 2023).

2.2.2. Transformative Role of AI in Tourism

Artificial intelligence (AI) is changing how travel companies connect with customers and run their day-to-day operations. New tools like personalised recommendations, round-the-clock chat support, and smart forecasting help firms work faster and keep guests happier (Black, 2024). For example, by using past booking data and search habits, businesses can send customised deals that match each traveller's taste, which boosts loyalty and positive word-of-mouth (Chen et al., 2024). In Pakistan, where delays and unclear schedules often frustrate visitors, AI-powered apps recommend the best routes, hotels, and even local guides, helping every trip run more smoothly (Zhong et al., 2022).

Live chatbots and voice assistants give real-time answers to questions about flights, baggage rules, or weather patterns, a big relief for people touring remote corners of the country like Gilgit and Skardu (Kumail et al., 2023). On a larger scale, predictive analytics track patterns in bookings, cancellations, and even social media buzz; this data lets companies fine-tune pricing, schedule extra shuttles, or launch promotions just when demand spikes, all of which lift guest satisfaction and shrink wasted resources (Buhalis & Moldavska, 2022).

2.2.3. Challenges and Opportunities in AI Adoption

Even with promising benefits, developing economies still wrestle with several roadblocks that slow AI use in travel, something local authorities must tackle if the sector is to grow. First, low digital know-how leaves many users and

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agents puzzled, so hands-on workshops and clear online guides need to come before flashy tech (Rasheed et al., 2024). Second, patchy phone signals and drop-out Wi-Fi in northern Pakistan hinder bookings and real-time updates, so government and private firms should pool funds to lay sturdier cables and share mobile towers (Arif, 2019). Third, fears over leaked profiles or biased pricing operate as silent brakes; firms must build transparent data rules, audit their algorithms, and keep customers in the loop if they wish to gain trust and treat all travelers fairly.

Filling these gaps also opens the door for innovative programmes, such as chatbots that speak Urdu or local dialects and tourism sites that reflect regional cultures, making AI feel useful rather than foreign. By solving practical flaws while building smart, locally tuned solutions, authorities can clear the runway for AI tools that boost reservations, improve guides long before the next tour season arrives (Khan, Khan, et al., 2024).

2.3 Global Studies on AI in Tourism

Travel brands around the world now use artificial intelligence to answer hundreds of guest questions every hour and keep their operations running smoothly. Reports show that round-the-clock chatbots lower wait times, kick in when systems go down, and save staff from answering the same basic questions over and over (Rana et al., 2022). During booking, these digital helpers suggest flights, hotels, and activities, making travel planning faster and adding a personal touch that many guests appreciate (Camilleri et al., 2023). Chaturvedi et al. (2023) even argue that smart, tailored messages at check-in can turn first-time visitors into repeat loyalists. Mondal et al. (2023) support this by showing that data-driven insights boost hotel marketing, keeping guests more engaged and ultimately happier.

On a broader scale, A.I. tools now scan customer reviews in seconds, revealing how culture-savvy services can make or break a stay, a key insight in global hospitality (Fouad et al., 2024). Yet tougher questions about privacy, bias in A.I. models, and whether guests truly trust these systems remain

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mostly unexamined, especially in Pakistan (Ali et al., 2024). Filling that gap could show industry leaders how local attitudes shape A.I. rollout, steering future projects and policies toward safer, fairer technology. Taking the time to look into these problems will give us a clearer picture of what A.I. really means for the area as a whole.

2.4 AI and Tourism in Pakistan

Pakistan is home to breathtaking scenery and a deep cultural past, and nowhere is that clearer than in the north, in spots like Gilgit, Hunza, and Skardu. Still, the tourist experience often gets hampered by shaky roads, limited accommodation options, and slow, scattered information (Kumail et al., 2023). Artificial Intelligence steps in here, offering smart, low-cost fixes that fit the region's unique strengths and hurdles (Ali et al., 2024). Early tests show that tools like chatbots and virtual guides already ease booking headaches, answer questions at night, and serve travel tips that feel personal (Gursoy & Cai, 2024).

Push a bit deeper and you find that AI-powered weather alerts, crowd forecasts, and route suggestions work together to keep a holiday on schedule and even save fuel (Khalaf et al., 2024). Academics often turn to the Technology Acceptance Model, or TAM, when asking why new gadgets catch on, but in Pakistan that lens still needs local testing. Trust in mobile apps, the sense that they really help, and a simple interface add up to the yardstick by which travellers will welcome, or shrug off, AI, and those pieces are under study right now (Rasheed et al., 2024).

2.5 Critique of Previous Studies

Most research about artificial intelligence keeps circling business growth in general, leaving tourism development in the slow lane (Wahbi et al., 2023). Even studies that look beyond hotels and online booking still overlook the one-of-a-kind problems and opportunities Pakistan's travel industry faces as a developing South Asian country. On top of that, past papers have praised AI's promise while barely touching its drawbacks, like the gap in local know-how

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and how that gap changes day-to-day tourism practices across less-developed places.

The same limited view shows up when scholars talk about AI's long-term effects in Pakistan. What is truly needed now are studies that run over months or even years to track how adopting AI reshapes customer loyalty, satisfaction, and trust (Khan et al., 2024). At the same time, there is hardly any work comparing how AI impacts travel and culture-specific plans around different regions. Side-by-side insight would help tailor these plans so that local businesses speak directly to the tastes and hopes of guests wherever they land (Baig et al., 2024). Filling in these blanks could give researchers, and, in turn, policy makers, a clearer picture of how AI might steer Pakistan's tourism tomorrow and guide other nations along a similar path.

2.6 Research Gaps and Opportunities

This study steps in where earlier research leaves off by looking at how artificial intelligence affects tourism in northern Pakistan's Gilgit, Hunza, and Skardu areas. By doing so, it shows policymakers and local businesses practical ways that AI tools can make visitors feel more welcome and satisfied. It also tests the Technology Acceptance Model, or TAM theory, giving scholars a fresh view of how technology is received in Pakistan. Still, putting these ideas to work demands a close reading of local realities, from shaky internet links to regional customs and the preferences of today's traveller. Overall, the review underlines that further study is needed if the full power of AI is to drive sustainable growth in Pakistan's tourism sector.

3. Materials and Methods

This study employed a quantitative research design to investigate how AI travel tools influence customer experiences in the northern tourist destinations of Gilgit, Hunza, and Skardu. The design combined descriptive and explanatory approaches, enabling an exploration of the relationships between AI-enabled features such as personalization, service convenience, trust, and real-time assistance, and key outcomes including customer

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satisfaction, perceived value, and intention to adopt. The Technology Acceptance Model (TAM) served as the guiding theoretical framework, as it explains the drivers behind users' acceptance or rejection of new technologies.

The population of interest included both domestic and international tourists visiting the selected destinations. These areas were deliberately chosen because, while they are among the most visited in Pakistan, they continue to face infrastructural and economic challenges, making them a suitable context to study technology adoption in tourism. Using a convenience sampling method, a total of 300 respondents were surveyed, ensuring a diverse mix of age, gender, ethnicity, and travel frequency.

Data were collected through a structured questionnaire administered onsite in both paper-based and electronic formats with assistance from local municipality and tourism offices. The instrument was adapted from established studies to maintain reliability and validity while being modified to fit the local tourism context. The questionnaire consisted of two parts: demographic details and TAM-based constructs, including personalization, service convenience, trust in AI, real-time assistance, customer satisfaction, perceived value, and intention to adopt AI-driven tools. All items were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

The survey instrument used in this study was divided into two sections. The first section collected demographic information, including age, gender, ethnicity, travel frequency, and familiarity with AI tools. The second section focused on the key constructs derived from the Technology Acceptance Model (TAM) and related literature. These constructs included personalization, which referred to customized AI strategies designed to enhance user experience; service convenience, which measured the ease and efficiency of using AI tools; trust in AI, reflecting confidence in the reliability and security of AI-based systems; and real-time assistance, which captured the responsiveness of AI-powered technologies in providing immediate support.

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In addition, the survey assessed customer satisfaction as the overall evaluation of AI usage, perceived value as the balance between benefits and costs of AI solutions, and intention to use AI, which represented the likelihood of adopting AI-driven travel assistance in the future. To ensure clarity and alignment with prior studies, a comprehensive table (Table 1) was included to present the constructs, sample items, and their supporting references systematically.

Table 1: ***Instruments***

Construct	Sample Items	Article
Personalization	The AI system provides recommendations that match my preferences. I feel that the AI system understands my individual needs. The suggestions offered by the AI are tailored to my interests. The AI system personalizes its services to suit my requirements.	*An empirical evaluation of technology acceptance model for Artificial Intelligence in E-commerce (Wang et al., 2001).*
Service Convenience	Using the AI tool makes completing tasks more convenient.	*AI technology and online purchase intention: Multi-group analysis based on perceived*

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	The AI system simplifies the process of obtaining information. I find it easy to use the AI services provided. The AI tool enhances the efficiency of my interactions.	*value (Yin & Qiu, 2021).*
Trust in AI	I trust the AI system to act in my best interest. The AI technology is reliable in providing accurate information. I feel secure when using the AI services offered. The AI system is dependable in its performance.	*Trust in AI and its role in the acceptance of AI technologies (Choung et al., 2023).*
Real-Time Assistance	The AI system provides immediate responses to my inquiries. I receive prompt assistance from the AI tool when needed.	*Artificial intelligence (AI): revolutionizing digital marketing (van Esch & Stewart Black, 2021).*

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	The AI service addresses my concerns in real-time. I can rely on the AI system for quick support.	
Customer Satisfaction	I am satisfied with the AI services provided. The AI system meets my expectations. My experience with the AI tool has been positive. I am happy with the performance of the AI system.	*Unveiling the Impact of AI-Powered Chatbots on Customer Acceptance in Sweden (Granlund et al., 2024).*
Perceived Value	The AI service offers good value for the cost involved. I find the benefits of using the AI system to be worthwhile. The AI tool provides value that justifies any expenses incurred. Using the AI service is a valuable experience considering the cost.	*Perceived value of AI-based recommendations service: the case of voice assistants (Akdim et al., 2023).*

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Intention to Use AI	I intend to use AI-driven travel assistance in the future. I will consider adopting AI tools for my travel planning. I am likely to use AI-based travel assistance services. I plan to utilize AI technology for my travel needs.	*The use of a technology acceptance model (TAM) to predict patients' usage of a personal health record system: the role of security, privacy, and usability (Mostafa et al., 2023).*

All constructs were measured on a **5-point Likert scale** (1 = strongly disagree, 5 = strongly agree).

4. Findings and Analysis

4.1 Measurement Model Evaluation

Reliability and validity were tested for personalization, service convenience, trust in AI, real-time assistance, customer satisfaction, perceived value, and intention to adopt AI-driven solutions.

Table 2: ***Measurement Model Results***

Construct	Indicator	Factor Loading	Cronbach's Alpha	CR	AVE
Personalization	PER1	0.81	0.88	0.91	0.72
	PER2	0.84			
	PER3	0.86			
	PER4	0.83			
Service	SC1	0.82	0.89	0.92	0.73

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Construct	Indicator	Factor Loading	Cronbach's Alpha	CR	AVE
Convenience					
	SC2	0.85			
	SC3	0.80			
	SC4	0.83			
Trust in AI	TAI1	0.86	0.90	0.93	0.75
	TAI2	0.87			
	TAI3	0.85			
	TAI4	0.84			
Real-Time Assistance	RTA1	0.81	0.87	0.90	0.70
	RTA2	0.82			
	RTA3	0.80			
	RTA4	0.83			

Table 2 presents the results of the measurement model assessment. All constructs demonstrated strong reliability and validity, as indicated by factor loadings above the recommended threshold of 0.70 (Hair et al., 2019). Cronbach's alpha values ranged from 0.87 to 0.90, and composite reliability (CR) values ranged from 0.90 to 0.93, both exceeding the acceptable benchmark of 0.70, confirming internal consistency (Fornell & Larcker, 1981). Furthermore, the average variance extracted (AVE) values for all constructs were above 0.70, surpassing the minimum requirement of 0.50, which indicates adequate convergent validity (Chin, 1998). These results suggest that the constructs, personalization, service convenience, trust in AI, and real-time assistance, were measured with satisfactory reliability and validity, providing a solid foundation for further structural model analysis.

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Table 3 reports the model fit indicators, which demonstrate that the structural model meets recommended benchmarks. The R^2 values for customer satisfaction (0.68) and intention to adopt (0.73) exceed the minimum threshold of 0.25 (Cohen, 1988), indicating substantial explanatory power. The standardized root means square residual (SRMR) value of 0.046 is below the recommended cut-off of 0.08 (Hu & Bentler, 1999), confirming a good model fit. Furthermore, the Q^2 predictive relevance value of 0.52 is greater than zero, demonstrating strong predictive accuracy (Hair et al., 2019). Collectively, these indicators confirm that the model is both reliable and valid for explaining AI adoption in the tourism context.

Table 3: ***Model Fit Indicators***

Indicator	Value	Threshold
R^2 (Satisfaction)	0.68	≥0.25
R^2 (Intention to Adopt)	0.73	≥0.25
SRMR	0.046	≤0.08
Q^2 Predictive Relevance	0.52	>0

4.2 Structural Model Evaluation

Path coefficients, t-values, and R^2 values were computed to assess the structural model. Table 4 summarizes the structural model results and hypothesis testing. All hypothesized relationships were found to be positive and statistically significant at the $p < 0.001$ level. Personalization ($\beta = 0.32$, $t = 5.25$), service convenience ($\beta = 0.29$, $t = 4.92$), trust in AI ($\beta = 0.28$, $t = 4.78$), and real-time assistance ($\beta = 0.31$, $t = 5.10$) each had a significant effect on customer satisfaction. In turn, customer satisfaction significantly influenced intention to adopt AI-driven travel tools ($\beta = 0.35$, $t = 5.72$). These findings confirm the robustness of the proposed model and align with prior TAM-based studies, which emphasize the central role of perceived usefulness and ease of use in shaping satisfaction and adoption behaviors (Davis, 1989; Venkatesh & Davis, 2000; Hair et al., 2019). Reviewing the data, the ratings

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proved steady, and teammates agreed. When comparing factors, personalization, service ease, trust in AI, instant support, satisfaction, added value, and intent to use AI programmes stood out. Even product satisfaction mattered for a traveler wanting more AI features. Strong fits in the models reassure everyone that the results are solid. These insights underline how AI-rich travel services can lift user experience and gain fans in tourism. Also the results highlight that AI features enhancing convenience, personalization, and trust directly contribute to greater satisfaction, which then drives tourists' willingness to adopt AI technologies.

Table 4: ***Structural Model Results***

Path	Path Coefficient (β)	T-value	P-value	Result
Personalization → Satisfaction	0.32	5.25	<0.001	Supported
Service Convenience → Satisfaction	0.29	4.92	<0.001	Supported
Trust in AI → Satisfaction	0.28	4.78	<0.001	Supported
Real-Time Assistance → Satisfaction	0.31	5.10	<0.001	Supported
Satisfaction → Intention to Adopt	0.35	5.72	<0.001	Supported

5. Discussion

Artificial intelligence (AI) is changing the travel industry by making customer service faster, smarter, and more personal. In the northern districts of Pakistan - Gilgit, Hunza, and Skardu - a study looks at what helps or hinders travelers and businesses in using AI travel tools. Guided by the Technology Acceptance Model (TAM), researchers focused on seven ideas: how well services are tailored (personalization), how easy they are to reach (convenience), faith in smart systems (trust), help that arrives in minutes

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(real-time support), overall happiness (satisfaction), added worth travelers see (perceived value), and the willingness to choose these tools again (adoption intent). In the full report, the team lines up its results with earlier studies, shares practical tips for hotels, guides, and app makers, notes what the research could not cover, and maps out where new questions still await answers.

5.1 Alignment with the Technology Acceptance Model (TAM)

The findings support the applicability of TAM in understanding the use of AI in business. According to this model, perceived usefulness and perceived ease of use appear to be important factors in tourists' behavior towards using AI tools. Self-service and immediacy (mainly perceived usefulness) are shown to be the key drivers of customer satisfaction and trust in AI technology. This is consistent with our results, where satisfaction explained 68% of variance ($r^2 = 0.68$) and strongly predicted intention to adopt ai ($\beta = 0.35$, $p < 0.001$). These findings are consistent with TAM theory and extend its relevance to Pakistan's cultural identity and infrastructure.

5.2 Personalization and Service Convenience

Personal change is thought to be a key determinant of customer satisfaction, supporting the claim that appropriate recommendations can improve travel. This is consistent with international research (Wang et al., 2021), which emphasizes the importance of AI-driven reforms in commitment to fairness and resilience. In the northern region of Pakistan, where tourists often face transportation challenges, the ability of AI tools to provide location-specific recommendations and popular suggestions is proving to be an advantage. Our data confirmed this relationship, as personalization ($\beta = 0.32$, $p < 0.001$) and service convenience ($\beta = 0.29$, $p < 0.001$) both showed significant effects on satisfaction. Ease of service appears to be another important variable that moderates the relationship between AI adoption and customer satisfaction. Visitors agree that AI tools should not be disruptive, especially in remote areas where human assistance is available.

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5.3 Trust in AI and Real-Time Assistance

Trust has become a major factor influencing the use of smart devices. Studies show that tourists trust AI solutions when they are reliable, secure, and transparent. Existing aids are particularly valuable due to their ability to address urgent problems and improve decision-making processes. These findings echo previous research (e.g. Gretzel et al., 2020) that emphasizes the role of immediate solutions in building trust and satisfaction. Our results further support this, as trust in ai ($\beta = 0.28$, $p < 0.001$) and real-time assistance ($\beta = 0.31$, $p < 0.001$) were both significant predictors of satisfaction, highlighting their practical importance in tourism services.

5.4 Customer Satisfaction, Perceived Value, and Behavioral Intentions

The study found that customer satisfaction and perceived value are significant determinants of tourists' willingness to adopt AI solutions. Interest is closely related to the quality and impact of AI services, while perceived value includes both the functionality and needs provided by AI technology. These findings echo the work of Akdim et al. (2023), who demonstrated the role of interest and perceived value in driving technology use. In line with this, our structural model showed that satisfaction was the strongest driver of intention to adopt ($\beta = 0.35$, $p < 0.001$), while the high r^2 value for intention to adopt (0.73) confirms that satisfied tourists are highly likely to embrace ai tools in future travel.

5.5 Contextual Challenges and Opportunities

While the findings align with global trends, they also highlight the unique challenges facing Pakistan. Low digital literacy, unreliable internet connections, and poor infrastructure in remote areas are significant barriers to the effectiveness of AI solutions. But these challenges also present opportunities for intervention. For example, AI tools that provide support for multiple languages and cultural contexts can improve accessibility and inclusion. Collaboration between government agencies, private organizations,

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and local communities can also address infrastructure challenges and ensure stable economic development. Our results suggest that despite these obstacles, ai still demonstrates strong predictive power (q^2 = 0.52), indicating that tourists see value in these tools even under resource-constrained conditions. This makes northern Pakistan an ideal testbed for practical and policy interventions.

6. Conclusion

This study highlights the transformative potential of AI technology to enhance and redefine tourism experiences in northern Pakistan. The study provides valuable insights for stakeholders by identifying key factors influencing the adoption and effectiveness of AI-driven travel assistance. The findings emphasize the critical importance of personalization, convenient service, reliability, and prompt support in improving customer satisfaction and driving future adoption. Guided by the Technology Acceptance Model (TAM), the research combines theoretical knowledge with practical applications to provide a better understanding of the role of AI in evolving tourism research. In doing so, it offers both academic contributions, by extending tam to a developing country context, and practical implications, by showing how ai can help overcome infrastructure limitations and service gaps in remote destinations.

Implications

Practical Implications

The positive results of this study provide important insights for multiple stakeholders in the tourism industry of Northern Pakistan. The findings show that personalization, service convenience, trust, and real-time support significantly influence customer satisfaction, which in turn shapes tourists' willingness to adopt new travel technologies. This highlights the need for service providers, such as hotels, transport operators, and tour agencies, to prioritize digital tools that deliver instant updates, multilingual support, and location-specific recommendations, ensuring travelers' needs are met quickly

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and effectively. Policymakers are urged to strengthen digital infrastructure and promote capacity-building programs, especially in remote areas, so that tourists can reliably access these tools despite current connectivity limitations. Such investments will not only bridge service gaps but also create a more inclusive and competitive tourism economy. For local businesses, the study demonstrates how customer behavior data can be harnessed to improve marketing strategies, optimize resource allocation, and increase overall service reliability. By aligning technological solutions with cultural and geographic needs, tourism operators can enhance visitor satisfaction and stimulate sustainable growth in destinations such as Gilgit, Hunza, and Skardu.

Theoretical Implications

Theoretically, this study advances the Technology Acceptance Model (TAM) by validating it in the underexplored context of Northern Pakistan's tourism industry. While TAM has been widely tested in developed economies, its application in regions with infrastructural constraints remains limited. This study's novelty lies in extending tam to a developing country tourism setting, showing that perceived usefulness and ease of use remain critical even under conditions of unstable connectivity and low digital literacy. The results confirm that customer satisfaction acts as a key mediator linking personalization, convenience, trust, and real-time support to adoption intention. This provides a richer understanding of how tourists interact with smart technologies in resource-constrained environments and fills a gap in existing scholarship, which has largely overlooked Pakistan. Furthermore, the findings open pathways for future research by emphasizing the need for cross-cultural validation of TAM, longitudinal studies tracking changes in adoption behavior over time, and exploration of how infrastructural improvements might strengthen the model's predictive power.

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Limitations and Future Research

This study has several limitations. Its focus on northern Pakistan restricts the findings' applicability to other regions and cultural contexts, as the area's unique infrastructure and tourism dynamics differ significantly from international travel markets. Additionally, the sample, comprising tourists visiting specific destinations, may not represent diverse cultural and demographic profiles. The cross-sectional design limits the ability to analyze behavioral changes, satisfaction, and performance over time. Furthermore, variations in the quality and functionality of AI solutions from different vendors, which influence user perceptions and experiences, were not thoroughly examined. Future research should explore cross-cultural and longitudinal studies, inclusive AI design, and policy implications to enhance understanding and global applicability of AI-driven solutions in tourism.

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