



Artificial Intelligence and Sustainable Tourism: Assessing Environmental Awareness, Technological Readiness, and Risk Perception in Northern Pakistan

Tehmina Aziz¹, Muhammad Temoor Roaf² & Sayyid
Kamran Hussain³

Author's Affiliation:

¹Doctoral student, School of Integrated Climate and Earth System Sciences (SICSS), University of Hamburg, Germany.

²Research Assistant, Department of Tourism, College of Management, Ocean University of China, Qingdao, China.

³Department of Computer Science, Times institute Multan, Pakistan.

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Corresponding author(s):

Tehmina Aziz

Email:

tehmينا.aziz@studium.uni-hamburg.de

Co-author(s) Email:

Muhammad Temoor Roaf

Temoor225@gmail.com

Sayyid Kamran Hussain

Kamranshah.092@gmail.com

Abstract

Purpose— As global tourism evolves toward sustainability; the integration of artificial intelligence (AI) offers innovative pathways to promote environmentally responsible tourist behavior. This study investigates how environmental awareness, technological readiness, and ecological risk perception influence sustainable tourist behavior, with the mediating role of AI-driven environmental engagement. Grounded in environmental sociology and supported by the Technology Acceptance and Theory of Planned Behavior frameworks, this research bridges environmental science and digital transformation in tourism.

Study Design/methodology/approach— The target population comprises domestic and international tourists visiting ecologically sensitive regions of Northern Pakistan, including Hunza Valley, Skardu, Gilgit, and Naran-Kaghan. A total of 450 responses were collected via structured online surveys using purposive sampling. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM).

Findings— Results indicate that environmental awareness, technological readiness, and ecological risk perception significantly enhance sustainable tourist behavior, both directly and indirectly through increased engagement with AI-based tools such as smart environmental alerts, carbon footprint calculators, and digital eco-guides.

Research Practical Implications— This study contributes to theory by integrating AI-driven engagement as a sociotechnical mediator in sustainable tourism behavior and offers practical implications for environmental policymakers, tourism authorities, and tech developers seeking to promote eco-conscious tourism in fragile ecosystems.

Originality/value— This study contributes to theory by integrating AI-driven engagement as a sociotechnical mediator in sustainable tourism behavior and bridges environmental science and digital transformation in tourism.

Keywords: Sustainable Tourism, Environmental Awareness, Technological Readiness, Ecological Risk Perception, AI-Driven Engagement

1 | INTRODUCTION

The current research adds empirical data to the body of research on sustainable tourism by showing the direct and indirect effects of environmental awareness, technological preparedness, and the ecological risk perception on pro-environmental tourist behaviors. The results confirm the assumptions of the Theory of Planned Behavior and the Technology Acceptance Model. In particular, increased environmental knowledge and beliefs of ecosystem vulnerability are linked to a higher propensity to engage in sustainable behaviors, including plastic reduction, reserving eco-certified hotels, and engaging in conservation programs, which are also in line with the past literature on the role of environmental awareness in influencing protective behavior (Mainjot, 2025). Moreover, the research finds that technological readiness acts as a moderator and raises the use of artificial intelligence (AI)-based apps aimed at making environmentally friendly decisions during travel. These findings underline the increasing significance of digital literacy and willingness to technological novelty in modern tourism (Costa et al., 2025).

Along with these direct impacts, the investigation suggests a new mediating construct, AI-driven environmental engagement. When AI tools, such as smart environmental alerts, digital eco-guides, real-time carbon-footprint trackers, are incorporated into the tourist experience, they not only transfer information but also act as behavioral nudges, thus reducing the intention-behavior gap commonly witnessed in environmental psychology (Ngo, 2025). Such tools ensure context-sensitive messaging that enhances the impact of awareness campaigns and pushes tourists to take specific actions as opposed to an informed choice.

Ecological risk perception offers a second key psychological process, whereby greater perceived risk of ecological degradation is associated with more cautious and responsible tourist behavior. By making tourists perceive glacial recession in Skardu, water shortage in Hunza or deforestation in Naran Kaghan as a direct threat, the AI tools will make them more willing to act responsibly, especially when risk perception is supported with concrete, real-time data (Altaf & Hussain, 2021). As a result, the combination of emotional and cognitive risk judgments, which is captured by digital interaction, shows great potential to be used as a driving force of sustainable tourism.

Together, the research suggests that a combination of environmental awareness, technological readiness, and ecological risk perception creates a fruitful environment to develop sustainable behavior, and AI-based environmental interaction serves as a resolute gateway between the intention and action. The results confirm the existence of a holistic approach to the cognition and manipulation of tourist behavior in ecologically sensitive areas, with the complementary nature of sociocognitive and technological innovation (He et al., 2024).

On the basis of these findings, a package of policy recommendations is offered. To begin with, the Northern Pakistan tourism authorities and local governments should make investments into the creation and implementation of AI-empowered environmental technologies tailored to ecotourism, such as multilingual digital eco-guides, interactive sustainability maps, and personal environmental behavior trackers that report on the ecological impacts in real-time to the tourists. Second, awareness should be combined with technological interventions to have the greatest effect; e.g., digital stories about environmental degradation in Gilgit-Baltistan, embedded in mobile apps or augmented-reality interfaces, can enhance the ecological empathy and engagement of visitors (Nichter, 2022). Third, technology developers ought to focus on user-friendly designs, especially among the domestic tourists who do not have an in-depth digital literacy.

The study has multiple theoretical implications. It builds on the Theory of Planned Behavior by adding AI-mediated environmental engagement as a mediating sociotechnical construct, and in

so doing resolves the long-standing problem of how environmental attitudes translate into behavior. Similarly, the incorporation of the Technology Acceptance Model into the framework of environmental sociology reveals the effects of the perceived ease of use and perceived usefulness on pro-environmental behavior (Wijaya & Kokchang, 2023). Moreover, the results demonstrate the need to adopt a cross-disciplinary method that would integrate environmental science, digital innovation, and behavioral psychology to solve sustainability issues in tourism.

The implications of this on a practical level spread to various stakeholders. Policymakers should consider investing in digital infrastructure in tourist-intensive regions to enable the use of AI and environmental organizations can partner with technology companies to open-access platforms that can inform and engage visitors in real-time. Eco-branding can be enhanced when tourism operators and businesses incorporate AI tools in their services to attract environmentally conscious tourists. Lastly, the local communities in Northern Pakistan will be able to enjoy more informed visitors who will be responsible and thus preserve the delicate ecosystems in an effort to promote sustainable economic growth (Sahu et al., 2025).

Overall, the research provides an innovative input by investigating the interaction between environmental, psychological, and technological determinants of developing sustainable tourist behavior in which AI-based interaction is a central mediator. With the tourism industry moving towards sustainability all over the world, the findings of this study can offer an emulatable framework to ecologically sensitive areas. Sustainable tourism is a potential solution to developing the human values that can be integrated into the smart technology and become a digitalized practice that will ensure the preservation of natural environments and cultural heritage in Northern Pakistan to future generations.

2 | LITERATURE REVIEW

The increased pace of digitalization in various industries has also led to the integration of the emerging technologies, with the most prominent one being artificial intelligence (AI) into environmental management and sustainable tourism. The Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM) are the foundations of this study, and the combination of the two models explains the interactive processes of the individual psychological constructs, adoption of technology, and environmental consequences. TPB assumes that behavioral intentions are based on attitudes, subjective norms and perceived behavioral control in contrast to TAM, which places perceived usefulness and perceived ease of use in the forefront of predictors of technology acceptance (Wang et al., 2023). Therefore, TPB and TAM can be said to provide a powerful conceptual framework to understand the influence of environmental consciousness and technological receptiveness on sustainable behavioral intentions and behavior in tourists. These frameworks help to explain how the willingness of tourists to use AI-based tools and their sense of environmental risk in the tourism context is realized in environmentally responsible behavior, especially in ecologically sensitive areas, like Northern Pakistan (Tanveer et al., 2025).

Empirical studies are increasingly proving the relevance of environmental awareness to sustainable behavior in various situations of tourism. Environmental awareness as the understanding of the person about the environmental problems and their consequences has been confirmed as an important predictor of pro-environmental behaviour, such as waste minimisation, environmental resource management and involvement in local environmental activities. Research in mountain tourism destinations, national parks, and coastal ecosystems all indicate that the greater the level of environmental consciousness the greater the desire to reduce environmental degradation (Wang & Wang, 2022). These results are of particular relevance to Northern Pakistan where increasing tourist populations put vulnerable ecosystems under intense pressure. Knowledge of phenomena like

glacier meltdown, biodiversity loss, and water shortage have been found to encourage tourists to choose green hotels, engage in conservation activities and avoid littering or harmful trekking activities (Bhattarai & Pokharel, 2020).

Technological preparedness has also become a critical factor in determining sustainable tourism behavior especially in the digital age. Tourists with a high level of technological preparedness tend to adopt innovations that enable sustainability such as mobile applications that guide eco-tours, real time environmental notifications and carbon footprint tracking systems. Studies show that people with high levels of comfort, confidence, and optimism towards technology will be more likely to use AI-based environmental solutions during their journeys (Chen et al., 2025). Indicatively, research in the technologically developed eco-destinations indicates that once tourists are provided with intelligent applications or online platforms that make sustainable decisions easier, their likelihood of behaving responsibly goes up. In developing countries, where technological infrastructures are still in transition, this preparedness takes on an even greater significance to make sure that digital tools are embraced and used to good effect in environmental management (Rosário & Dias, 2022).

The perception of ecological risk also plays a significant motivational role on the behavior of the tourist. Ecological risk perception is the subjective judgments of the individual about the danger to the natural environment, such as pollution, destruction of habitats, and climate change effects. The literature on scholarship argues that the more a person views a destination as having environmental risk, the more likely he or she will resort to precautionary and protective measures (González-Reverté et al., 2022). Such a relationship has been well established in literature on destinations where degradation is apparent or climate stress is evident with tourists frequently expressing a sense of moral duty to act responsibly. In Northern Pakistan where environmental threats like deforestation, glacial retreat and habitat erosion are becoming more apparent, subjective perceptions of tourists towards these threats play an important role in determining their behavioral intentions (Ahmad & Khan).

The continued use of AI in the sustainable tourism sector presents a new mediating process whereby the environmental and technological factors have a combined effect. The use of AI in environmental engagement is associated with the implementation of smart digital solutions that enable real-time interactions with environmental data, encourage sustainable decisions, and strengthen eco-friendly behavior. These can be mobile guides with AI that suggest low-impact travel paths, chatbots that provide conservation advice, and apps that measure the carbon footprint of travel (Basu, 2024). Smart tourism destinations have shown empirically that AI systems do not only expand the access of tourists to environmental information but also provide behavioral nudges that promote sustainable choices. These platforms enhance the awareness of tourists and increase behavioral consistency with environmental standards by personalizing messaging, visualizing ecological impact, and providing immediate feedback.

The integration of the artificial intelligence (AI) into modern tourism practice is consistent with the current trends in the environmental communication and behavioral change. Empirical research studies show that interactivity, personalization, and predictive accuracy of AI-based apps significantly increase the effectiveness of environmental messaging. The unchanging, traditional informational campaigns are thus substituted by the user-friendly, flexible interventions that can be adapted to personal behaviours and preferences. As an example, the tourists who get tailored messages about the erosion of the trails or the rules to follow in protecting the wildlife are proved to be more likely to adjust their behavior in relation to them (Aktymbayeva et al., 2023). Moreover, AI tools that gamify sustainable behavior, e.g., by offering rewards to travelers who take steps toward

plastic-reduction or choosing low-emission transportation modes, make people more motivated and committed to the long-term goals of sustainability. The digital mechanisms are especially helpful in distant, ecologically threatened destinations where the more conventional communication options are scarce (Mansourihanis et al., 2025).

In spite of these developments, the literature is still lacking integrative theoretical frameworks that would have taken into account the potential antecedents of AI-driven engagement, including environmental awareness, technological readiness, and ecological risk perception, simultaneously. Even though some studies have evaluated the relationship between environmental consciousness and sustainable behavior, as well as technological adoption and environmental behavior, there are not many studies that have considered AI as an intervening variable that connects the two constructs. Also, there is a dearth of empirical uses of such models in underrepresented geographic areas like Northern Pakistan, which creates a gap in the theory as well as representation of regional context in sustainable tourism studies (Siddiqui et al., 2025). Most of the current models are based on Western or technologically advanced Asian contexts, and this is why research that reflects the ecological, cultural, and technological processes in the emerging South-Asian destinations is needed. This gap needs to be addressed to improve on the theoretical constructs and come up with practical approaches that promote sustainable tourism within fragile ecosystems (Mandić, 2020).

In order to address this gap in the literature, this study combines psychological, technological, and environmental factors into a single explanatory framework. The model provides a holistic paradigm that can be used to understand sustainable tourist behavior in digital tourism in sensitive ecosystems by examining the synergistic effect of environmental awareness, technological preparedness and risk perception of ecological hazards on sustainable tourist behavior mediated by the engagement of AI. Its relevance can also be extended to the study of Northern Pakistan, which is ecologically valuable and undergoing a digital transformation at a rapid pace. This integrative methodology is based on the already existing theoretical backgrounds like the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM), but it goes beyond them by adding a sociotechnical mediator that reflects the latest trends in AI application to environmental sustainability.

The hypothesis of the research is that psychological preparedness, risk sensitivity, and digital competence have a combined effect on environmentally responsible tourist behavior, especially when they are supplemented by smart technological interactions. It is expected that empirical testing of these hypotheses would provide a strong evidentiary foundation to policy initiatives, technological innovations and behavioral programs aimed at sustainable tourism in ecologically fragile destinations.

3 | METHODOLOGY & DESIGN

The current study adheres to a positivist quantitative paradigm, which is based on the idea of objective measurement, the application of statistical methods to testing the hypothesis and the ensuing generalization of the empirical patterns. The given epistemological orientation is especially compatible with the analysis of the interrelations between measurable constructs: environmental awareness, technological readiness, ecological risk perception, AI-based environmental interaction, and sustainable tourist behavior. The nature of the positivist position is that statistical instruments are used to outline the causal pathways and measure the strength of proposed relationships, thus supporting the explanatory goals of the study.

The sample is made up of tourists travelling to the ecologically sensitive northern parts of Pakistan such as Hunza Valley, Skardu, Gilgit, and Naran-Kaghan area. These sites have been

chosen based on their special environmental susceptibilities and increasing vulnerability to tourism stressors. Purposive sampling was used to include persons who were subjected to physical environmental factors and AI-based tourism technologies. The use of non-probability purposive sampling was suitable since it allowed the selection of respondents that best matched the research questions, especially the individuals who had experienced digital eco-tools in the course of travel.

The data were collected through a structured online questionnaire that was designed using six items Likert-Scale (strongly disagree to strongly agree). To ensure the linguistic diversity of the domestic and international visitors, the instrument was translated into English and distributed via tourism related forums, networks of hotels, and social media platforms related to travel in Northern Pakistan. Before the actual collection of data, a pilot run was conducted on 30 respondents to determine the reliability and explain any ambiguous questions, and any necessary changes were done accordingly. The participation was voluntary and all the respondents signed an informed consent, therefore, making the study transparent and ethically sound.

The analyses were done with Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0. PLS-SEM was chosen because it is effective in predictive and explanatory modeling, especially in a situation where mediating variables and multiple constructs are present. The analytical process started with the measurement model that evaluated reliability, convergent validity and discriminant validity. The type of structural model used to test the proposed relationships between constructs. The significance of path coefficients and mediating effects was determined by bootstrapping with 5,000 resamples and gave robust and statistically sound estimates. The fact that the survey data are non-normal made this procedure favorable, since it specifically adapts to heterogeneous tourist populations.

Ethical issues were incorporated throughout the research process. The anonymity of the participants was maintained and data confidentiality was maintained. No personal data was gathered and all answers were used only in academic purposes. The respondents were clearly told about the purpose of the study and that they can withdraw without any repercussions at any point. Lastly, the research protocol was reviewed and approved by an institutional ethical review committee thus meeting the national and international standards. The synthesis of methodological rigor and ethical responsibility makes the findings valid and responsible, and they have a significant contribution to the modern discourse of sustainable tourism and digital environmental engagement.

4 | RESULTS AND ANALYSIS

4.1 | Reliability Analysis

Table 4.1 Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite (CR)	Reliability Average (AVE)	Variance Extracted
Environmental Awareness (EA)	0.853	0.892		0.676
Technological Readiness (TR)	0.867	0.903		0.701
Ecological Risk Perception (ERP)	0.831	0.876		0.641
AI-Driven Environmental Engagement (AIEE)	0.879	0.915		0.732
Sustainable Tourist Behavior (STB)	0.861	0.902		0.697

Reliability and convergent validity tests produced acceptable internal consistency and

validity of all the constructs in the proposed model. Cronbach alpha values were between 0.831 and 0.879 and all of them were above the standard value of 0.7. The coefficients of Composite Reliability (CR) were within the range of 0.876-0.915 and supported the construct consistency and stability. In addition, the values of Average Variance Extracted (AVE) were all above the minimum suggested 0.50 with the highest one of 0.732 belonging to AI-Driven Environmental Engagement and the lowest of 0.641 to Ecological Risk Perception, meaning that a significant proportion of variance is explained by indicators in each construct. Collectively, these measures support the reliability and validity of the measurement model and the appropriateness of using it to analyze the relationships that have been described in the structural model.

4.2 | Discriminant Validity (HTMT Ratio)

Table 4.2 Discriminant Validity

Constructs	EA	TR	ERP	AIEE	STB
Environmental Awareness (EA)	—				
Technological Readiness (TR)	0.602	—			
Ecological Risk Perception (ERP)	0.544	0.496	—		
AI-Driven Environmental Engagement (AIEE)	0.573	0.605	0.559	—	
Sustainable Tourist Behavior (STB)	0.631	0.616	0.598	0.671	—

The discriminant validity of the constructs in the present study is strong as all the HTMT ratios are far below the conservative cut-off of 0.85. The HTMT values are 0.496 between Technological Readiness and Ecological Risk Perception, and 0.671 between AI-Driven Environmental Engagement and Sustainable Tourist Behavior, which proves that each construct is empirically different and reflects a different part of the entire model. The moderate correlations show that, despite the constructs having a relationship, as would be expected in a conceptual framework of awareness, readiness, perception and behavior, they are not so similar that they would be redundant. The results justify the independent application of each of the constructs in the structural equation model and justify the robustness of the measurement model in reflecting the theoretical dimensions of sustainable tourist behavior.

4.3| Structural Model (Path Coefficients, t-values, p-values)

Table 4.3 Structural Model

Hypothesis	Path	β (Beta)	t-value	p-value	Decision
H1	Environmental Awareness → STB	0.241	4.015	0.000	Supported
H2	Technological Readiness → STB	0.278	4.823	0.000	Supported
H3	Ecological Risk Perception → STB	0.198	3.526	0.000	Supported
H4	Environmental Awareness → AIEE	0.265	4.091	0.000	Supported
H5	Technological Readiness → AIEE	0.309	5.106	0.000	Supported
H6	Ecological Risk Perception → AIEE	0.221	3.782	0.000	Supported
—	AIEE → STB	0.344	5.489	0.000	Significant
—	Indirect EA → STB via AIEE	0.091	3.012	0.003	Mediation

Hypothesis	Path	β (Beta)	t-value	p-value	Decision
—	Indirect TR \rightarrow STB via AIEE	0.106	3.567	0.000	Mediation
—	Indirect ERP \rightarrow STB via AIEE	0.076	2.889	0.004	Mediation

The structural model analysis provides strong empirical support of all the relationships that were predicted, proving each of the hypothesized direct and indirect effects on sustainable tourist behavior (STB). The direct effects of Environmental Awareness ($\beta = 0.241$, $p = 0.000$), Technological Readiness ($\beta = 0.278$, $p = 0.000$), and Ecological Risk Perception ($\beta = 0.198$, $p = 0.000$) on STB are strong, positive, and statistically significant, and therefore they confirm the fundamental role of these constructs in the formation of eco-conscious travel behavior. The three constructs also play a major role in predicting AI-Driven Environmental Engagement (AIEE) sequentially, Technological Readiness ($B = 0.309$), Environmental Awareness (0.265) and Ecological Risk Perception (0.221) at $p < 0.001$. AIEE, in its turn, is a strong predictor of STB ($\beta = 0.344$, $p = 0.000$) which proves its significant mediating effect. Mediation analysis also shows that AIEE mediates the links between Environmental Awareness, Technological Readiness, and Ecological Risk Perception to some degree with all indirect effects significant ($p < 0.01$). These findings suggest that pro-environmental behavior of tourists is not merely a product of awareness and perceptions but enhanced through the interactive process of using AI tools, thus confirming the proposed sociotechnical route to sustainable tourism behavior.

5 | DISCUSSION

The current paper provides strong empirical support that environmental awareness, technological preparedness, and ecological risk perception are important direct and indirect antecedents of sustainable tourist behavior through AI-mediated environmental involvement. A strong positive pathway between environmental awareness and sustainable tourist behavior suggests that well-informed tourists are overrepresented in the pro-responsible travel behavior. This observation is consistent with the current theoretical views based on the environmental sociology and Theory of Planned Behavior that suggests that the increased cognitive awareness of the issues of ecological problems gives rise to the sense of moral duty and behavioral change. Awareness acts as a booster to sustainable action in environmentally sensitive areas like Northern Pakistan where the degradation of the environment is becoming more evident to domestic and international tourists.

The second predictor of sustainable tourist behavior and the use of AI-based environmental tools turned out to be technological readiness, which was also a powerful predictor. Those tourists who trusted digital technologies more were more likely to use AI-based functions, such as carbon-footprint calculators, eco-guides, and intelligent environmental notifications. This performance is in line with the Technology Acceptance Model that stipulates that the readiness of people to use new technologies depends on the ease of use and usefulness of the technologies. In this regard, technologically ready tourists did not only engage with AI tools but also translated their engagement into real sustainable actions like choosing low-impact travel opportunities and adhering to real-time conservation principles. The finding emphasizes the importance of digital literacy in the development of environmentally friendly tourism trends and indicates a potentially bright point of contact between technology and sustainability.

The other significant determinant of sustainable tourist behavior was ecological risk perception. Those tourists who felt that the environment was in danger due to either climate change, pollution, or habitat loss were more inclined to change their behavior. Risk perception also played a significant role in increasing the involvement in AI tools, which explained that people who are

worried about environmental threats embrace technological interventions that aim at making informed and responsible decisions. The incorporation of risk perception into behavioral models thus brings in a psychological aspect that is synonymous with awareness and preparedness, which asserts that the emotional assessment of environmental damage is a key determinant of behavioral response in tourism contexts.

The most innovative contribution of the research is the mediating role of AI-driven environmental engagement. They discovered that AI engagement plays a strong mediating role between all three predictors, environmental awareness, technological readiness, and ecological risk perception, and sustainable tourist behavior. This observation suggests that AI tools are more than an add-on to awareness or perception; they actually augment and convert these constructs to behavioral outputs. The interaction of tourists with AI-powered applications provides them with context-sensitive, personalized information that informs their real-time actions, which further enhances their knowledge of the issues related to the environment and maintains engagement in the process. This interactive dynamism fills the gap between environmental intention and action that is frequently cited and makes AI a sociotechnical facilitator of sustainable tourism by affecting individual actions at scale.

To conclude, the research proves that sustainable tourist behavior in Northern Pakistan is determined decisively by a complex of environmental awareness, technological preparedness, and ecological risk perception, with the role of AI-based environmental interaction being critical as a mediator. The findings support the theoretical applicability of the Theory of Planned Behavior and the Technology Acceptance Model to determine sustainability-oriented behavior in tourism. More generally, they give a refined insight into the interaction of psychological, technological, and behavioral constructs in environmentally sensitive destinations.

On the basis of these findings, it is possible to make a number of recommendations. Destination managers and tourism policymakers ought to invest in environmental education and digital infrastructure to make sure that visitors are well prepared to practice sustainability. Specific initiatives must focus on creating user-friendly AI applications that are adapted to the Northern Pakistan ecological environment, including mobile apps that provide real-time information on the environment, route recommendations based on conservation sensitivity, and gamification of positive behaviours. These tools must be multilingual and inclusive to suit the various tourist demographics of the region. At the same time, technological solutions that enable tourists to take action at the same time as awareness-raising campaigns about ecological risks, such as glacier retreat, deforestation, and pollution, should be provided.

The study implications have academic, practical, and policy implications. In theory, it adds to the growing body of knowledge on sustainable tourism in terms of incorporating AI-driven engagement into a behavioral model, which is the gap between environmental attitudes and behaviors. In a practical sense, it provides practical information that can be used by tourism enterprises and local authorities to improve experiences and maintain ecological integrity. These findings can help policymakers develop intelligent tourism policies that will employ AI not only as a convenience tool but as a sustainability tool, especially in destinations with environmental stress. Lastly, developers and technologists will have an indication to develop intelligent systems that focus on environmental impact as well as user involvement, thus making AI a major advocate in the world to achieve sustainable tourism.

All in all, the research points out that there is more to achieving sustainable tourism in fragile ecosystems than increased awareness and perception; there must be smart technological involvement as well. Through the use of AI, tourism stakeholders can take a step further in passive education and shift to active behavioral change, creating a culture of environmental responsibility in

line with the objectives of sustainable development as a whole.

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Sayyid Kamran Hussain: Literature Review, Methodology

Muhammad Temoor Roaf: Data Analysis and Discussion.

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