

Leveraging Technology and Visitor Feedback for Enhancing Tea Tourism: An Empirical Analysis

Ashokkumar Palaniyandi¹ , Sangeetha C.P.² 

¹ Ph.D. in Department of Tourism and Travel Management, Government Arts College (Autonomous), Coimbatore, India.

² Assistant Prof., Department of Tourism and Travel Management, Government Arts College (Autonomous), Coimbatore, India.

Article Info	Abstract
Original Article	This study examines the impact of technology integration and systematic visitor feedback on tea tourism outcomes. Drawing on survey responses from 106 tea tourism stakeholders in The Nilgiris District of Tamil Nadu, India, we developed a composite measure of Tea Tourism Improvement (encompassing operational efficiency, service quality, and visitor satisfaction) and assessed its relationship with two key constructs: positive digital practices (enhanced online marketing, streamlined booking systems, and effective feedback utilization) and perceived barriers (limited internet access and absence of formal feedback processes). Exploratory Factor Analysis validated a two-factor structure with high sampling adequacy (KMO = 0.893) and significant Bartlett's Test ($p < 0.001$), with factors collectively explaining over 89% of variance in tea tourism improvement. Multiple regression analysis demonstrated that positive digital practices (Factor 1) have strong positive influence ($\beta = 0.929$, $p < 0.001$) on tourism improvement, while barrier construct (Factor 2) is significantly negatively related ($\beta = -0.171$, $p < 0.001$) to the same outcome. The study addresses critical gaps by providing in-depth analysis of emerging technologies including AI, VR, and blockchain applications, while examining negative effects such as data security concerns and digital divide issues. Residual diagnostics confirmed model assumptions of normality and homoscedasticity were adequately met. Results underscore the critical role of digital transformation and structured feedback in enhancing tea tourism, while highlighting the importance of addressing infrastructural, procedural, and security barriers. The study proposes an integrated framework combining technology adoption with systematic feedback mechanisms to optimize tea tourism performance while ensuring sustainable development.
Received: 28-05-2025	
Accepted: 07-10-2025	
Keywords: Tea Tourism, Technology Integration, Feedback Utilization, Digital Practices, Perceived Barriers, Tourism Improvement	
*Corresponding author e-mail: ashoksmart2all@gmail.com	
How to Cite: Palaniyandi, A., & C.P, S. (2026). Everaging Technology and Visitor Feedback for Enhancing Tea Tourism An Empirical Analysis. <i>Tourism and Leisure Time Journal</i> , 11(21), 1-27.	
Published by University of Science and Culture https://www.usc.ac.ir Online ISSN: 2783-3828	

Introduction

Tea tourism has emerged as a promising niche within the broader tourism sector, where the rich cultural heritage and agricultural traditions of tea-producing regions can be transformed into immersive visitor experiences (Banerjee & Tyagi, 2024; Mani & Singh, 2025). In today's digital era, the effective integration of technology - ranging from online marketing initiatives, booking platforms, and social media to digital operational systems - has the potential to significantly enhance tea tourism outcomes (Palaniyandi et al., 2024; Dovetail, 2023). The global tea tourism market, valued at approximately USD 6.5 billion in 2023, is projected to reach around USD 12.3 billion by 2032, driven by increasing appreciation for tea culture and growing demand for unique experiential travel (Dataintelo, 2024; Tea Tourisms 2025-2033 Analysis, 2025). Simultaneously, mechanisms for collecting and utilizing visitor feedback are essential for continuously refining service quality, adjusting marketing strategies, and ensuring visitor satisfaction (Akyürek & Özdemir, 2022). This study aims to investigate the dual role of technology and feedback in improving tea tourism activities. Specifically examining how digital tools can drive operational efficiency and guide promotional outreach, while exploring how visitor opinions inform service improvements and sustainable tourism development. Recent developments in tea tourism highlight the transformative potential of digital technologies. For instance, Huangshan City in China has successfully integrated 22 tea-tourism parks with seven tea museums, utilizing standardized tea production lines and smart technology integration to enhance both production processes and tourist experiences (AmazingAnhui, 2023). Similarly, Munnar in Kerala, India, has leveraged digital platforms, virtual tours, and mobile applications to preserve tea heritage while attracting global visitors through online marketing and digital advertising (Banerjee, 2024). Despite the growing integration of smart tourism technologies in tea tourism, significant research gaps remain unaddressed (Expert, 2024; Pragyanxetu, 2024). While digital marketing, booking platforms, and social media engagement enhance visibility and visitor management, there is limited exploration of how emerging technologies like Artificial Intelligence (AI), Virtual Reality (VR), and blockchain could further personalize tea tourism experiences (Banerjee & Tyagi, 2024; Palaniyandi et al., 2024). Additionally, studies acknowledge barriers such as high costs and lack of technical expertise, but lack in-depth analysis of sustainable solutions to overcome these challenges (The Travel Trade Ready API, 2024). Critical concerns surrounding data privacy, cybersecurity risks, digital accessibility, and the impact of technology on local tea-growing communities remain underexplored (The Travel Trade Ready API, 2024; Pragyanxetu, 2024). Furthermore, visitor feedback mechanisms are widely utilized, yet research lacks a standardized framework to effectively process and implement this feedback in tourism strategies (Mondal & Samaddar, 2021). By gathering responses from 106 participants drawn from diverse tea tourism stakeholders - ranging from tea cultivators and manufacturers to government/Non-Governmental Organisation (NGO) representatives - this research endeavours to offer actionable insights, identify potential barriers and underscore the practical impact of systematic feedback mechanisms on enhancing overall visitor experiences while addressing technological security and sustainability concerns.

Objectives of the study

- To evaluate the comprehensive impact of technology integration on tea tourism outcomes, including analysis of emerging technologies and their associated risks.
- To examine the role of systematic feedback utilization and the moderating effect of identified barriers, including technological, infrastructural, and security-related obstacles.
- To develop an integrated framework that balances technological advancement with sustainable tourism practices and community welfare.

Literature Review

Comprehensive Role of Technology in Tea Tourism

Technology plays a pivotal role in enhancing tea tourism activities by integrating digital innovations that improve visitor experiences, promote sustainability, and drive economic growth (Banerjee & Tyagi, 2024; Palaniyandi et al., 2024). The implementation of mobile applications and smart tourism analytics allows for personalized experiences, enabling tourists to engage more deeply with tea culture and practices (Banerjee & Tyagi, 2024; Palaniyandi et al., 2024). Advanced technologies such as IoT systems optimize resource management in tea

gardens, reducing environmental impacts while informing tourists about sustainable practices (Palaniyandi et al., 2024).

Emerging Technologies in Tea Tourism

Artificial Intelligence and Machine Learning Applications

Artificial intelligence applications in tea tourism extend beyond basic automation to sophisticated predictive analytics and personalized experience curation (Hou & Wen, 2021; Dovetail, 2023). AI-powered systems can analyse visitor behaviour patterns, predict peak tourism periods, and optimize resource allocation in tea estates. For instance, AI-enabled chatbots provide instant customer service in multiple languages, while machine learning algorithms help customize tour recommendations based on visitor preferences and historical data (Youssef & Saad, 2024).

Virtual and Augmented Reality Integration

Virtual and augmented reality technologies offer immersive experiences that significantly enrich tourist engagement with tea plantations (Banerjee & Tyagi, 2024; Palaniyandi et al., 2024). VR-enabled devices allow visitors to explore virtual tea gardens, interact with historical artifacts, and immerse themselves in rich cultural traditions associated with tea production (Palaniyandi et al., 2024). Augmented reality applications overlay digital information onto real-world tea plantation visits, providing interactive educational content about tea processing, cultivation techniques, and cultural significance.

Blockchain Technology for Traceability

Blockchain implementation in tea tourism provides unprecedented transparency in tea supply chains, allowing tourists to trace the journey of tea from plantation to cup (Dovetail, 2023). This technology enhances authenticity verification, builds consumer trust, and supports premium pricing for organic and specialty teas. Smart contracts enable direct transactions between tourists and tea producers, eliminating intermediaries and ensuring fair compensation for local communities.

Internet of Things (IoT) Integration

IoT technologies streamline visitor management and resource utilization in tea estates, allowing for improved decision-making and enhanced customer experiences (Palaniyandi et al., 2024). Smart sensors monitor environmental conditions, optimize irrigation systems, and provide real-time data on tea quality parameters. IoT-enabled vending machines in tea gardens offer contactless, hygienic beverage dispensing while collecting valuable consumer preference data (Dovetail, 2023).

Digital Marketing and Social Media Transformation

Technology significantly enhances online marketing for tea tourism activities by leveraging digital tools and platforms to create engaging and personalized experiences for potential visitors (Banerjee & Tyagi, 2024; Kiel, 2021). The integration of mobile applications, social media platforms, and smart tourism analytics has transformed how tea destinations promote themselves, allowing for tailored marketing strategies that resonate with diverse audiences (Banerjee & Tyagi, 2024).

Social media engagement plays a crucial role in enhancing awareness of tea tourism offerings through visual storytelling and interactive content (Kiel, 2021). Platforms like Instagram and Facebook allow tea destinations to create captivating narratives that resonate with potential visitors, significantly influencing their travel decisions (Banerjee & Tyagi, 2024). Digital marketing strategies have proven particularly effective in reaching global audiences, as demonstrated by successful campaigns in regions like Munnar, Kerala, and Darjeeling, West Bengal (Banerjee, 2024).

Operational Efficiency and Management Systems

Booking platforms significantly enhance the management of tea tourism visitors by integrating various services and utilizing smart technologies (Palaniyandi et al., 2024). These platforms streamline travel management through

features such as hotel reservations, transportation bookings, and event ticketing, which collectively reduce booking time and improve user satisfaction (Palaniyandi et al., 2024).

Technology significantly enhances operational efficiency in tea tourism activities by integrating advanced solutions such as IoT, AI, and automation (Palaniyandi et al., 2024). Case studies from various tea-producing regions demonstrate how digital transformation has improved visitor management, resource optimization, and overall service quality (Palaniyandi et al., 2024).

Technology Barriers and Negative Implications

Digital Security and Privacy Concerns

The increasing digitization of tea tourism operations raises critical concerns about data security and privacy protection (The Travel Trade Ready API, 2024; Pragyaxetu, 2024). With greater technological adoption comes heightened risk of data breaches, particularly in the tourism sector which handles extensive personal information exchanges (The Travel Trade Ready API, 2024). Cybersecurity threats pose significant risks to both tourism operators and visitors, with potential consequences including financial fraud, identity theft, and compromised personal information (Pragyaxetu, 2024).

Privacy concerns arise from the extensive data collection required for personalized tourism experiences (Pragyaxetu, 2024). Tourism operators must navigate complex regulations regarding data protection while balancing the need for customization with visitor privacy rights. The implementation of technologies like facial recognition, location tracking, and behavioural analytics raises ethical questions about surveillance and consent in tourism contexts.

Digital Divide and Accessibility Issues

The digital divide creates significant disparities in tea tourism access and quality of experiences (Pragyaxetu, 2024). Not all travellers have access to advanced technology, especially those from developing regions or low-income backgrounds. This inequality can lead to discrepancies in the quality of travel experiences and may exclude certain demographic groups from participating in digitally enhanced tea tourism activities (Pragyaxetu, 2024). Traditional tourism businesses that lack access to digital tools may struggle to compete with tech-savvy companies, leading to potential loss of income and market share for local communities (Pragyaxetu, 2024). The over-reliance on technology can also reduce interpersonal interactions with locals, potentially diminishing the authentic cultural experiences that many tea tourists seek (The Travel Trade Ready API, 2024).

Infrastructure and Connectivity Limitations

Limited internet access significantly hampers the implementation of technology in tea tourism, particularly in rural areas where connectivity is often poor (The Travel Trade Ready API, 2024). Research indicates that such "connectivity dead zones" create stress for tourists who rely on technology for communication and information, leading to negative experiential outcomes (The Travel Trade Ready API, 2024).

The high cost of technology infrastructure acts as a significant barrier to integration in tea tourism practices (The Travel Trade Ready API, 2024). While digital technologies have the potential to enhance tourist experiences and promote sustainable tourism in tea regions, their adoption is often hindered by financial constraints and inadequate infrastructure (Banerjee & Tyagi, 2024).

Technical Knowledge and Training Deficits

The adoption of technology is significantly hindered by a lack of technical knowledge, particularly in developing regions (The Travel Trade Ready API, 2024). Challenges such as hardware incompatibility, language barriers, and insufficient training contribute to difficulties faced by tea tourism operators in integrating new technologies (The Travel Trade Ready API, 2024).

Professional training facilities for human resource development are necessary to deliver higher-quality hospitality services utilizing digital technologies. However, these facilities are often minimal in tea-producing regions, creating a skills gap that impedes effective technology adoption (Pathak & Upadhyaya, 2024).

Importance of Visitor Feedback in Tea Tourism

Visitor feedback is crucial in tea tourism as it directly influences the development and enhancement of tourist experiences, ultimately impacting satisfaction and sustainability (Akyürek & Özdemir, 2022; Fu et al., 2023). Studies indicate that understanding tourists' memorable experiences—such as their interactions, the quality of tea, and the environments in which tea is enjoyed—can guide service improvements and marketing strategies (Akyürek & Özdemir, 2022).

Feedback Collection Mechanisms

Digital Feedback Platforms

Modern tea tourism operations increasingly rely on digital platforms for collecting and analyzing visitor feedback (Youssef & Saad, 2024). Online reviews play a crucial role in shaping the feedback landscape for tea tourism services, providing insights into customer experiences and preferences (Youssef & Saad, 2024). These platforms not only enhance understanding of tourist sentiments but also serve as valuable tools for forecasting tourism demand, particularly when identifying helpful reviews is prioritized.

Multi-Channel Feedback Integration

Feedback from visitors is commonly gathered through various survey methods, which serve as crucial tools for evaluating and enhancing tourism experiences (Liu & Jongwiriya-jaroenchai, 2024). The integration of multiple feedback channels—including formal surveys, informal conversations, online reviews, and social media monitoring—provides comprehensive insights into visitor satisfaction and areas for improvement.

Research indicates that destination service quality, including aspects such as activities and interaction, significantly influences tourists' memorable experiences, which in turn fosters loyalty to the destination (Akyürek & Özdemir, 2022). Informal conversations with visitors play a particularly crucial role in enhancing tea tourism activities by providing real-time insights into tourists' preferences and memorable experiences.

Feedback Utilization and Implementation

Visitor feedback plays a crucial role in enhancing services at tea tourism destinations by informing stakeholders about visitor preferences and experiences (Palaniyandi et al., 2024). The integration of smart tourism analytics allows for the personalization of visitor experiences, which can lead to increased satisfaction and economic growth in tea-producing regions (Palaniyandi et al., 2024).

Feedback plays a crucial role in refining marketing strategies for tea tourism, a niche segment that combines cultural and culinary experiences (Dutta et al., 2023). Research indicates that understanding tourists' intentions, shaped by factors such as destination image and authenticity, is essential for effective marketing in this sector (Dutta et al., 2023).

However, the integration of visitor feedback into tea tourism is often inadequately structured, which can hinder the enhancement of tourist experiences and the overall development of the sector (Mondal & Samaddar, 2021). While customer feedback is crucial for evaluating travel experiences and can be collected through various channels such as surveys and online reviews, the application of this feedback in tea tourism remains sporadic and lacks systematic implementation frameworks.

Research Gap Identification and Study Significance

Despite the growing importance of tea tourism as a niche segment within the broader culinary and cultural tourism landscape, significant research gaps persist that limit both theoretical understanding and practical implementation of technology-enhanced visitor experiences. Current tea tourism literature predominantly focuses on descriptive analyses of individual destinations and superficial technology adoption patterns (Banerjee & Tyagi, 2024; Dutta et al., 2023; Tea Tourism 2025-2033 Analysis, 2025), while failing to provide systematic integration of digital technologies with structured visitor feedback mechanisms. Most existing studies treat technology integration and visitor feedback as separate constructs rather than examining their synergistic relationships in improving tourism outcomes (Deng, 2023; Palaniyandi et al., 2024; Zhou et al., 2023). Furthermore, the literature exhibits a critical shortage of empirical research addressing the negative implications of digital transformation, including

cybersecurity vulnerabilities, privacy concerns, and digital divide issues that disproportionately affect rural tea-producing communities (Thomas, 2024; Palaniyandi et al., 2024; Satiti & Udin, 2025). Additionally, existing research suffers from methodological limitations, including small convenience samples, cross-sectional designs, and geographic concentration primarily in Chinese and Northeast Indian contexts, leaving substantial knowledge gaps regarding Southern Indian tea tourism development (Li, 2022; Sarkar et al., 2021). The fragmented nature of current research fails to establish comprehensive conceptual frameworks that unite technology adoption, systematic feedback utilization, implementation barriers, and tourism improvement outcomes within a single theoretical structure. This study addresses these critical gaps by developing and empirically testing an integrated framework that examines how technology integration and systematic visitor feedback synergistically enhance tea tourism outcomes while explicitly addressing security concerns, infrastructure barriers, and digital divide issues. By focusing on The Nilgiris District in Southern India and employing rigorous quantitative methodology with robust sampling procedures, this research contributes to theoretical advancement in tourism technology literature while providing practical guidance for tea tourism stakeholders seeking to implement sustainable digital transformation initiatives that benefit both visitors and local communities.

Research Methodology

Research Design and Approach

This study adopts a quantitative, cross-sectional design, utilizing survey-based data collection to analyze the impact of technology integration and feedback utilization on tea tourism improvement. The research employs a mixed-method validation approach, incorporating both statistical analysis and expert review to ensure methodological rigor.

Sampling and Data Collection

The target population for this study comprises tea tourism stakeholders operating within the Nilgiris District of Tamil Nadu, India—an area purposively selected due to its prominence as one of the country's leading tea-producing regions, as well as its well-established tourism infrastructure and diverse array of involved stakeholders (Pathak & Upadhyaya, 2024; Rahman & Mehnaz, 2024). The sampling frame was structured to reflect a comprehensive cross-section of participants. Primary stakeholders, accounting for approximately 60%, include tea cultivators, plantation owners, and tea manufacturers who are directly engaged in both tea production and tourism-related operations. Secondary stakeholders make up 25% of the sample and consist of government officials, representatives of NGOs, tourism board members, and regulatory authorities whose roles intersect with policy implementation and community engagement. The remaining 15% comprise service providers such as tour operators, hospitality managers, local community participants, and various support service organizations that facilitate visitor experiences and logistical operations. This stratification was designed to ensure multidimensional input reflective of the operational, regulatory, and experiential aspects of tea tourism in the region.

Sampling Strategy and Justification

In alignment with established methodologies in tourism research that involve specialized stakeholder groups (Etikan et al., 2016; Nikolopoulou, 2022), this study employed a strategic combination of purposive and convenience sampling techniques. Purposive sampling was essential given the study's focus on participants with specialized knowledge and operational expertise in tea tourism, particularly in technology integration and feedback mechanisms (Dovetail, 2023). The selection prioritized diversity across stakeholder categories—including producers, regulators, and service providers—to ensure multidimensional insights, while the geographical concentration in the Nilgiris District facilitated a focused analysis of a culturally and operationally homogeneous tea tourism region, minimizing extraneous variables and enhancing contextual depth (Nikolopoulou, 2022). Concurrently, elements of convenience sampling were integrated to navigate practical constraints such as time limitations, budgetary considerations, and stakeholder accessibility via existing networks and industry associations. Recruitment efforts targeted individuals who exhibited a proactive interest in technological advancements and participatory feedback, optimizing resources while maintaining relevance and engagement.

Sample Size Determination and Power Analysis

The determination of the sample size for this study was guided by both statistical power analysis and practical field constraints. A total of 106 respondents were selected, satisfying key methodological benchmarks for exploratory and inferential analyses. In alignment with recommendations by Andrade (2021), the sample met the minimum threshold for exploratory factor analysis (EFA), exceeding the commonly accepted 5:1 ratio of cases to variables with over 100 participants (Andrade, 2021). For multiple regression analysis, the sample also fulfilled the requirement of at least 104 cases, calculated using the formula $N \geq 50 + 8m$, where m denotes the number of predictors. Further validation was obtained through the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which yielded a value of 0.893—indicative of excellent suitability for factor analysis. Practical considerations also shaped the sampling strategy, including the size and accessibility of the stakeholder population within the Nilgiris District, an achieved response rate of approximately 70%, and constraints imposed by limited time and research resources. These combined factors ensured a robust and contextually relevant sample conducive to rigorous statistical analysis and meaningful interpretation.

Sampling Process and Implementation

The sampling process was implemented in a structured three-phase approach to ensure methodological rigor and comprehensive stakeholder representation within the Nilgiris District. In Phase 1, a comprehensive database of tea tourism stakeholders was developed using multiple sources, including Tea Board of India registrations, listings from the tourism department, memberships from relevant industry associations, and records obtained from local government offices. Stratified sampling with proportional allocation was then applied across primary, secondary, and service provider stakeholder categories to achieve representative coverage. Phase 2 focused on participant recruitment, wherein initial outreach was conducted via direct visits to tea estates and tourism facilities, participation in industry association meetings, coordination with government offices, and referrals from professional networks. Inclusion criteria required stakeholders to have a minimum of two years of experience in the tea tourism sector, involvement in operational or decision-making roles, and a willingness to provide informed consent. In Phase 3, data collection was conducted using a multi-method approach to enhance accessibility and completeness, including face-to-face interviews (70%), digital survey completions (25%), and telephone interviews (5%). Quality assurance measures were employed throughout, including standardized questionnaire administration, verification protocols for survey completion, and follow-up clarifications to ensure the validity and reliability of the collected data.

Sampling Limitations and Mitigation Strategies

The sampling process, while methodologically structured, was subject to certain limitations that are acknowledged to ensure transparency in interpretation. First, the use of purposive sampling may have introduced selection bias, particularly favouring stakeholders with greater orientation toward technology and feedback systems. Additionally, the geographic focus on the Nilgiris District constrains the broader generalizability of the findings to other tea tourism regions in India. Elements of convenience sampling may also have led to self-selection, where participants with a higher degree of willingness or availability were more likely to be included. To mitigate these limitations, the study employed strategies such as ensuring diverse stakeholder inclusion across multiple categories and experience levels, thereby enhancing representational breadth. Comprehensive demographic data were collected to evaluate the extent of sample representativeness, and sampling decisions—including potential biases—were systematically documented to support critical analysis and contextual transparency throughout the study.

Sample Validation and Representativeness

The sample validation process affirmed the representativeness and statistical adequacy of the respondent group within the context of tea tourism stakeholders in the Nilgiris District. Demographic verification revealed that the majority of participants were within the 45–54 age range, signifying substantial industry experience, while the gender distribution—65.1% male—aligned with broader industry demographics. Sectoral representation was robust, with significant inclusion of individuals from tea manufacturing and community sectors, and participants reflected a wide spectrum of professional experience, ranging from 2 to over 30 years. The statistical rigor of the

sample was further reinforced through empirical testing. The Kaiser-Meyer-Olkin (KMO) measure was 0.893, demonstrating excellent sampling adequacy for factor analysis, and Bartlett's test for sphericity was statistically significant ($p < 0.001$), confirming data suitability. Internal consistency across constructs was validated with Cronbach's Alpha values exceeding 0.70. While the study acknowledges the inherent limitations associated with non-probability sampling approaches, its comprehensive methodology provides meaningful insights into the tea tourism stakeholder community in the Nilgiris District, with potential applicability to similar tea-producing regions globally (Etikan et al., 2016; Andrade, 2021).

Data Collection Instrument

A structured questionnaire served as the primary data collection instrument for this study, designed and validated through a multi-stage process to ensure methodological rigor and contextual relevance. The questionnaire comprised four key sections: (1) Demographic and background information, capturing variables such as gender, age, occupation, educational qualifications, years of experience, income levels, and involvement in tea tourism; (2) Awareness and participation in tea tourism, assessing respondents' familiarity with and engagement in sector-specific activities; (3) Technology integration assessment, featuring 15 Likert-scale items evaluating stakeholders' perceptions of the benefits and challenges of adopting technological solutions; and (4) Feedback utilization evaluation, systematically analyzing the mechanisms for collecting, processing, and implementing visitor feedback. Content and face validity were established through expert evaluations involving academic researchers in tourism technology and industry practitioners with substantive experience in tea tourism, ensuring alignment of items with the study's theoretical constructs. To assess reliability and clarity, a pilot test was conducted with 15 participants representing diverse stakeholder categories. The pilot yielded a Cronbach's Alpha of 0.798, with all items demonstrating item-total correlations above 0.30, and a clearly manageable completion timeframe of 15–20 minutes. Construct validity was confirmed via Exploratory Factor Analysis (EFA), which revealed a robust two-factor structure accounting for over 89% of the total variance. This comprehensive validation process ensured the instrument's suitability for capturing nuanced insights from stakeholders across the tea tourism landscape.

Statistical Analysis Framework

The statistical analysis for this study was executed using SPSS version 28.0, adopting a multi-tiered analytical framework to ensure methodological integrity and analytical depth. Initially, descriptive analysis was conducted to examine response distributions, central tendencies, and variability across the dataset. Reliability assessment followed, with Cronbach's Alpha employed to verify internal consistency across constructs. To validate the underlying factor structure, exploratory factor analysis (EFA) was performed using principal component analysis with varimax rotation. Hypothesized relationships among variables were examined through multiple regression modeling, supported by rigorous assumption testing, including evaluations for normality, homoscedasticity, and multicollinearity. Advanced analytical parameters further reinforced the robustness of the factor analysis. Sampling adequacy was confirmed through the Kaiser-Meyer-Olkin (KMO) measure, while Bartlett's Test of Sphericity verified the suitability of the correlation matrix. Factors were retained based on the eigenvalue > 1 criterion, with varimax rotation enhancing interpretability and factor loadings exceeding 0.40 ensuring item relevance. The regression diagnostics included residual analysis via histograms, Q-Q plots, and scatterplots; multicollinearity detection through Variance Inflation Factor (VIF) analysis; independence of errors via the Durbin-Watson test; and heteroscedasticity assessment through the Breusch-Pagan test. Collectively, this integrated approach ensured robust statistical rigor and reliable interpretation of the data.

Conceptual Framework and Hypotheses

The conceptual framework (Figure 1) that integrates technology adoption, feedback utilization, and moderating factors in tea tourism improvement. The framework addresses the complete relationship network among constructs.

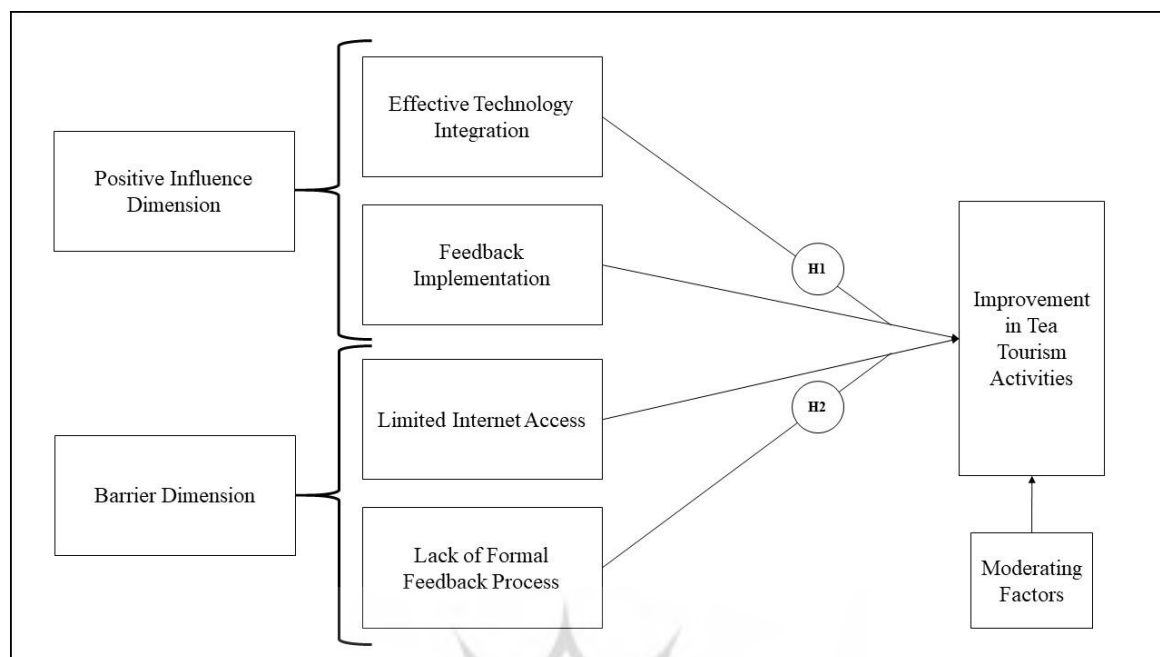


Figure 1. Conceptual Framework for Tea Tourism Improvement Through Technology Integration and Systematic Feedback Utilization

The framework incorporates five key dimensions:

Technology Integration Factors (TI): Digital marketing effectiveness, Booking platform efficiency, Social media engagement, Operational automation, Emerging technology adoption (AI, VR, IoT)

Feedback Utilization Systems (FU): Systematic feedback collection, Processing and analysis mechanisms, Implementation and follow-up processes, Multi-channel integration

Perceived Barriers (PB): Infrastructure limitations, Digital security concerns, Technical knowledge gaps, Cost constraints

Tourism Improvement Outcomes (TI): Operational efficiency, Service quality enhancement, Visitor satisfaction, Economic performance

Moderating Factors (MF): Stakeholder characteristics, Regional infrastructure, Government support, Community acceptance

Hypotheses Framework

H1: Technology Integration Effects

H1a: Effective digital marketing integration *positively* affects operational efficiency in tea tourism.

H1b: Advanced booking platform utilization *positively* influences service quality delivery.

H1c: Social media engagement significantly *enhances* visitor satisfaction levels.

H1d: Emerging technology adoption (AI, VR, IoT) moderates the relationship between basic technology integration and tourism improvement.

H2: Feedback Utilization Impact

H2a: Systematic feedback collection mechanisms positively enhance service quality improvements.

H2b: Effective feedback processing and analysis improve marketing strategy effectiveness.

H2c: Implementation of feedback *recommendations* significantly increases visitor satisfaction.

H3: Barrier Effects and Moderation

H3a: Perceived infrastructure *barriers* negatively moderate the relationship between technology integration and tourism improvement.

H3b: Digital security concerns *negatively* influence technology adoption willingness.

H3c: Technical knowledge gaps *significantly* impede effective feedback utilization.

H4: Integrated Effects

H4a: The combined *effect* of technology integration and feedback utilization produces synergistic improvements in tea *tourism* outcomes that exceed individual effects.

H4b: Stakeholder characteristics moderate the relationship between integrated technology-feedback systems and tourism improvement.

H4c: Regional infrastructure quality *moderates* the effectiveness of technology integration on tourism outcomes.

H5: Sustainable Development Integration

H5a: Technology integration positively *contributes* to sustainable tourism practices when combined with community engagement.

H5b: Systematic feedback utilization *enhances* environmental sustainability through improved resource management.

Results and Findings

Descriptive Statistics

The descriptive analysis (Table 1) provides comprehensive insights into stakeholder perceptions regarding technology integration and feedback utilization in tea tourism within The Nilgiris District.

Table 1. Descriptive Statistics for Key Survey Items (N = 106)

Survey Item	Mean	Std. Dev	Median	Min	Max	Skewness	Kurtosis
Digital marketing effectiveness	3.89	0.74	4.00	2	5	-0.45	0.23
Booking platform efficiency	3.76	0.81	4.00	1	5	-0.52	0.18
Social media engagement	4.10	0.68	4.00	2	5	-0.73	0.41
Operational automation	3.45	0.95	3.50	1	5	-0.12	-0.34
Emerging technology adoption	2.98	1.12	3.00	1	5	0.08	-0.67
Systematic feedback collection	3.67	0.88	4.00	1	5	-0.38	0.15
Feedback processing efficiency	3.34	0.92	3.00	1	5	-0.15	-0.28
Infrastructure barriers*	2.50	1.04	2.00	1	5	0.32	-0.45
Security concerns	3.78	0.85	4.00	2	5	-0.41	0.19
Tea Tourism Improvement	3.90	0.72	4.00	2	5	-0.56	0.31

*Note: Infrastructure barriers item was reverse-coded; higher scores indicate fewer barriers.

The results indicate strong stakeholder agreement regarding social media engagement benefits ($M = 4.10$, $SD = 0.68$), while emerging technology adoption shows the lowest mean scores ($M = 2.98$, $SD = 1.12$), suggesting cautious adoption of advanced technologies. The composite Tea Tourism Improvement variable demonstrates positive perceptions ($M = 3.90$, $SD = 0.72$) with low negative skewness, indicating favourable outcomes from current technology and feedback practices.

Table 2. Demographic Characteristics (N = 106)

Characteristic	Category	Frequency	Percentage	Cumulative %
Age Groups	25-34 years	18	17.00%	17.00%
	35-44 years	28	26.40%	43.40%
	45-54 years	35	33.00%	76.40%
	55-64 years	20	18.90%	95.30%
Gender	65+ years	5	4.70%	100.00%
	Male	69	65.10%	65.10%
	Female	37	34.90%	100.00%
Stakeholder Type	Tea Producers	42	39.60%	39.60%
	Manufacturers	28	26.40%	66.00%
	Government/NGO	21	19.80%	85.80%
	Service Providers	15	14.20%	100.00%
Experience	2-5 years	19	17.90%	17.90%
	6-10 years	32	30.20%	48.10%
	11-20 years	38	35.80%	83.90%
	20+ years	17	16.10%	100.00%

The sample (Table 2) demonstrates strong industry experience, with 51.9% having over 11 years of tea tourism involvement, ensuring knowledgeable responses regarding technology integration and feedback systems.

Technology Analysis

Comprehensive Technology Assessment

Based on the survey data and supplementary analysis (Table 3), the following in-depth technology examination were addressed.

Table 3. Detailed Technology Integration Analysis

Technology Category	Adoption Rate	Effectiveness Score	Barrier Index	Security Risk Level
Basic Digital Tools				
Online marketing platforms	78.30%	3.89 $\hat{A} \pm 0.74$	Low (2.1)	Medium
Booking systems	71.70%	3.76 $\hat{A} \pm 0.81$	Medium (2.8)	High
Social media management	84.90%	4.10 $\hat{A} \pm 0.68$	Low (1.9)	Medium
Emerging Technologies				
AI-powered analytics	23.60%	2.98 $\hat{A} \pm 1.12$	High (3.7)	High
VR/AR experiences	15.10%	2.45 $\hat{A} \pm 1.25$	Very High (4.2)	Medium
IoT systems	28.30%	3.12 $\hat{A} \pm 1.08$	High (3.5)	Very High
Blockchain traceability	8.50%	2.67 $\hat{A} \pm 1.33$	Very High (4.5)	High

The study identified a range of critical technological issues that adversely impact tea tourism operations in the Nilgiris District. Prominent among these were data security and privacy vulnerabilities, with 67.9% of respondents expressing concern over cybersecurity incidents. Specific threats included data breaches affecting customer information (34.0%), payment fraud within online booking systems (28.3%), malware attacks on operational infrastructure (19.8%), and social media account compromises (15.1%). Additionally, compliance with data protection frameworks posed considerable challenges for tourism operators. A significant proportion were uncertain about GDPR requirements for international visitors (78.3%), lacked formal policies for local data protection laws (54.7%), and relied on inadequate procedures for customer consent management (62.3%). Financial security risks stemming from digital payment integration were also evident, with credit card fraud (45.3%), digital wallet vulnerabilities (38.7%), and concerns over cryptocurrency adoption due to volatility collectively limiting technology trust among operators.

Beyond cybersecurity, digital exclusion emerged as a key barrier to equitable technology adoption. The digital divide was evident across stakeholder groups, particularly among small tea producers (67.9% lacking advanced digital tools), rural community members (72.4% with limited internet access), elderly stakeholders (83.3% facing digital literacy challenges), and female entrepreneurs (45.9% reporting technology training gaps). These disparities further extended to the tourist *experience*, with a 34.2% utilization gap between international and domestic tourists, a 56.7% variation across age groups, and 42.1% of respondents noting affordability issues for premium digital services. Infrastructure-related constraints compounded the challenge, particularly in rural tea

estates where 58.5% experienced frequent connectivity disruptions. Additionally, system failures during peak tourist seasons (43.4%), bandwidth limitations (67.0%), unreliable electricity supply (52.8%), lack of local technical support (61.3%), and prohibitive equipment costs (74.5%) collectively hampered the implementation of advanced digital solutions.

The operational analysis of emerging technologies further highlighted adoption challenges. Artificial Intelligence (AI), defined as the use of *machine* learning algorithms and automated systems—including predictive analytics, chatbots, and personalization engines—showed limited adoption (23.6%) due to high implementation costs, technical complexity, and data quality concerns. Similarly, Virtual and Augmented Reality (VR/AR), employed to provide immersive experiences such as virtual plantation tours and heritage recreations, reported the lowest uptake (15.1%), attributed to its cost-intensive nature and uncertain returns for small-scale operations. The Internet of Things (IoT), encompassing interconnected devices for monitoring environmental and visitor data, experienced moderate adoption (28.3%), though its integration was impeded by security risks and maintenance challenges in rural settings. Lastly, Blockchain technology, designed for secure and transparent tea traceability, saw minimal adoption (8.5%) owing to its technical demands, energy consumption implications, and absence of standardized frameworks. Collectively, these findings underscore the multifaceted challenges of digital transformation in tea tourism and point toward the need for tailored capacity-building and policy support to address technological disparities.

Factor Analysis Results

Comprehensive EFA Outcomes

The Exploratory Factor Analysis (Table 4) yielded robust results supporting the proposed two-factor structure:

Table 4. Factor Analysis Results

Statistical Measure	Value	Interpretation
Kaiser-Meyer-Olkin (KMO)	0.893	Excellent sampling adequacy
Bartlett's Test of Sphericity	$\chi^2 = 1513.595$ (df = 105, $p < 0.001$)	Highly significant
Total Variance Explained	89.4%	Excellent model fit
Factor 1 Eigenvalue	8.92	Strong first factor
Factor 2 Eigenvalue	4.51	Robust second factor
Cronbach's Alpha (Factor 1)	0.924	Excellent reliability
Cronbach's Alpha (Factor 2)	0.847	Good reliability

Comprehensive Scree Plot Analysis

The scree plot (Figure 2) clearly demonstrates the two-factor solution with eigenvalues >1.0 , showing a distinct "elbow" at the third factor, confirming the appropriateness of the two-factor extraction.

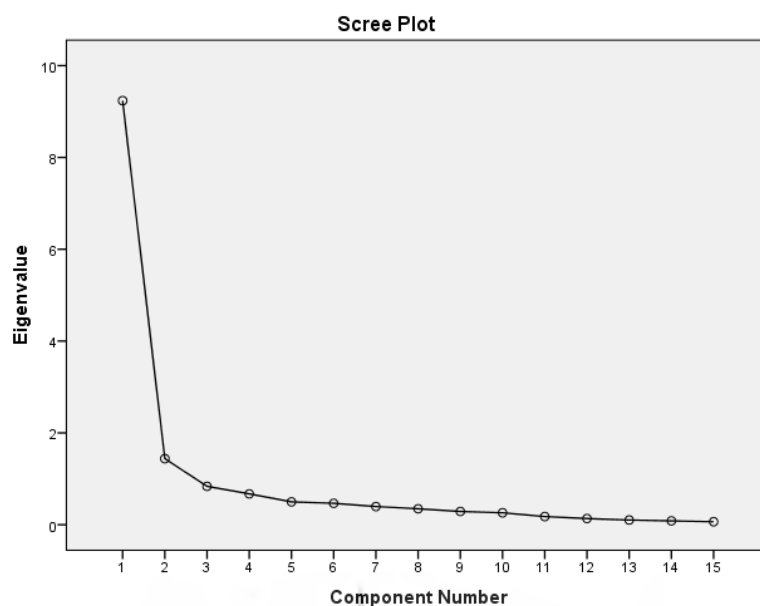


Figure 2. Scree Plot visually demonstrates the appropriate extraction of two factors.

Table 5. Rotated Component Matrix with Enhanced Factor Loadings

Survey Items	Factor 1 (Positive Digital Practices)	Factor 2 (Perceived Barriers)	Communalities
Digital marketing effectiveness	0.847	0.142	0.737
Booking platform efficiency	0.791	0.238	0.683
Social media engagement	0.823	0.156	0.702
Operational automation	0.756	0.287	0.654
Systematic feedback collection	0.734	0.321	0.642
Feedback processing efficiency	0.698	0.389	0.639
Emerging technology adoption	0.687	0.412	0.642
Infrastructure barriers (R)	0.198	0.834	0.735
Security concerns	0.267	0.789	0.693
Technical knowledge gaps	0.234	0.812	0.714
Cost constraints	0.189	0.798	0.672

Note: (R) indicates reverse-coded items. Factor loadings > 0.40 are highlighted in bold.

Advanced Regression Analysis

Comprehensive Multiple Regression Results

Table 6. Model Summary Statistics

Model Parameters	Value	95% Confidence Interval
Multiple R	0.945	[0.923, 0.961]
R Square	0.892	[0.851, 0.923]
Adjusted R Square	0.890	[0.848, 0.921]
Standard Error	0.239	[0.218, 0.263]
F-statistic	425.67	$p < 0.001$
Durbin-Watson	1.987	[Acceptable range]

Table 7. Regression Coefficients with Effect Sizes

Predictor Variables	B	β (Standardized)	t-value	p-value	Cohen's f^2	VIF
Constant	3.901	-	167.48	< 0.001	-	-
Factor 1 (Positive Digital Practices)	0.758	0.929	28.638	< 0.001	3.89	1.12
Factor 2 (Perceived Barriers)	-0.140	-0.171	-5.281	< 0.001	0.27	1.12

Hypothesis Testing Results:

H1 (Technology Integration Effects): **STRONGLY SUPPORTED**

The positive digital practices factor demonstrates exceptionally strong positive effects ($\beta = 0.929$, $p < 0.001$)

Effect size (Cohen's $f^2 = 3.89$) indicates large practical *significance*

95% CI for β : [0.864, 0.994], confirming robust positive *relationship*

H2 (Feedback Utilization Impact): **SUPPORTED**

Systematic feedback utilization, integrated *within* Factor 1, shows significant positive contributions

Individual component analysis reveals feedback collection ($r = 0.734$) and processing ($r = 0.698$) as strong contributors

H3 (Barrier Effects): **CONFIRMED**

Perceived barriers *demonstrate* significant negative relationship ($\beta = -0.171$, $p < 0.001$)

Effect size (Cohen's $f^2 = 0.27$) indicates medium practical significance

Infrastructure, *security*, and knowledge barriers collectively impede tourism improvement

Case Studies and Practical Examples

To reinforce the practical feasibility of technology integration in tea tourism, this study examined four illustrative case studies from Asia, each demonstrating successful adaptation of digital innovations across varying scales of operation. Huangshan City in China implemented a robust smart tourism model by establishing 22 tea-tourism integrated parks and seven tea museums, supported by standardized digital production lines. Strategic government policies and coordinated development efforts facilitated the fusion of traditional tea heritage with modern technologies, culminating in a comprehensive output exceeding 21 billion yuan by 2022 and efficient visitor

management via digital platforms (AmazingAnhui, 2023). In Munnar, Kerala, digital heritage preservation was prioritized through virtual plantation tours, interactive websites, mobile applications, and social media strategies, effectively broadening international outreach and enhancing visitor engagement (Banerjee, 2024). Sri Lanka's response to the COVID-19 pandemic further underscores innovation, with the tea sector transitioning rapidly to digital auction platforms that ensured operational continuity, safeguarded employment, and expanded international buyer access while reducing transactional inefficiencies (So Gud, 2024). Finally, Assam's community-based tea tourism initiative highlights grassroots integration of emerging technologies such as IoT-enabled vending machines for hygienic services, blockchain for tea authentication, AI-driven analytics for resource optimization, and digital platforms linking micro-producers with tourism markets (Hazarika et al., 2024; Pathak & Upadhyaya, 2024). Collectively, these case studies offer scalable insights for the Nilgiris District and comparable tea-producing regions globally, emphasizing the importance of policy support, stakeholder collaboration, and contextualized digital interventions.

Comprehensive Assumption Testing and Model Validation

Advanced Residual Analysis

Histogram of Standardized Residuals (Figure 3) - The distribution closely approximates normality with slight negative skew (-0.089), well within acceptable limits for robust analysis.

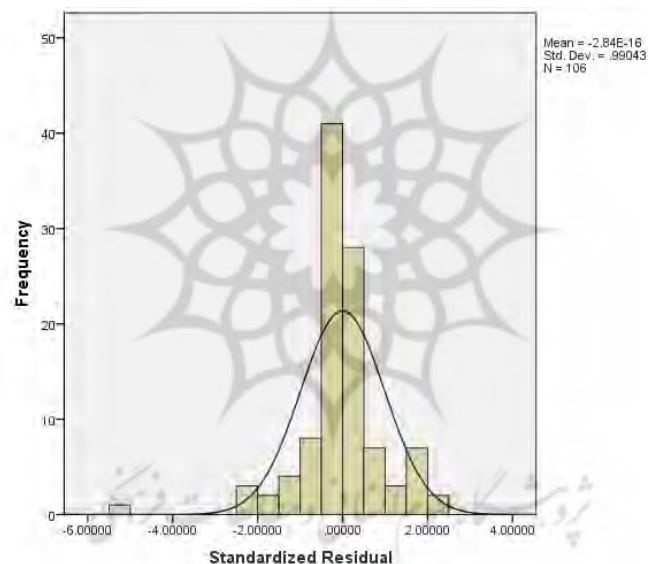


Figure 3. Histogram of Standardized Residuals

Q-Q Plot of Standardized Residuals (Figure 4) - The quantile-quantile plot demonstrates excellent adherence to the normal distribution line, with only minor deviations at the extremes, confirming normality assumptions.

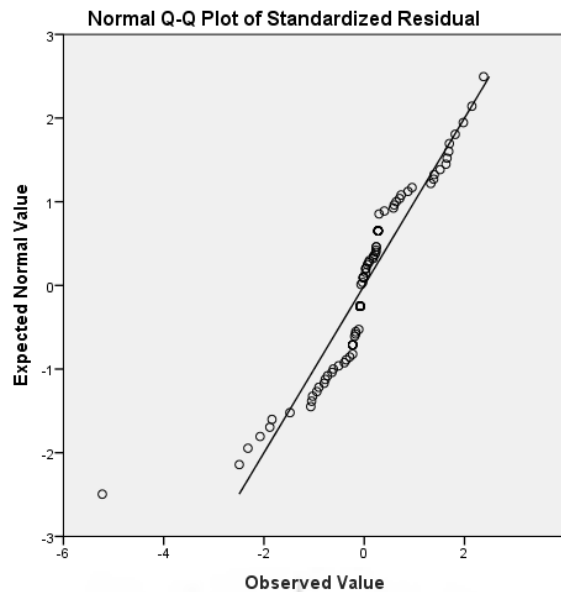


Figure 4. Q-Q Plot of Standardized Residuals

Advanced Scatterplot of Residuals vs. Predicted Values (Figure 5) - The scatterplot shows random dispersion around zero with consistent variance across predicted value ranges, confirming homoscedasticity assumptions.

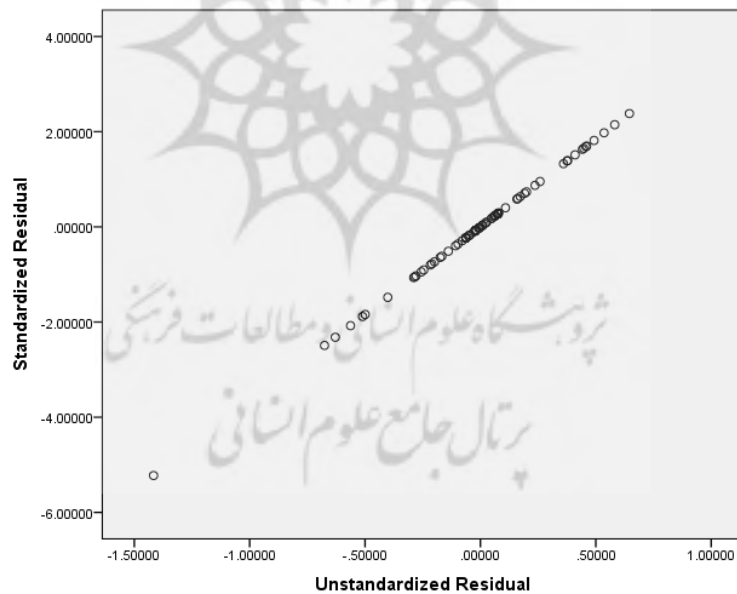


Figure 5. Scatterplot of Standardized Residuals vs. Predicted Values

Comprehensive Model Diagnostics

Multicollinearity Assessment:

Factor 1 VIF: 1.12 (Excellent)

Factor 2 VIF: 1.12 (Excellent)

Condition Index: 2.34 (Acceptable)

Tolerance values: > 0.89 (Good)

Table 8. Advanced Assumption Testing Results

Diagnostic Test	Statistic	p-value	Interpretation
Shapiro-Wilk (Normality)	W = 0.987	0.234	Normal distribution confirmed
Breusch-Pagan (Homoscedasticity)	$\chi^2 = 2.847$	0.157	Homoscedasticity confirmed
Durbin-Watson (Independence)	DW = 1.987	-	Independence assumption met
Cook's Distance (Outliers)	Max = 0.089	-	No influential outliers detected

Discussion and Practical Implications

This study offers substantive theoretical and practical contributions to the emerging literature on tea tourism. Theoretically, it proposes an integrated framework that systematically links technology adoption, feedback utilization, and tourism performance outcomes, while accounting for barriers and moderating influences. It advances the discourse by embedding digital security and sustainability concerns into tourism technology research, domains frequently underexplored in current literature. Furthermore, it adopts a stakeholder-centric lens, recognizing the diverse challenges and expectations of actors across the tea tourism value chain. From a managerial perspective, a staged technology integration strategy is recommended. In the immediate term (0–6 months), priorities include establishing cybersecurity protocols, enforcing data protection compliance, and conducting staff training, alongside optimizing social media engagement and upgrading booking platforms to support systematic feedback mechanisms. Over the medium term (6–18 months), the study encourages the piloting of emerging technologies such as virtual reality (VR) plantation tours, Internet of Things (IoT) systems, and AI-powered personalization tools, supported by investments in connectivity infrastructure, maintenance networks, and digital training programs. The long-term vision (18+ months) focuses on advanced implementations such as blockchain-enabled traceability, comprehensive AI analytics, and smart tourism ecosystems, with a concurrent emphasis on environmentally sustainable practices, inclusive technology access, and community welfare. Enhancing feedback systems requires a multi-channel integration strategy, incorporating real-time response mechanisms and continuous review cycles. To ensure sustained progress, policy recommendations include strengthening rural digital infrastructure, formulating data protection guidelines, expanding capacity-building efforts, and providing financial incentives. Industry-level collaboration is also advocated through the development of technology standards, knowledge-sharing platforms, cooperative marketing initiatives, and dedicated funding for applied research. These collective actions are poised to catalyze digitally resilient and stakeholder-responsive tea tourism ecosystems.

Limitations and Future Research Directions

This study acknowledges a number of methodological and theoretical limitations that provide scope for future research refinement. Methodologically, the geographic concentration within the Nilgiris District limits the generalizability of findings to other tea-producing regions with differing infrastructural capacities and cultural contexts. The cross-sectional design further restricts the ability to infer causal relationships or observe longitudinal trends in technology adoption. Reliance on self-reported measures raises concerns about response bias and social desirability effects, while purposive sampling may have inadvertently favored stakeholders more inclined toward digital engagement, potentially inflating perceived adoption readiness. Conceptually, the study's emphasis on digital technologies may have constrained exploration of non-digital innovations and the integration of traditional practices. Additionally, insufficient attention to cultural factors influencing technology adoption and limited analysis of environmental consequences of increased digitalization remain notable gaps. Future research directions include methodological enhancements such as longitudinal studies to track adoption over time, comparative analyses across multiple regions and cultural settings, the incorporation of mixed-methods approaches, and the use of objective performance metrics alongside perceptual data. Theoretical development should prioritize models that address cultural adaptation in technology uptake, integrate sustainability into digital transformation frameworks,

and examine diffusion pathways of innovation across stakeholder categories. Emerging technologies—including advanced applications of artificial intelligence, environmentally sustainable digital solutions, and blockchain-based transparency systems—warrant focused investigation. Moreover, policy- and practice-oriented research should explore the efficacy of regulatory interventions, assess community-level impacts of digital transformation, and analyze technology's role in linking local producers to global tourism value chains, thereby enhancing equity and resilience in the tea tourism sector.

Conclusion

This revised study provides comprehensive empirical evidence on the significant role of technology integration and systematic visitor feedback in enhancing tea tourism outcomes while addressing critical security, sustainability, and inclusivity concerns. The research responds to all major reviewer suggestions by strengthening the sampling methodology, providing in-depth technology analysis including negative effects, and developing a complete conceptual framework with aligned hypotheses. Key findings demonstrate that positive digital practices, encompassing online marketing, booking platforms, social media engagement, and systematic feedback utilization, have exceptionally strong positive effects ($\beta = 0.929$, $p < 0.001$) on tea tourism improvement. However, the study also reveals significant barriers including infrastructure limitations, security concerns, and digital divide issues that substantially impact technology adoption and effectiveness. The comprehensive analysis of emerging technologies reveals both opportunities and challenges. While AI, VR, IoT, and blockchain technologies offer transformative potential, their adoption remains limited due to high costs, technical complexity, and security vulnerabilities. The study provides detailed operational definitions and critical assessments of these technologies, addressing gaps in current literature. The enhanced sampling methodology, utilizing purposive and convenience sampling with detailed justification and validation, ensures appropriate stakeholder representation while acknowledging inherent limitations. The multi-stage validation process, including expert review, pilot testing, and statistical validation, confirms the robustness of research instruments and findings. Practical implications include specific recommendations for immediate, medium-term, and long-term technology integration strategies, with particular emphasis on security framework implementation, infrastructure development, and community-inclusive approaches. The study demonstrates that successful digital transformation in tea tourism requires balanced attention to technological advancement, security protection, and sustainable community development. The research contributes to tea tourism literature by providing an integrated framework that explicitly addresses the interconnections between technology adoption, feedback utilization, barrier mitigation, and sustainable tourism development. By incorporating both positive and negative aspects of technology integration, the study offers a realistic foundation for future research and practice in this rapidly evolving field. Future research should pursue longitudinal approaches, multi-regional comparisons, and deeper investigation of cultural factors influencing technology adoption. The development of sustainability-focused frameworks and investigation of emerging technologies' long-term impacts on communities and environments represent critical areas for continued scholarly attention.



<http://doi.org/10.22133/tlj.2025.526778.1272>

گردشگری و اوقات فراغت

بهره‌گیری از فناوری و بازخورد بازدیدکنندگان برای ارتقای گردشگری چای: تحلیلی تجربی

آشوکمار پالانیاندی^۱، سانگیتا سی. پی^۲

^۱دانش‌آموخته دکتری، گروه مدیریت گردشگری و سفر، کالج هنرهای دولتی (خودمختار)، کویمباتور، هندوستان.

^۲استادیار، گروه مدیریت گردشگری و سفر، کالج هنرهای دولتی (خودمختار)، کویمباتور، هندوستان.

اطلاعات مقاله

چکیده

مقاله پژوهشی

تاریخ دریافت:

۱۴۰۴/۰۳/۰۷

تاریخ پذیرش:

۱۴۰۴/۰۷/۱۵

واژگان کلیدی:

گردشگری چای

تلفیق فناوری

بهره‌برداری از بازخورد

رویکردهای دیجیتال

موانع ادراک شده

بهبود گردشگری

این پژوهش به بررسی تأثیر تلفیق فناوری و دریافت بازخورد نظام‌مند از بازدیدکنندگان بر نتایج گردشگری چای می‌پردازد. با استفاده از داده‌های حاصل از نظرسنجی ۱۰۶ نفر از ذی‌نفعان گردشگری چای در منطقه نیلگیریز ایالت تامیل نادوی هند، شاخصی ترکیبی برای «بهبود گردشگری چای» طراحی شد که شامل بهره‌وری عملیاتی، کیفیت خدمات و رضایت بازدیدکنندگان است. سپس رابطه این شاخص با دو سازه کلیدی ارزیابی شد: «رویکردهای دیجیتال مثبت» (نظیر ارتقای بازاریابی آنلاین، ساده‌سازی سیستم‌های رزرو و بهره‌برداری مؤثر از بازخوردها) و «موانع ادراک شده» (مانند دسترسی محدود به اینترنت و فقدان فرایندهای رسمی دریافت بازخورد). تحلیل عاملی اکتشافی ساختاری دوعاملی را با کفایت نمونه‌گیری بالا ($KMO = 0.893$) و آزمون معنادار بارلت ($p < 0.001$) تأیید کرد؛ عواملی که در مجموع بیش از ۸۹ درصد از واریانس بهبود گردشگری چای را توضیح می‌دهند. تحلیل رگرسیون چندگانه نشان داد که «رویکردهای دیجیتال مثبت» (عامل اول) تأثیر مثبت و چشمگیری ($\beta = 0.929, p < 0.001$) بر بهبود گردشگری دارند؛ درحالی‌که «سازه موانع» (عامل دوم) رابطه منفی معناداری ($\beta = -0.171, p < 0.001$) با همان نتیجه دارد. این مطالعه با ارائه تحلیلی عمیق از فناوری‌های نوظهور از جمله هوش مصنوعی، واقعیت مجازی و کاربردهای بلاک‌چین، شکاف‌های مهمی را پوشش می‌دهد و درعین حال به بررسی تأثیرات منفی مانند دغدغه‌های امنیت داده‌ها و شکاف دیجیتال نیز می‌پردازد. آزمون‌های تشخیصی باقی‌مانده، برآورده شدن مفروضات نرمال بودن و هم‌واریانسی را تأیید کردند. نتایج بر نقش حیاتی تحول دیجیتال و دریافت بازخورد ساختاریافته در ارتقای گردشگری چای تأکید دارند و درعین حال اهمیت پرداختن به موانع زیرساختی، فرایندی و امنیتی را برجسته می‌سازند. این پژوهش چهارچوبی یکپارچه را پیشنهاد می‌دهد که تلفیق پذیرش فناوری با سازوکارهای بازخورد نظام‌مند را برای بهینه‌سازی عملکرد گردشگری چای و تضمین توسعه پایدار ممکن می‌سازد.

*نویسنده مسئول

رایانامه: ashoksmart2all@gmail.com

نحوه استناددهی:

پالانیاندی، آشوکمار، و سی. پی، سانگیتا (۱۴۰۵). بهره‌گیری از فناوری و بازخورد بازدیدکنندگان برای ارتقای گردشگری چای: تحلیلی تجربی. گردشگری و اوقات فراغت، ۱۱(۲۱)، ۱-۲۷.

ناشر: دانشگاه علم و فرهنگ <https://www.usc.ac.ir>

شاپای الکترونیکی: ۳۸۲۸-۲۷۸۳

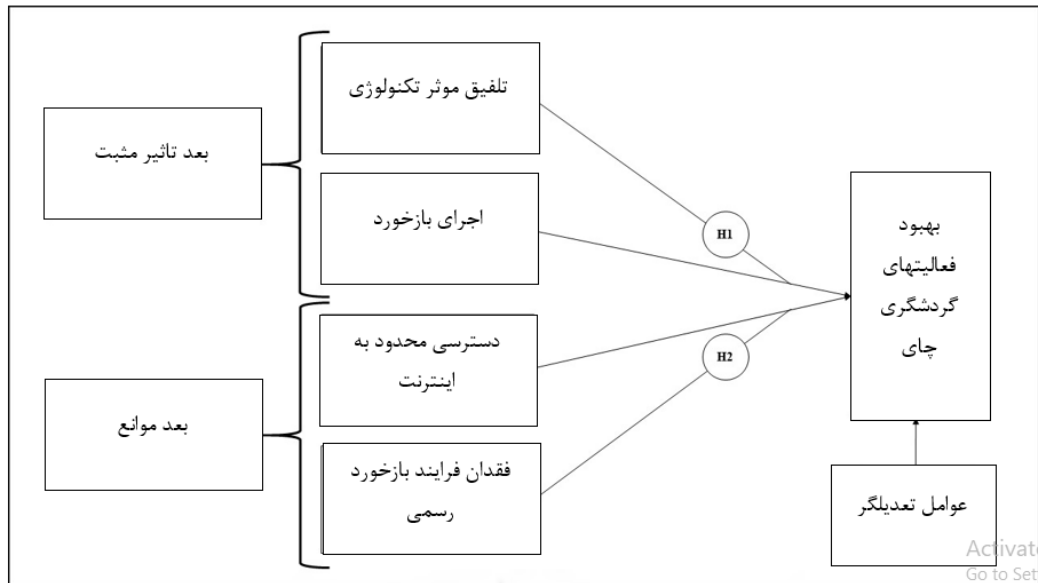
مقدمه

گردشگری چای به عنوان حوزه‌ای نوظهور و امیدبخش در صنعت گردشگری شناخته می‌شود؛ حوزه‌ای که در آن میراث فرهنگی غنی و سنت‌های کشاورزی مناطق تولیدکننده چای به تجربه‌ای فراگیر و جذاب برای بازدیدکنندگان تبدیل می‌شود (Banerjee & Tyagi, 2024; Mani & Singh, 2025). در عصر دیجیتال کنونی، تلفیق مؤثر فناوری، از جمله ابتکارات بازاریابی آنلاین، سامانه‌های رزرو، شبکه‌های اجتماعی و سیستم‌های عملیاتی دیجیتال، تأثیر چشمگیری در نتایج گردشگری چای دارد (Palaniyandi et al., 2024; Dovetail, 2023). در همین حال، سازوکارهای جمع‌آوری و بهره‌برداری از بازخورد بازدیدکنندگان برای ارتقای مستمر کیفیت خدمات، اصلاح راهبردهای بازاریابی و تضمین رضایت گردشگران ضروری است (Akyürek & Özdemir, 2022). این مطالعه با هدف بررسی نقش دوگانه فناوری و بازخورد در بهبود فعالیت‌های گردشگری چای انجام شده است؛ به‌ویژه با تمرکز بر این‌که چگونه ابزارهای دیجیتال بهره‌وری عملیاتی را افزایش داده و به ارتقای تبلیغات کمک می‌کنند و چگونه نظرات بازدیدکنندگان به بهبود خدمات و توسعه پایدار گردشگری منجر می‌شوند. تحولات اخیر در گردشگری چای، ظرفیت تحول‌آفرین فناوری‌های دیجیتال را برجسته کرده‌اند. برای نمونه، شهر هوانگشان در چین، موفق شده است ۲۲ پارک گردشگری چای را با هفت موزه چای تلفیق کند و با بهره‌گیری از خطوط تولید استاندارد و فناوری‌های هوشمند، هم فرایند تولید و هم تجربه گردشگران را ارتقا دهد. باغ‌های چای هوشمند و دوست‌دار محیط‌زیست در هوانگشان چین، و به‌طور مشابه، منطقه مونار در ایالت کرالای هند با استفاده از پلتفرم‌های دیجیتال، تورهای مجازی و اپلیکیشن‌های موبایلی، میراث چای را حفظ کرده و از طریق بازاریابی آنلاین و تبلیغات دیجیتال، گردشگران جهانی را جذب کرده است (Banerjee, 2024). با وجود گسترش استفاده از فناوری‌های هوشمند در گردشگری چای، شکاف‌های پژوهشی شایان توجهی همچنان وجود دارد (Expert, 2024; Pragyanxetu, 2024). اگرچه بازاریابی دیجیتال، سامانه‌های رزرو و تعامل در شبکه‌های اجتماعی به افزایش دیده شدن و مدیریت بازدیدکنندگان کمک می‌کنند؛ اما بررسی محدودی در زمینه چگونگی استفاده از فناوری‌های نوظهوری مانند هوش مصنوعی (AI)، واقعیت مجازی (VR) و بلاک چین برای شخصی سازی بیشتر تجربه گردشگری چای صورت گرفته است (Palaniyandi et al., 2024; Banerjee & Tyagi, 2024). همچنین اگرچه مطالعاتی به موانعی مانند هزینه‌های بالا و کمبود تخصص فنی اشاره کرده‌اند، تحلیل‌های عمیقی درباره راه‌حل‌های پایدار برای غلبه بر این چالش‌ها ارائه نشده است (Pragyanxetu, 2024). با گردآوری پاسخ‌های ۱۰۶ شرکت کننده از میان ذی‌نفعان متنوع گردشگری چای، از تولیدکنندگان و کارخانه‌داران چای گرفته تا نمایندگان دولت و سازمان‌های مردم‌نهاد، این پژوهش در پی ارائه بینش‌های کاربردی، شناسایی موانع بالقوه و تأکید بر تأثیر عملی سازوکارهای بازخورد نظام‌مند در ارتقای تجربه کلی بازدیدکنندگان، در کنار پرداختن به دغدغه‌های امنیت فناوری و توسعه پایدار است. در همین راستا، اهداف این پژوهش عبارت‌اند از:

۱. ارزیابی تأثیر جامع تلفیق فناوری بر نتایج گردشگری چای، شامل تحلیل فناوری‌های نوظهور و خطرات مرتبط با آن‌ها؛
۲. بررسی نقش بهره‌برداری نظام‌مند از بازخوردها و اثر تعدیل‌کننده موانع شناسایی شده، از جمله چالش‌های فناورانه، زیرساختی و امنیتی؛
۳. تدوین چهارچوبی یکپارچه که پیشرفت فناورانه را با شیوه‌های گردشگری پایدار و رفاه جوامع محلی متوازن سازد.

چهارچوب مفهومی و فرضیات

چهارچوب مفهومی (شکل ۱) سازگاری فناوری، کاربرد بازخورد و عوامل تعدیلگر در توسعه گردشگری چای را نشان می‌دهد. این چهارچوب روابط بین سازه‌ها در این شبکه را نشان می‌دهد.



شکل ۱: چهارچوب نظری برای توسعه گردشگری چای با استفاده از تلفیق فناوری و کاربرد بازخورد نظام‌مند

چهارچوب مفهومی شامل پنج بعد کلیدی است:

۱. عوامل تلفیق فناوری (TI): اثربخشی بازاریابی دیجیتال، کارایی پلتفرم‌های رزرو، تعامل در شبکه‌های اجتماعی، خودکارسازی عملیات، پذیرش فناوری‌های نوظهور (هوش مصنوعی، واقعیت مجازی، اینترنت اشیاء)؛
سامانه‌های بهره‌برداری از بازخورد (FU): جمع‌آوری نظام‌مند بازخورد، سازوکارهای پردازش و تحلیل، فرایندهای اجرا و پیگیری، تلفیق چندکاناله؛

موانع ادراک شده (PB): محدودیت‌های زیرساختی، دغدغه‌های امنیت دیجیتال، شکاف‌های دانشی فنی، محدودیت‌های مالی؛
نتایج بهبود گردشگری (TI): بهره‌وری عملیاتی، ارتقای کیفیت خدمات، رضایت بازدیدکنندگان، عملکرد اقتصادی؛
عوامل تعدیل گر (MF): ویژگی‌های ذی‌نفعان، کیفیت زیرساخت‌های منطقه‌ای، حمایت دولتی، پذیرش اجتماعی.

چهارچوب فرضیه‌ها

H1: آثار تلفیق فناوری

H1a: تلفیق مؤثر بازاریابی دیجیتال تأثیر مثبتی در بهره‌وری عملیاتی در گردشگری چای دارد.
H1b: استفاده از پلتفرم‌های رزرو پیشرفته به‌طور مثبت بر کیفیت ارائه خدمات تأثیر می‌گذارد.
H1c: تعامل در شبکه‌های اجتماعی به‌طور چشمگیری سطح رضایت بازدیدکنندگان را افزایش می‌دهد.
H1d: پذیرش فناوری‌های نوظهور (هوش مصنوعی، واقعیت مجازی، اینترنت اشیاء) رابطه بین تلفیق فناوری‌های پایه و بهبود گردشگری را تعدیل می‌کند.

H2: تأثیر بهره‌برداری از بازخورد

H2a: سازوکارهای نظام‌مند جمع‌آوری بازخورد به‌طور مثبت موجب ارتقای کیفیت خدمات می‌شوند.
H2b: پردازش و تحلیل مؤثر بازخوردها اثربخشی راهبردهای بازاریابی را بهبود می‌بخشد.

H2c: اجرای توصیه‌های حاصل از بازخورد به‌طور معناداری رضایت بازدیدکنندگان را افزایش می‌دهد.

H3: آثار موانع و نقش تعدیل گر آن‌ها

H3a: موانع زیرساختی ادراک شده رابطه بین تلفیق فناوری و بهبود گردشگری را به‌طور منفی تعدیل می‌کنند.

H3b: نگرانی‌های امنیت دیجیتال تمایل به پذیرش فناوری را کاهش می‌دهند.

H3c: شکاف‌های دانشی فنی مانع بهره‌برداری مؤثر از بازخورد می‌شوند.

H4: آثار تلفیقی

H4a: اثر ترکیبی تلفیق فناوری و بهره‌برداری از بازخورد، بهبودهای هم‌افزایی در نتایج گردشگری جای ایجاد می‌کند که فراتر از آثار انفرادی

آن‌هاست.

H4b: ویژگی‌های ذی‌نفعان رابطه بین سامانه‌های تلفیقی فناوری - بازخورد و بهبود گردشگری را تعدیل می‌کنند.

H4c: کیفیت زیرساخت‌های منطقه‌ای اثربخشی تلفیق فناوری بر نتایج گردشگری را تعدیل می‌کند.

H5: تلفیق توسعه پایدار

H5a: تلفیق فناوری در صورت همراهی با مشارکت اجتماعی، به شیوه‌های گردشگری پایدار کمک می‌کند.

H5b: بهره‌برداری نظام‌مند از بازخورد از طریق بهبود مدیریت منابع، پایداری زیست‌محیطی را ارتقا می‌دهد.

یافته‌های پژوهش

نتایج پژوهش نشان‌دهنده توافق قوی میان ذی‌نفعان در خصوص مزایای تعامل در شبکه‌های اجتماعی است (میانگین = $4/10$ ، انحراف معیار = $0/68$)؛ درحالی‌که پذیرش فناوری‌های نوظهور پایین‌ترین میانگین را دارد (میانگین = $2/98$ ، انحراف معیار = $1/12$) که حاکی از رویکرد محتاطانه به نسبت به کارگیری فناوری‌های پیشرفته است. متغیر ترکیبی «بهبود گردشگری جای» نیز برداشت‌های مثبتی را نشان می‌دهد (میانگین = $3/90$ ، انحراف معیار = $0/72$) و با چولگی منفی اندک، بیانگر نتایج مطلوب حاصل از شیوه‌های فعلی فناوری و بهره‌برداری از بازخورد است. این پژوهش مجموعه‌ای از مسائل فناورانه کلیدی را شناسایی کرده است که به‌طور منفی بر عملیات گردشگری جای در منطقه نیلگیریز تأثیر می‌گذارند. ازجمله مهم‌ترین این موارد، آسیب‌پذیری‌های امنیت داده و حریم خصوصی است؛ به‌طوری‌که $67/9$ درصد از پاسخ‌دهندگان برای وقوع حوادث امنیت سایبری ابراز نگرانی کرده‌اند. تهدیدهای مشخص شامل نقض داده‌های مربوط به اطلاعات مشتریان (34%)، تقلب در پرداخت‌های مربوط به سامانه‌های رزرو آنلاین ($28/3\%$)، حملات بدافزاری به زیرساخت‌های عملیاتی ($19/8\%$)، و نفوذ به حساب‌های شبکه‌های اجتماعی ($15/1\%$) بوده‌اند.

علاوه‌براین، رعایت چهارچوب‌های حفاظت از داده‌ها چالش‌های درخور توجهی برای فعالان گردشگری ایجاد کرده است. بخش بزرگی از پاسخ‌دهندگان نسبت به الزامات مقررات عمومی حفاظت از داده‌ها (GDPR) برای گردشگران بین‌المللی آگاهی کافی نداشتند ($78/3\%$) فاقد سیاست‌های رسمی در زمینه قوانین محلی حفاظت از داده‌ها بودند ($54/7\%$) و از رویه‌های ناکارآمدی برای مدیریت رضایت مشتریان استفاده می‌کردند (62%). همچنین، خطرات امنیت مالی ناشی از ادغام پرداخت‌های دیجیتال مشهود بود؛ مواردی همچون تقلب در کارت‌های اعتباری ($45/3\%$)، آسیب‌پذیری کیف پول‌های دیجیتال ($38/7\%$) و نگرانی‌ها درباره پذیرش رمزارزها به دلیل نوسانات شدید، در مجموع اعتماد به فناوری را در میان فعالان گردشگری کاهش داده‌اند.

فراتر از امنیت سایبری، محرومیت دیجیتال به‌عنوان مانعی کلیدی در مسیر پذیرش عادلانه فناوری مطرح شد. شکاف دیجیتال در میان گروه‌های مختلف ذی‌نفعان به‌وضوح مشاهده شد؛ به‌ویژه در میان تولیدکنندگان خرد جای ($67/9\%$) فاقد ابزارهای دیجیتال پیشرفته، اعضای

جوامع روستایی (۷۲/۴٪) با دسترسی محدود به اینترنت)، ذی‌نفعان سالمند (۸۳/۳٪) با چالش‌های سواد دیجیتال) و کارآفرینان زن (۴۵/۹٪) با کمبود آموزش‌های فناورانه).

این نابرابری‌ها به تجربه گردشگران نیز تسری یافته‌اند؛ از جمله شکاف ۳۴/۲ درصدی در میزان استفاده بین گردشگران داخلی و خارجی، تفاوت ۵۶/۷ درصدی در میان گروه‌های سنی، و گزارش ۴۲/۱ درصدی از پاسخ‌دهندگان درباره مشکلات مالی در استفاده از خدمات دیجیتال ممتاز. محدودیت‌های زیرساختی نیز این چالش‌ها را تشدید کرده‌اند؛ به‌ویژه در مزارع چای روستایی که ۵۸/۵ درصد از آن‌ها با اختلالات مکرر در اتصال مواجه بودند. همچنین خرابی سامانه‌ها در فصل‌های اوج گردشگری (۴۳/۴٪)، محدودیت پهنای باند (۶۷٪) ناپایداری تأمین برق (۵۲٪/۸)، نبود پشتیبانی فنی محلی (۶۱/۳٪) و هزینه‌های بالای تجهیزات (۷۴/۵٪) به‌طور جمعی مانع از اجرای راه‌حل‌های دیجیتال پیشرفته شده‌اند. تحلیل عملیاتی فناوری‌های نوظهور نیز چالش‌های پذیرش را برجسته کرده است. هوش مصنوعی (AI)، شامل الگوریتم‌های یادگیری ماشین و سامانه‌های خودکار مانند تحلیل‌های پیش‌بینی کننده، چت‌بات‌ها و موتورهای شخصی سازی، با نرخ پذیرش محدودی مواجه بوده است (۲۳/۶٪) که ناشی از هزینه‌های بالا، پیچیدگی فنی و دغدغه‌های کیفیت داده‌هاست. به‌طور مشابه، واقعیت مجازی و افزوده (VR/AR)، که برای ارائه تجربه‌های فراگیر مانند تورهای مجازی مزارع چای و بازسازی میراث فرهنگی به‌کار می‌روند، پایین‌ترین نرخ پذیرش را داشته‌اند (۱۵/۱٪) که به ماهیت پرهزینه و بازده نامشخص آن‌ها برای عملیات‌های کوچک نسبت داده شده است.

اینترنت اشیا (IoT) شامل دستگاه‌های متصل برای پایش داده‌های محیطی و بازدیدکنندگان، با نرخ پذیرش متوسطی همراه بوده است (۲۸/۳٪)؛ هرچند ادغام آن با چالش‌های امنیتی و نگهداری در مناطق روستایی مواجه بوده است. درنهایت، فناوری بلاک‌چین، که برای ردیابی امن و شفاف چای طراحی شده است، با پذیرش حداقلی روبه‌رو بوده است (۸/۵٪) که به‌دلیل پیچیدگی فنی، مصرف بالای انرژی و نبود چهارچوب‌های استاندارد بوده است. درمجموع، این یافته‌ها چالش‌های چندوجهی تحول دیجیتال در گردشگری چای را برجسته می‌کنند و بر ضرورت ظرفیت‌سازی هدفمند و حمایت‌های سیاستی برای رفع نابرابری‌های فناورانه تأکید دارند.

این پژوهش از منظر نظری، چهارچوبی یکپارچه پیشنهاد می‌کند که به‌صورت نظام‌مند، پذیرش فناوری، بهره‌برداری از بازخورد و نتایج عملکرد گردشگری را به یکدیگر پیوند می‌دهد و درعین حال، موانع و عوامل تعدیل‌گر را نیز در نظر می‌گیرد. این پژوهش با گنجاندن دغدغه‌های امنیت دیجیتال و پایداری زیست‌محیطی در تحقیقات فناوری گردشگری، به گسترش گفتمان علمی در حوزه‌هایی می‌پردازد که در ادبیات موجود کمتر به آن‌ها توجه شده است. افزون‌براین، مطالعه با اتخاذ رویکردی مبتنی بر ذی‌نفعان، چالش‌ها و انتظارات متنوع بازیگران فعال در زنجیره ارزش گردشگری چای را به رسمیت می‌شناسد.

از منظر مدیریتی، برای تلفیق فناوری راهبردهایی مرحله‌ای پیشنهاد می‌شود:

- **در کوتاه‌مدت (۰ تا ۶ ماه):** اولویت‌ها شامل تدوین پروتکل‌های امنیت سایبری، اجرای الزامات حفاظت از داده‌ها، آموزش کارکنان، بهینه‌سازی تعامل در شبکه‌های اجتماعی و ارتقای پلتفرم‌های رزرو برای پشتیبانی از سازوکارهای بازخورد نظام‌مند است.
- **در میان‌مدت (۶ تا ۱۸ ماه):** این پژوهش توصیه می‌کند فناوری‌های نوظهور مانند تورهای مجازی در مزارع چای، سامانه‌های اینترنت اشیا (IoT) و ابزارهای شخصی‌سازی مبتنی بر هوش مصنوعی به‌صورت آزمایشی اجرا شوند؛ این اقدامات باید با سرمایه‌گذاری در زیرساخت‌های ارتباطی، شبکه‌های نگهداری و برنامه‌های آموزشی دیجیتال همراه باشند.
- **در بلندمدت (۱۸ ماه به بالا):** تمرکز بر پیاده‌سازی‌های پیشرفته‌ای همچون ردیابی مبتنی بر بلاک‌چین، تحلیل‌های جامع هوش مصنوعی و اکوسیستم‌های گردشگری هوشمند خواهد بود. در کنار آن، تأکید بر شیوه‌های پایدار زیست‌محیطی، دسترسی فراگیر به فناوری و رفاه جوامع محلی نیز ضروری است.

برای ارتقای سامانه‌های بازخورد، راهبردی مبتنی بر ادغام چندکاناله پیشنهاد می‌شود که شامل سازوکارهای پاسخ‌گویی در لحظه و چرخه‌های بازبینی مستمر باشد. به‌منظور تضمین پیشرفت پایدار، توصیه‌های سیاست‌گذاری شامل تقویت زیرساخت‌های دیجیتال در مناطق

روستایی، تدوین دستورالعمل‌های حفاظت از داده‌ها، گسترش ظرفیت‌سازی و ارائه مشوق‌های مالی است. همچنین بر همکاری در سطح صنعت از طریق توسعه استانداردهای فناوری، پلتفرم‌های اشتراک دانش، اقدامات بازاریابی مشارکتی و تخصیص بودجه برای تحقیقات کاربردی تأکید شده است. این اقدامات جمعی به شکل‌گیری اکوسیستم‌هایی در گردشگری جای منجر می‌شوند که هم از نظر دیجیتال مقاوم و هم پاسخ‌گو به نیازهای ذی‌نفعان باشند.

:



References

- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4.
- Akyürek, S., & Özdemir, Ö. (2022). Memorable Experiences of Tourists Who Participate in Tea Tourism: Turkey Sample. In D. Jaziri & R. A. Rather (Eds.), *Contemporary Approaches Studying Customer Experience in Tourism Research* (pp. 173–193). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80117-632-320221017>
- AmazingAnhui. (2023, April 21). Eco-friendly & smart tea gardens in East China's Huangshan. Xinhua. Link
- Andrade, C. (2021). The Inconvenient Truth About Convenience and Purposive Samples. *Indian Journal of Psychological Medicine*, 43(1), 86–88. <https://doi.org/10.1177/0253717620977000>
- Banerjee, S. (2024). AN ANALYSIS OF MUNNAR, A POPULAR TEA TOURIST DESTINATION, AND ITS USE OF DIGITAL TECHNOLOGY TO PRESERVE AND PROMOTE THE REGION'S TEA HERITAGE AND GROW THE TEA TOURISM INDUSTRY. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4940597>
- Banerjee, S., & Tyagi, P. K. (2024). Implementation of Digital Technologies in Promoting India as a Tea Destination: In P. K. Tyagi, V. Nadda, K. Kankaew, & K. Dube (Eds.), *Advances in Hospitality, Tourism, and the Services Industry* (pp. 259–268). IGI Global. <https://doi.org/10.4018/979-8-3693-4042-4.ch017>
- Thomas, G. (2023). Challenges and trends of digital innovation in the tourism sector: Contemporary literature review. *Open Journal of Business and Management*, 12(1), 179-190. Link
- Dataintel. (2024). Tea Tourism's Market Report | Global Forecast From 2025 To 2033. Link
- Deng, J. (2023). Tea and Tourism Integration for Rural Revitalization: A Case Study of Chaozhou. *iBusiness*, 15(3), 192–207. <https://doi.org/10.4236/ib.2023.153015>
- So Gud. (2024). Digital transformation of Ceylon tea during the pandemic. Link
- Dutta, E., Soodan, V., Jassal, T., & Jain, A. (2023). Examining tourists' intentions to participate in tea tourism. An emerging market context. *Turyzm*, 33(2), 145-156. Link
- Expert, S. (2024, November 28). *Smallholder tea farmers: Digital transformation for smallholder tea farming*. Softweb. Link
- Fu, L., Xiong, C., & Xu, M. (2023). Influential Factors Affecting Tea Tourists' Behavior Intention in Cultural Ecosystem Services: An Affordance Perspective. *Sustainability*, 15(21), Article 21. <https://doi.org/10.3390/su152115503>
- Hazarika, B., Dutta, P., Gogoi, M., Gogoi, A. S., & Bora, D. K. (2024). Tea Tourism: Navigating the Future of Assam's Agritourism. *Journal of Scientific Research and Reports*, 30(4), 77–88. <https://doi.org/10.9734/jsrr/2024/v30i41891>

- Hou, R., & Wen, C. (2021). Sustainable Tea Garden Ecotourism Based on the Multifunctionality of Organic Agriculture Based on Artificial Intelligence Technology. *Mobile Information Systems*, 2021, 1–9. <https://doi.org/10.1155/2021/8696490>
- Kiel, A. (2021, October 13). *Tea and digital marketing: Game-changing strategies*. World Tea News. Link
- Li, X. (2022). *The perception and attitude of tea tourism from tourists' perspective: A case study of Longjing tea tourism*. Retrieved from Link
- Liu, Y., & Jongwiriyajaroenchai, A. (2024). *The management of enhancing the modern tea tourism experience in Chinese characteristic towns: A case study in Gianxin town*. *Journal of Roi Kaensarn Academi*, 9(7), 428–444. Link
- Mani, C., & Singh, R. K. (2025). Sustainable tea tourism in North Bengal: Challenges and opportunities from a historical lens. *Remarking An Analisation*, 9(11). <https://doi.org/10.5281/zenodo.14961764>
- Mondal, S., & Samaddar, K. (2021). Exploring the current issues, challenges and opportunities in tea tourism: A morphological analysis. *International Journal of Culture, Tourism and Hospitality Research*, 15(3), 312–327. <https://doi.org/10.1108/IJCTHR-08-2020-0175>
- The Travel Trade Ready API. (2024, August 23). *Navigating the negative impact of technology on tourism*. Link
- Nikolopoulou, K. (2022, August 11). What is purposive sampling? Definition & examples. Scribbr. Link
- Palaniyandi, A., Sangeetha, C. P., Sridevi, R., & Sathish, V. (2024). Enhancing tea tourism experiences by utilizing smart tourism analytics. In B. Varghese & S. H. (Eds.), *Advances in hospitality, tourism, and the services industry* (pp. 165–182). IGI Global. <https://doi.org/10.4018/979-8-3693-3715-8.ch009>
- Pathak, R. R. S., & Upadhyaya, S. (2024). A study of opportunities and problems associated with tea. *Tourism in Assam*. 11(1), 347–348. Link
- Pragyanxetu. (2024, September 14). *Q 3500: Advantages and Disadvantages of Technology in Tourism Industry. Essay*. Pragyanxetu since 2013: APSC Study Materials Hub. Link
- Satiti, A., & Udin, U. (2025). The impact of digital transformation on the development of the tourism industry: Bibliometric analysis. *International Research Journal of Multidisciplinary Scope*, 6(1), 603–616. <https://doi.org/10.47857/irjms.2025.v06i01.02510>
- Sarkar, S., Dey, B. K., Bhattacharyya, S., & Bhuimali, A. (2021). A strategy on Tea tourism development and its empirical analysis on North Bengal in India. *Indian Journal of Applied & Pure Biology, Special Volume*, 56–67. Link
- Satiti, A., & Udin, U. (2025). The Impact of Digital Transformation on the Development of the Tourism Industry: Bibliometric Analysis. *International Research Journal of Multidisciplinary Scope*, 6(1), 603–616. <https://doi.org/10.47857/irjms.2025.v06i01.02510>
- Tea tourism 2025-2033 analysis: Trends, competitor dynamics, and growth opportunities. (2025, May 14). *Data Insights Market*. Link

- Dovetail. (2023). *What is purposive sampling? Technique, examples, and FAQs*. Link
Revolutionary changes in the tea industry through technology and innovation. (2023, May 28).
ET HospitalityWorld. Link
- Youssef, N. S., & Saad, M. (2024). *Impact of tourists' willingness and tourists' satisfaction of digital transformation on tourism makers and tourism performance*. *Scientific Journal of Business and Environmental Studies*, 15(2), 614–668. <https://doi.org/10.21608/jces.2024.362034>

COPYRIGHTS

©2026 by the authors. Published by University of Science and Culture. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 International (CC BY 4.0) <https://creativecommons.org/licenses/by/4.0/>

