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EDITORIAL OFFICE

Faculty of Sciences,
Department of Geography,
Tourism and Hotel Management

Trg Dositeja Obradovića 3,
21000 Novi Sad, Serbia,
tel. +381 21 450-105;
fax +381 21 459-696

turizam@dgt.uns.ac.rs,
http://www.dgt.uns.ac.rs/turizam/engindex.htm

Content

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Overtourism: Insights from Residents of a Himalayan Heritage Hill Station

Kushal TamangA*, Dr Sanmoy MallickB

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Abstract

Overtourism is a phenomenon that negatively affects a tourist destination's economic, social, and environmental aspects. The problems overtourism reflects are overcrowding, traffic congestion, pollution, and stress on transportation infrastructure. This leads our study to understand the overtourism phenomenon through the residents' perception in a tourist destination of a Himalayan hill station. A descriptive research design is used to explore the problems of overtourism from the residents' perspective. The data was collected from 148 residents using Google Forms. The study was conducted in Darjeeling, a prominent Himalayan Heritage hill station situated in the northernmost part of the State of West Bengal, India. The study finds that overtourism is a concerning phenomenon, with its effects highly felt by the residents. The results further presented a strong agreement among locals regarding the region's high economic dependency on tourism. Recognising the need for an economically sound and socially acceptable solution. The study proposes a 3R strategic overtourism management model to address overtourism, where 3R stands for Reduce, Replace, and Regenerate. Rather than a strictly linear or sequential strategy, the 3R model for overtourism is conceptualised as a cross-sectional framework in which all three components may co-exist in an integrated manner within a destination's policy environment. This model proposes three key solutions to mitigating tourism pressure, diversifying tourism as a source of income, and regenerating tourism in a more sustainable manner.

Keywords: *Economic, Environmental, transportation, Overtourism, Perception, Residents, sustainability.*

Introduction

Tourism has often been seen as a vital segment of economic growth driven by advancements in technologies, accessibility of information, and affordability of travel. The rapid increase in tourism activities has brought the concept of overtourism into focus among researchers and experts (Gulsen et al., 2021). The UNWTO (2018) describes overtourism as a situation where tourism negatively influences residents' quality of life and visitors' overall experience. This

A Research scholar, Department of Management, University of North Bengal, Darjeeling, West Bengal, India; Corresponding author: rs_kushal@nbu.ac.in
B Assistant Professor, Department of Management, University of North Bengal, Darjeeling, West Bengal, India; sanmoy.mallick@nbu.ac.in

phenomenon is mainly observed in popular cities like Barcelona, Amsterdam, Venice, London, Kyoto, and Dubrovnik (Colomb & Novy, 2017; Goodwin, 2017). Additionally, concerns are rising rapidly in other places such as Hawaii, Greece, beaches in Spain, national parks of the United States, unexplored places in Japan, and Africa (World Economic Forum, 2023). While tourism improves economies and livelihoods, excessive tourism causes overcrowding, environmental harm, higher costs, gentrification, and reduced visitor satisfaction, leading to negative public perception (Kruczek, 2019; Fedyk et al., 2020). This obstructs global efforts toward sustainable tourism (Goodwin, 2017). Recognising the urgent need to address overtourism, the academic community has started to study and understand its far-reaching consequences and propose potential solutions (Capocchi et al., 2019; Milano et al., 2019a, b). Extensive case studies conducted across different regions have provided valuable insights into the challenges posed by overtourism, along with strategies to mitigate its adverse effects (Wattanacharoensil & Weber, 2020).

While overtourism has been widely debated, most conversations and studies have revolved around European destinations. Developing countries in Asia, like India, with immense tourism potential, have not been studied enough in the context of overtourism (Tamang & Mallick, 2025). In Asia, where many developing nations heavily rely on tourism, residents often tolerate overtourism issues like overcrowding and environmental harm, unlike in the West (Khainthola et al., 2021). Cultural and economic factors also enhance local pride, fostering positive perceptions despite these challenges (Quadros et al., 2024).

Darjeeling, a scenic hill station in West Bengal, India, is known for its popular tea gardens, cool climate, and views of Kanchenjunga. Tourism began in 1829 and flourished under British development, making it a premier retreat by 1880 (Mukherjee, 2022). However, its fragile terrain, with narrow roads, landslide risks, and limited water, faces strain from increasing tourist numbers (Kannegieser, 2015). This growth has led to traffic congestion, water shortages, and overcrowding, issues shared by other Indian hill stations like Shimla, Manali, Ooty, and Nainital (Dar, 2024). These shared struggles make Darjeeling a valuable lens through which to examine overtourism, particularly by amplifying the voices of its residents to guide more sustainable tourism policies.

Despite Darjeeling's enduring popularity as a tourist destination, research on overtourism in the region is scarce. Tourism remains concentrated in Darjeeling town, where a dense cluster of hotels, homestays, and key attractions makes it especially prone to overtourism (Bhattacharya, 1986; Mallick et al., 2023). While some studies have identified tourist hotspots (Banerjee & George, 2024), they often overlook how residents perceive and experience the impacts of tourism. This human dimension is critical, particularly in Asia, where locals may endure tourism-related hardships in exchange for economic stability (Khainthola et al., 2021). No existing research, as far as we know, captures the lived experiences of overtourism by Darjeeling's residents, leaving a gap in understanding that this study aims to address. Using a descriptive, perception-based approach, the study explores whether overtourism is even recognised as an issue by the local population. Giving voice to residents contributes to the global discourse on overtourism and offers a foundation for future, more rigorous research in the region. Ultimately, the study seeks to guide policymakers in managing overtourism in Darjeeling and other similarly vulnerable mountain destinations, recognising that sustainable tourism depends on continued local support and positive resident attitudes (Nunkoo et al., 2019).

Literature review

Concept and definition of overtourism

Overtourism emerged as a formal research concept in 2018, though its underlying issues, such as overcrowding, environmental degradation, and local resistance, were examined as early as the 1960s (Forster, 1964; Wagar, 1964). By the 1980s, attention shifted to carrying capacity, though this remains a contested and context-dependent concept (Nilsson, 2020). The term "overtourism" was used in the early 2000s to describe tourism's overuse of natural resources (An et al., 2008; Nelson, 2002). It is not merely about tourist volume, but when visitation exceeds a destination's physical, ecological, or social capacity, leading to overcrowding, environmental damage, rising costs, gentrification, and resident dissatisfaction (Kruczek, 2019; Fedyk et al., 2020). Environmental impacts include biodiversity loss, pollution, and infrastructure strain (Perez Garrido et al., 2022). Definitions by UNWTO (2018), Peeters et al. (2018), and Higgins-Desbiolles et al. (2019) are widely cited, with Peeters et al. defining overtourism as impacts exceeding ecological or socio-economic thresholds.

Various factors have been considered for overtourism. An increase in tourists, with 1 billion in 2012, is expected to double by 2030 (UNWTO, 2019), increasing overtourism risks. Domestic tourism also adds pressure (Hall, 2015; Phi, 2020). Dodds and Butler (2019) list ten causes of overtourism, from more tourists and cheaper travel to poor management and stakeholder conflicts. Overtourism leads to overcrowding, rising living costs, visitor-host conflicts, and safety concerns (Phi, 2020; Koens et al., 2018). It disrupts local economies, fuels gentrification, harms the environment, and can destroy attractions, creating a 'tourism dystopia' (Bauman, 2019; Panayiotopoulos & Pisano, 2019). Addressing its causes and impacts is vital for sustainable tourism.

Cases of Overtourism Globally

Overtourism has emerged as a key topic in sustainable tourism discussions (Mihalic, 2020), with extensive research focused on popular European cities like Amsterdam, Barcelona, Venice, and Wroclaw, where excessive tourism has raised growing concerns (Alonso-Almeida et al., 2019; Adie et al., 2020; Bertocchi et al., 2020; Fedyk et al., 2020; Hidalgo-Giralt et al., 2021; Benito et al., 2025). These European contexts continue to shape much of the academic discourse on overtourism (Adie et al., 2020; Santos-Rojo et al., 2023), yet the phenomenon varies globally depending on local economic, social, cultural, and ecological factors (Nilsson, 2020; Santos-Rojo et al., 2023). Cases outside Europe, such as Santorini in Greece (Leka et al., 2025), Petra in Jordan, the Karnak Temples in Egypt (Khater et al., 2025), Hunza in Pakistan (Ud Din et al., 2024), and forest tourism in South Korea (Yoon et al., 2024), show overtourism's diverse impacts, from cultural and environmental degradation to overcrowding and identity loss. Events like Mexico City's Day of the Dead celebration exemplify temporal overtourism (Sánchez-Aguirre et al., 2025), while studies in Prague, Krakow, and Braga stress the value of involving residents in tourism planning to mitigate tensions (Walas et al., 2024). Bibliometric analyses confirm that overtourism and sustainability are dominant themes in current tourism research, with growing attention to Asian contexts and their unique challenges (Robayo-Acuña & Chams-Anturi, 2023; Tamang & Mallick, 2025). Understanding overtourism in varied regional settings is vital for crafting context-specific, effective solutions (Khater et al., 2025).

Overtourism in India and Darjeeling

In the Indian context, overtourism has gained significant media attention, with destinations like Karnataka, Uttarakhand, Mount Everest, the hills of West Bengal, and the forts of Maharashtra experiencing severe tourism pressure (Ganguly, 2024; Nabi, 2024). In their study, Gowreesunkar and Gavinolla (2020) evaluate city tourism, urbanism, and overtourism in Hyderabad, reflecting their interconnected impacts. A study by Barbhuiya (2021) examines overtourism in Nainital and highlights various factors for overtourism. Specific issues, such as overcrowded trekking routes, strained infrastructure, and ecological degradation, are frequently reported in India. In Darjeeling, a fragile Himalayan hill station, witnesses similar issues to those of overtourism, ranging from traffic congestion and infrastructure stress to resource shortages and unchecked urban expansion (Kannegieser, 2015; Dasgupta & Garg, 2021; Bhutia, 2015). While recent studies have mapped tourist flows using geospatial tools (Banerjee & George, 2024), they lack insights into how local communities perceive these changes. Understanding residents' perceptions is critical, as the success of sustainable tourism depends on inclusive stakeholder engagement (Adongo et al., 2017; Butler & Dodds, 2022). Without local acknowledgement of overcrowding, the existence and impact of overtourism may be underestimated.

This study addresses this gap by using descriptive statistics to explore overtourism through the lens of Darjeeling's residents. It aims to validate whether overtourism is felt locally and proposes resident-informed directions for managing it. The study also introduces the "3R Strategic Overtourism Management Model": Reduce, Replace, and Regenerate, as a conceptual solution rooted in community perception.

Research Methodology

This study explores how residents of Darjeeling perceive the growing pressures of overtourism in their region. Using a descriptive research design, it aims to capture and describe the behavioural dimensions of overtourism without establishing cause-and-effect relationships. Rooted in perception, this approach acknowledges that individuals absorb information about the surroundings through their senses (Melgarejo, 1994; Capel, 1973; Crane, 2005; Muñoz, 2008). The study employed a structured questionnaire comprising 15 statements rated on a five-point Likert scale. These statements addressed environmental degradation, strain on public transportation infrastructure, quality of life, economic dependence on tourism, and concerns like rising costs, traffic, pollution, and safety (Cao et al., 2021). The survey was distributed via Google Forms using convenience sampling, suitable for the study's exploratory nature. Responses from 148 local participants were analysed using mean, standard deviation (SD), skewness, and kurtosis to gauge overall sentiment. The questionnaire demonstrated strong reliability with a Cronbach's alpha of 0.815. Data analysis used Jamovi version 2.6 (The Jamovi Project, 2025). Ethical standards were upheld, with informed consent and participant anonymity strictly maintained. Demographic details are presented in Table 1.

Table 1. Demographic details of the respondent from Darjeeling.

Gender	
Male	79
Female	69
Age	
Below 20	11
21 to 30	124
above 31	13
Educational Background	
10th	3
12th	14
Under Graduate	60
Post Graduate	68
Ph.D. scholar	3

Source: Author

Table 2. Questionnaire items.

Question code	**QUESTIONNAIRE ITEM**
A	Darjeeling is overcrowded with tourists.
B	Tourism has resulted in a lack of space in this area.
C	The economy of Darjeeling is too tourism-oriented.
D	Tourism has increased the amount of waste generated.
E	Tourism has increased the amount of sewage released.
F	The construction of tourist facilities and homestays has destroyed the natural landscape of Darjeeling.
G	There is a need for a reduction in tourists during the peak season.
H	There is a need to redistribute tourists from popular tourist spots to surrounding tourist destinations.
I	Limiting the number of visitors daily is necessary to reduce the stress on popular destinations.
J	Locals are denied transportation services because tourists consume most taxi services for sightseeing.
K	Tourism during peak season often puts significant stress on transportation infrastructure.
L	Toy trains using the same path as the vehicles, often during peak season, cause traffic jams.
M	Tourism has created employment opportunities for your community.
N	Tourism has attracted more investment to your community.
O	Tourism has provided a business opportunity for the locals.

Source: Author's conceptualisation

Findings and recommendations.

Residents' Perception of Overtourism

The descriptive analysis of the 15 Likert-scale items, based on responses from 148 participants, reveals a general tendency toward agreement across all items, as indicated by high mean scores ranging from 3.69 to 4.42, as shown in Table 3. Question (Code K and A) about stress on transportation infrastructure and overcrowding during peak tourist season recorded the highest means, suggesting strong consensus. Stress on transportation infrastructure and overcrowding issues have also been a significant problem in other hill stations like Shimla, Manali, Ooty, and Nainital (Dar, 2024). The main contributor of overtourism, being overcrowding, has also been highly agreed upon by the locals of Darjeeling. Dodds and Butler (2019) highlight a rise in the number of tourists, resulting in overcrowding in a particular destination at a time, which is a key contributor to overtourism. While questions (Code G) about the reduction of tourist numbers revealed the lowest mean (M = 3.69, SD = 1.124), indicating more varied opinions. Standard deviations ranged between 0.726 and 1.124, reflecting moderate response variability, with greater dispersion observed in questions like G and I, which concern reducing and limiting tourist numbers. The standard errors(SE) of the mean were consistently low (ranging from 0.0597 to 0.0924), confirming the precision and reliability of the calculated means.

Table 3. Descriptive results of the responses to questions on a 5-point Likert scale.

Question code	N	Mean	SE	SD	Skewness	SE	Kurtosis	SE
A	148	4.29	0.0659	0.802	-1.057	0.199	1.1535	0.396
B	148	3.99	0.0657	0.8	-0.704	0.199	0.8058	0.396
C	148	4.13	0.0732	0.89	-0.901	0.199	0.4404	0.396
D	148	4.21	0.0769	0.935	-1.14	0.199	0.7032	0.396
E	148	4.09	0.0713	0.868	-0.692	0.199	-0.2265	0.396
F	148	4.3	0.0641	0.779	-0.854	0.199	-7.16e–4	0.396
G	148	3.69	0.0924	1.124	-0.497	0.199	-0.6126	0.396
H	148	4.18	0.0597	0.726	-0.498	0.199	-0.2294	0.396
I	148	3.91	0.0894	1.088	-0.853	0.199	-0.068	0.396
J	148	4.18	0.0806	0.981	-1.106	0.199	0.4133	0.396
K	148	4.42	0.0621	0.756	-1.348	0.199	1.6771	0.396
L	148	4.18	0.0761	0.926	-1.05	0.199	0.5397	0.396
M	148	3.84	0.0812	0.988	-1.271	0.199	1.9679	0.396
N	148	3.85	0.072	0.876	-1.183	0.199	2.2451	0.396
O	148	4.07	0.0722	0.878	-1.294	0.199	2.5325	0.396

Source: Author

All items exhibited negative skewness values (ranging from -0.497 to -1.348), suggesting a distribution skewed toward higher agreement levels. Overtourism issues in the region are being felt by the respondents, with a need for a reduction of tourist numbers and high economic dependency on tourism. Items such as K, O, and M showed stronger negative skewness, reflecting a clustering of responses around "agree" or "strongly agree." In terms of kurtosis, values

varied from -0.6126 to 2.5325. Some items (notably O and N) exhibited leptokurtic tendencies, suggesting a sharper concentration of agreement around the mean. This relates to people's economic benefits derived from tourism. Darjeeling highly depends on tourism for income generation among the locals (Bhutia, 2015; Kannegieser, 2015). The descriptive statistics show a generally favourable and consistent agreement pattern among the residents about overtourism issues and economic benefits. However, opinions regarding limiting and reducing tourism vary with leptokurtic tendencies. This shows an interesting pattern where the residents of Darjeeling agree highly on overtourism issues and economic benefits, which results in a varied opinion about reducing or limiting tourist numbers. These issues are alarming in the region, calling for a change of conventional tourism approaches to a more sustainable form of tourism (Bhutia, 2015). This observation calls for a localised solution that is economically viable to solve overtourism issues in such highly economically dependent destinations.

Conceptualisation of the 3R strategic Overtourism management model.

Table 4. 3R strategic overtourism Management model for managing the problem of overtourism.

Step	Meaning	Targeted problems
Reduce	Immediate control of mass tourism pressure on local life, space, and infrastructure. Limit and manage current excesses of tourism.	Short-term corrective measures for managing internal threats within tourism.
Replace	Shift focus from tourism as the sole economic driver to alternative development areas. Build alternative local industries beyond tourism.	Lack of other opportunities and external threats.
Regenerate	Rebuild tourism sustainably via niche, mindful experiences, and a community-based approach.	Long-term internal threats, through the transformation of tourism practices.

Source: Author's conceptualisation

The above findings of the study suggest locals in the region feel that there are overtourism issues in Darjeeling. The results also show a tendency to be hesitant towards reducing tourism due to the high economic benefits derived. This calls for a solution tailored to mitigate overtourism issues in the region. Considering this observation, a 3R strategic overtourism management model for solving overtourism is proposed, as seen in Table 4, where 3R stands for Re-

duce, Replace, and Regenerate. This solution to overtourism integrates managerial and normative critical perspectives (Black et al., 2025). The managerial perspective deals with local conflicts between tourists and residents, focusing on impacts, accommodation, daily life, and policies. In contrast, the normative perspective deals with deeper ethical concerns in tourism and the global economy, advocating for broader, structural solutions.

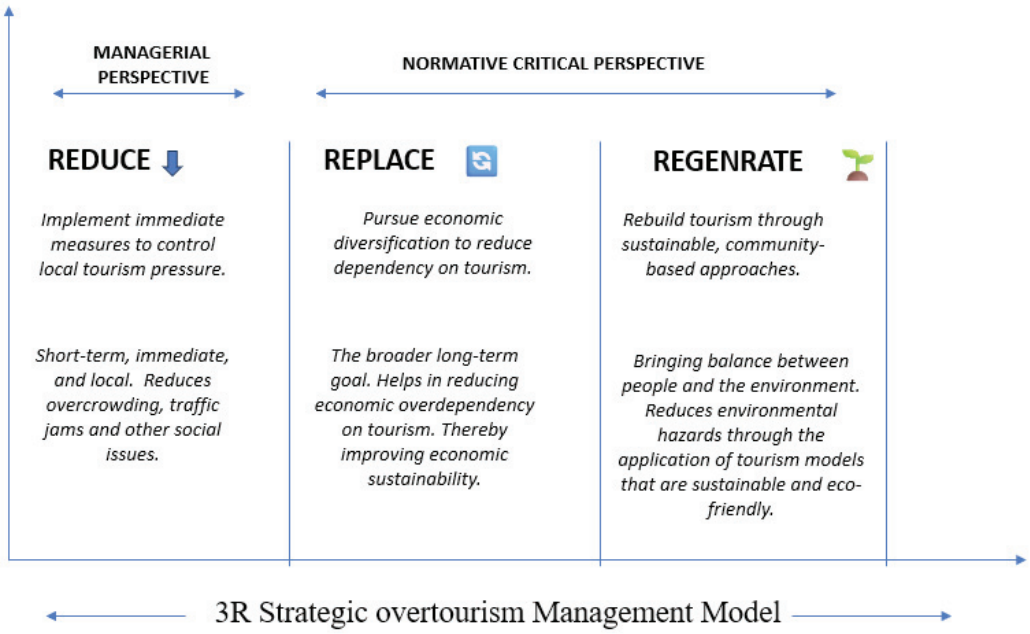

Figure 1. 3R Strategic Overtourism Management Model.
Source: Author's conceptualisation

Rather than a strictly linear or sequential strategy, the 3R model for overtourism is conceptualised as a cross-sectional framework in which all three components may co-exist in an integrated manner within a destination's policy environment, as seen in Figure 1. However, their effects and visibility may unfold phase-wise. The Reduce aspects emphasise immediate tourism pressure management strategies. Rogowski (2019) outlines the method for establishing visitor entry limits. This approach implements a managerial perspective by solving the issues locally in the short term. This results in immediate and instant relief on various overtourism issues.. However, limiting visitors is controversial, but must be viewed through the lens of balancing benefits and losses, with priority given to preserving sensitive natural values (Arnenberger & Haider, 2007; Rogowski, 2025).

The study recognises that reducing and limiting visitors can offer short-term relief, but such measures may undermine tourism's long-term benefits. In destinations like Darjeeling, where tourism is closely linked to global growth systems, reduction alone risks creating an unsustainable model that fails to support future development. Therefore, along with reducing tourist inflows, the Replacement aspect of this model plays a crucial role by replacing tourism with economic diversification for other industries. While replacing and reducing may act as a solu-

tion to overtourism. However, these two aspects may solve some of the problems associated with overtourism. However, one of the key problems of overtourism is the undesirable growth of tourism. The reduction and Replacement aspects may stop undesirable tourism growth, but they do not lead to desirable growth. In such a scenario, Regenerative aspects play a crucial role in the transformative rebuilding of tourism itself. Transformation of tourism through alternative tourism products has been highly recommended (Jieyao et al., 2025). The model uses existing concepts such as degrowth and sustainable tourism within the elements of 'reduce' and 'regenerate' to propose a solution internally within the tourism framework. The novelty of this model comes from the combined use of the degrowth solution, redistribution measures (Hosper, 2019; Sibrijns & Vanneste, 2021), the alternative tourism solution, and economic diversification. While degrowth as a solution to overtourism has been discussed for a long time (Fletcher et al., 2019). This framework's 'reduce' element also upholds the principles of degrowth. The difference this framework makes is that it integrates these degrowth principles with regeneration and replacement elements. Tourism regeneration is empowered by sustainable tourism and alternative tourism (Iflazoglu & Can, 2021; Koba, 2022). Unlike traditional models that seek to fix tourism from within, this framework recognises that true sustainability may require stepping away from tourism first, only to reintroduce it later in resident-led, environmentally grounded, and culturally meaningful forms. The study also proposes this model as a potential solution to overtourism issues in Darjeeling, based on the 3R model, as seen in Table 5.

Table 5. The 3R strategic tourism management model and practical implications for overtourism management in Darjeeling.

3R Strategy	Practical Implication
Reduce	❖ Limit tourists during peak seasons. ❖ Redistribute tourist flows to the outskirts. ❖ Decongest and distribute transportation infrastructure for all stakeholders of the tourist destination. ❖ Pricing or time-based restrictions to control tourist inflow.
Replace	❖ Reinvest in the tea industry. ❖ Promote education/literary heritage in Darjeeling. ❖ Encourage local entrepreneurship outside tourism.
Regenerate	❖ Promote niche tourism (education, tea, culture, Dark tourism). ❖ Extend tourism beyond seasons. ❖ Rebuild eco-friendly infrastructure.

Sources: Author's conceptualisation

Conclusion

This study examined residents' perceptions of overtourism in Darjeeling, revealing social, environmental, and infrastructural concerns. The findings indicate that overtourism is not only recognised by locals but also seen as a pressing issue that calls for immediate, balanced action. Theoretically, the study adds a new context to overtourism literature by introducing Darjeeling, encouraging further research in similar fragile destinations. A key contribution is the 3R Strategic Overtourism Management Model, Reduce, Replace, and Regenerate, which offers a holistic, community-centric framework that addresses both short- and long-term challenges. While grounded in Darjeeling, this model is adaptable to other hill stations and global contexts. Practically, the study provides insights for policymakers aiming to balance tourism growth with local well-being and sustainability.

Lastly, this study uses a descriptive research design to identify how people of Darjeeling perceive the problems of overtourism. This exploratory study used convenience sampling through an online survey, which may not fully represent all residents of Darjeeling. Future studies may include identified issues with more methodological rigour and more representative sampling methods to look for a potential solution to the problem of overtourism in the region.

Ultimately, the study underscores the urgency of rethinking tourism in Darjeeling and other similar hill stations and tourist destinations worldwide. Tourism must be rethought not as an unlimited engine of growth but as a system that must be managed with care, responsibility, and inclusivity to ensure long-term benefits for both people and the environment.

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Indigenous Herbal Wellness: A Potent Threshold towards Growth of Tourism Business in Kashmir Horizon, India

Tahmeed Ahmad Badam[A], Dr Shahnawaz Ahmad Dar[I]

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Abstract

Indigenous herbal medicine, despite its deep cultural roots, remains undervalued in the development of wellness tourism. Kashmir, a biodiversity hotspot of India, possesses a rich heritage of medicinal herbs with traditional therapeutic uses recorded in folklore since ancient times. The Valley's floral diversity presents considerable potential for promoting herbal wellness tourism. This study was undertaken with three objectives: to examine the potential of indigenous bio-herbal heritage for wellness tourism in Kashmir; to highlight the traditional medical significance of herbs in treating various ailments; and to analyze the economic benefits of medicinal plants within the emerging herbal wellness tourism industry and its contribution to host communities. One-Way ANOVA and pooled interval plots has been executed to assess variance (StDev) among wellness market segments, while regression analysis with fitted line plots was employed to explore tourist arrival trends. Analytical evaluation was conducted through MINITAB-18 to ensure reliability. Findings reveal dynamic shifts in wellness travel behavior, with beauty care and nutritional care dominating market shares, followed by alternative therapy, fitness centers, and rejuvenation practices. The study concludes that indigenous herbal wellness traditions significantly influence tourist behavior and present opportunities for local economic development. Furthermore, the revival of traditional herbal healing practices not only strengthens cultural identity but also introduces a new research dimension in wellness tourism scholarship.

Key Words: *Herbal-Plants; Economic-boon; Healthcare; Indigenous; Tourism; Wellness.*

Introduction

The Himalayan region of Jammu & Kashmir is globally recognized for its rich medicinal plant diversity and deep-seated traditional healthcare systems. Ethnobotanical studies in the region reveal extensive use of wild medicinal plants among local communities. For instance, a survey in the Tral region documented 47 plant species from 27 families used medicinally by local inhabitants (Mir, Mir, & Peer, 2024). Another study recorded 72 medicinal and aromatic plant species in the Kashmir Himalayan region, underscoring the depth of local knowledge systems

A Department of Tourism Hospitality and Leisure Studies, University of Kashmir. Corresponding author: tahmeedbadam@gmail.com

(Gillani, Ahmad, et al. 2024). Such data suggest that the region's bio-cultural resources are considerable and potentially under-utilized. Indigenous communities in this area continue to rely heavily on herbal remedies for primary healthcare a dependency supported by the existence of hundreds of medicinal plant species, many of which are rare, endemic, and unique to the region (Gairola, Sharma, et al. 2014). These practices rooted in vernacular ethno medicine lend themselves naturally to the concept of wellness tourism, defined as travel motivated by the pursuit of physical, mental, or spiritual wellbeing, often including herbal or complementary medicine as a central feature (Dimon, 2013). Simultaneously, the tourism business environment in India (and specifically in mountainous and nature–centric destinations) is evolving to integrate wellness, nature, and experiential offerings. Research shows that wellness tourism is not only about treatments, but also about experience, motivation, nature-based settings and destination branding. For instance, a review focusing on the Indian wellness tourism sector underlined how wellness travel aligns with multiple Sustainable Development Goals (SDGs), and that the country's biodiversity and cultural heritage form a key competitive advantage (Bhuyan, Naik, et al. 2015). Another study validated a wellness-tourism motivation scale among Indian tourists, pointing to the importance of nature, self-exploration and novelty in wellness travel decisions (Dhillon, 2025). The Jammu & Kashmir government, acknowledging this synergy, has recently initiated AYUSH-based wellness centers across key tourist sites such as Pahalgam, Sonamarg, Srinagar, and Gulmarg to capitalize on the healing properties of indigenous herbal traditions (Kashmir Convener, 2023). With evolving global tourism trends and shifting traveler preferences, wellness tourism, medical tourism, and health tourism have emerged as prominent drivers in the international tourism sector in fact it is rapidly expanding segment, with global expenditures rising from approximately US$439 billion in 2012 to an estimated US$830 billion by 2023 (Global Wellness Institute, 2024). The economic and cultural benefits of herbal tourism are multifaceted. Regions offering herbal retreats and plant-based healing experiences not only enhance visitor spending through accommodations, workshops, and local crafts but also contribute substantially to local livelihoods by creating jobs for practitioners, guides, artisans, and hospitality staff (The Economic Botanist, 2025). This model simultaneously supports the preservation of indigenous herbal traditions and encourages sustainable, eco-conscious practices such as organic herb cultivation, conservation of rare species, and eco-friendly facility design (The Economic Botanist, 2025).

Kashmir is uniquely positioned to cultivate a niche tourism segment grounded in its botanical heritage, ecological integrity, and cultural heritage. Initiatives such as herbal parks, high-altitude medicinal plant sanctuaries, and institutions like the Institute of High Altitude Medicinal Plants in Doda district are actively preserving biodiversity while opening up avenues for herbal education, tourism, and agri-preneurship (Precious Kashmir, 2022). However, the intensification of tourism in such ecologically sensitive landscapes also demands careful attention to sustainability. Reports suggest that unchecked tourist influx without effective regulation can lead to environmental degradation, particularly in fragile areas like Gulmarg, where the carrying capacity has already been exceeded (Qurashi, 2024). This emphasizes a critical tension between leveraging indigenous herbal wellness as a tourism asset and preserving the very ecosystems that support these traditions. Therefore, it becomes pivotal to harness the potential of indigenous bio-herbal diversity from the perspective of herbal wellness tourism in Kashmir. This stimulates highlighting traditional remedial practices, emphasizing the therapeutic significance of medicinal plants in addressing diverse health disorders, and providing insights into the economic benefits of ethnic medicinal resources within the framework of the herbal travel industry for the host community.

Research Gap: Apart from the above discussion it is apparent that Kashmir province being politically instable region the tourism activities suffered a lot since couple of decades as a result deficient number of research studies in context of indigenous herbal wellness has been conducted. Although a significant number of studies were realized over rest of the areas like, tourist satisfaction, destination loyalty, tourist behavioral intention to revisit; unfortunately herbal wellness studies are hardly to found. Existing literature has either documented plant use and ethno-medicinal knowledge or separately analyzed dynamics and general tourism statistics; few studies systematically link (a) the bio-cultural assets of Kashmir's medicinal flora and indigenous healing practices with (b) the market logic, product design, and enterprise models that could scale wellness. Hence the reason has prompted the present authors to take-up such initiative to address this research gap and contribute towards the existing literature in Kashmir horizon. Based on a depth literature investigation important objectives were identified and analyzed through systematic statistical methods.

Research Questions:

- Q1: Draw attention to traditional medical significance of herbs in association to diverse ailments?
- Q2: Discuss economic benefits of indigenous medicinal plants in reflection of herbal wellness tourism on host community?

This study intended to offer pragmatic insights into these research questions recognizing the value of Kashmir's indigenous herbal heritage through the lens of herbal wellness tourism in turn would generate widespread benefits extending beyond specific regions to impact positively the overall economy of Jammu and Kashmir. Such an approach would foster income generation, create employment opportunities, enhance the demand for indigenous produce, promote cultural exchange, and facilitate mobilization of ethnic herbal knowledge and expertise. Further it is anticipated to provide guidelines on the ways in which antecedents in the tourists' holiday environment can be identified and managed to increase tourist revisit intention, build healthy destination image and business in indigenous herbal wellness areas.

Organization/Structure of the paper: The next section reviews the scientific literature on conceptualizing ethno herbal tourism and medicinal-plant significance, followed by an overview of indigenous herbals a motivational factor towards wellness travel for market dynamics and in Jammu & Kashmir. Subsequent sections present empirical findings from field interviews and secondary data, discuss sustainable business approaches and conclude with concrete recommendations for practitioners, academia, local communities and policymakers interested in building a regenerative herbal-wellness tourism sector in Kashmir.

Literature Review

Conceptualize the Herbal Tourism

Herbal tourism, a form of traditional and alternative medicine tourism, integrates local ethno botanical knowledge into wellness offerings, providing treatments for conditions such as constipation, pustules, joint disorders, nerve stiffness and rheumatism, gout, and bone dislocation without reliance on allopathic medicine or surgical techniques. This niche promotes wellness through culturally embedded practices and natural remedies. Travelers increasingly seek unique, destination-specific wellness experiences grounded in indigenous healing methods,

including native plants and traditional practices (Global Wellness Institute, 2024). Moreover, scholars emphasize that traditional and alternative medicine tourism including Ayurveda, Traditional Complimentary Medicine, naturopathy, and herbal therapies is a recognized and growing component of health tourism (Tourism Institute, 2023). Herbal tourism stimulates travel for the purpose of promoting physical, mental or spiritual well-being has emerged as one of the fastest-growing segments of the global tourism industry. In the Indian context, wellness tourism is increasingly being recognized as a strategic growth area, rooted in the country's rich heritage of traditional healing systems like Ayurveda, Yoga and other indigenous health practices. For example, research shows that the Indian wellness-tourism sector is gaining momentum in the post-COVID era, positioning India as an emerging global herbal wellness hub (Choudhary, 2022).

Herbal tourism sits at the intersection of ethno-botany, wellness tourism, and place-based cultural heritage: it describes travel motivated by interest in medicinal plants, traditional healing practices, herbal gardens and related experiences (workshops, foraging walks, spa/tea therapies). In Kashmir a region with high medicinal-plant diversity and strong local knowledge systems herbal tourism is both a practical opportunity and a conservation challenge. This review synthesizes existing literature (ethno botany, conservation, wellness tourism) to propose a working conceptualization and identify empirical gaps for Kashmir-specific research and policy (Bhat, Singh, etal 2021). Herbal tourism a travel to experience, learn about, purchase, or benefit from plants used in traditional medicine and related cultural practices motivating visits to herbal gardens, guided ethno-botanic tours, participatory herbal workshops, inhalation/infusion therapies, and product-based experiences (herbal teas, oils, remedies). This concept draws on literature over wellness tourism, traditional health tourism (THT), and medical-tourism typologies (Al-ansi, Kim, etal. 2024). The literature indicates that Kashmir has both the bio-cultural resources and emerging grassroots initiatives to support a carefully governed herbal-tourism sector.

The Global Wellness Institute (2016) defines herbal tourism as the travel associated with the pursuit of maintaining or enhancing one's physical and psychological health." In contrast with medical tourism, which usually includes traveling for the objective of medical intervention to treat or cure illness (Carrera & Bridges, 2006; Yu & Ko, 2012). Unlike conventional tourism experience, the herbal tourism experience is more associated with the pursuit of maintaining or enhancing one's health physically and psychologically (Mueller & Kaufmann, 2001). Systematically analyzed individuals' herbal wellness experiences based on the extent of their participation and response to an external stimulus. They found that the herbal tourism experience comprises multiple dimensions that include educational, entertainment, esthetic, and escapist facets (Liao, Zuo, et al. 2018). The herbal wellness tourism experience not only improves tourists' functional status but also plays an important role in promoting physical and mental relaxation and well-being. People desiring self-improvement can enhance their self-perception through experience, use, purchase, and other behaviors (Liu, Zhou, 2023). Conceptually, herbal tourism should be framed as an integrated socio-ecological product grounded in ethno-botanical knowledge, packaged through wellness tourism design, and constrained by conservation and ethical governance.

Herbal Tourism 'Factor Motivation' Towards Wellness

Herbal tourism is increasingly recognized as a growing niche within the broader wellness tourism sector, primarily driven by visitors' motivations for natural, holistic, and culturally grounded healing experiences. Key motivational factors include the desire for health enhancement and preventive care, where tourists seek herbal therapies for detoxification, stress management, and lifestyle-related health improvements (Smith & Puczko, 2014). Another major driver is the authenticity of cultural experience, as travelers are motivated by the opportunity to engage with indigenous herbal knowledge and traditional healing practices (Voigt & Pforr, 2013). In addition, nature-based motivations play a vital role, with herbal tourism often associated with bio-diverse landscapes and immersive environments that promote rejuvenation and well-being (Goodarzi, Taghipour, et al 2017). The trend toward eco-wellness and sustainability further motivates wellness tourists to choose herbal-based treatments, aligning with environmentally conscious travel preferences (Kelly, 2012). Finally, the pursuit of spiritual and psychological well-being constitutes a central factor, as herbal tourism is frequently linked to stress reduction, mindfulness, and inner balance (Voigt, Brown, et al 2011). Collectively, these motivations highlight the multi-dimensional appeal of herbal tourism as a pathway toward physiological wellness. According to Brooker & Joppe (2014), herbal wellness tourism aims people who are proactive and interested in maintaining their health by offering them treatments like herbal therapies.

India has a potential to attractsignificant number of health tourists per annum which will contribute billions to the economy. Patients from various countries are becoming medical tourists to India for low cost and health restorative alternative treatments. The Medical Tourists undergo health restorative treatments of a combination of Ayurveda, yoga, acupuncture, herbal oil massage, nature therapies and some ancient Indian healthcare methods. This novel phenomenon has been acknowledged as the Unique Selling Proposition (USP) of Kerala (Borgohain 2015). The key factors that contribute to this are the availability of trained, skilled English and foreign language speaking doctors and paramedics, pleasant weather with two monsoons ideal for treatments, availability of authentic medicines due to the medicinal plants wealth, large number of accredited wellness centers and resorts. Wellness seekers around the world opt for Kerala as a most sought after "Wellness Tourism Destination". In Kerala, Ayurveda is not only an alternative way of treatment but also one of the powerful engines for its economic and employment growth. It is estimated that around 30% of the foreign tourists visiting Kerala are for wellness purpose (approx 3.3 lakh) and about 40% of the State's tourism revenue is generated from Ayurveda (i.e appox Rs. 17,000 crore). Ayurveda and wellness has become synonymous in Kerala and the State has embarked on ensuring various parameters to certify the Wellness centers and hospitals though its classification norms and committees (Krishnan, 2020).

Herbal tourism represents an emerging niche market that is progressively expanding across the horizons of Jammu and Kashmir. In various geographical belts, the wellness components vary according to the prevalence of herbal diversity, traditional therapies, and wellness expertise. The Union Territory of Kashmir holds significant potential to be recognized as an abode of indigenous herbal wellness. Many of the recognized wellness practices like naturopathy, Ayurveda, homeopathy are considerably being practiced since immemorial times in Kashmir Vale. Lawrence (2014), elaborated that I have known cases in which some of my subordinates have derived great benefit from the skill of the Kashmiri Hakim. Once, when I was in great anxiety, a deputation of Kashmiris begged me to allow a well-known *Hakim* to treat my son. They urged that this *Hakim* had never failed to cure the disease. The *Hakim* had a great knowl-

edge of herbs and their herb collectors are the shepherds, who spend the summer on the high mountains where the herbs are found. The discussion highlights perspectives on wellness tourism while offering literary insights into the herbal wealth of Kashmir, which can be further harnessed for developing the region's herbal wellness tourism. Meanwhile may serve as a foundation for advancing research-driven initiatives in herbal wellness tourism.

Methodology

Research Design

The study is exploratory in nature and grounded in extensive fieldwork. It adopts a mixed-methods design, combining qualitative and quantitative approaches to ensure comprehensive data collection, evaluation, and interpretation.

Population and Sampling

Purposive sampling was employed to select respondents based on their expertise and availability. The sample consisted of 50 indigenous folk herbal healing practitioners drawn from distinct, selective regions. This sampling approach was considered appropriate due to the specialized knowledge required for the study.

Data Collection Method

Primary data were collected in two phases.
1. Pilot Surveys were conducted to identify and catalogue herbal species.
2. Community Interactions were carried out to document knowledge on the uses, properties, modes of administration, and medicinal efficacies of these species.
Self administered open-ended questionnaires were used to capture quantitative data, allowing flexibility in responses while ensuring consistency across participants. Haldar (2023), the questionnaire was designed on the basis of the literature review each item of the instrument was measured on a five-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Additionally, an interview schedule was administered to selected informants. This method was chosen to provide in-depth narratives that could not be obtained through structured instruments alone.

Data Analysis Technique

Qualitative Data: Responses were organized into themes and analyzed using content analysis. Content analysis was justified because it allows for systematic categorization of textual data, thereby identifying recurring themes and patterns within indigenous facts and information. Badam (2024), themes have been classified as one of the pertinent areas according to proper codes assigned. Some themes could have been in two of categories but it was decided to classify the themes into a category they considered most relevant through induction process to reach on point of conversion/deduction. The exercise was settled with the framework of 'substitution/conceptual method and correlation/relational method. Since analyze average mean values and deviation/variance in classified themes 'ANOVA technique (One way ANOVA)' has

been applied to bring validity. To achieve reliability in the results advanced analytical software MINITAB-18 has been utilized.

Quantitative Data: Statistical evaluation was conducted using MINITAB-18 ensuring accuracy, reliability, and robustness of results. One-Way ANOVA with pooled interval plots was employed to assess variance (StDev) across variables. Regression analysis was applied to examine the strength and direction of relationships among variables and to forecast business trends. Furthermore, fitted line plot were used to scrutinize current trends and the prospective growth of tourist arrivals.

Indigenous Herbal Plants of Kashmir: Diversity and Potential

The tourism in Jammu and Kashmir offers a wide array of places to see. The delighting backwaters, hill stations and landscape make J&K a beautiful tourist destination. Historical monuments, forts, places of religious importance, hill resorts, etc. add to the grandeur of the state. Thus, they attract tourists from all over the world. Jammu and Kashmir especially Kashmir valley offers various categories of tourism. These include adventure tourism, medical tourism, water rafting, skiing, religious tourism, etc. Jammu and Kashmir has a composite culture. Tourism has now become a significant industry in J&K, contributing enormously to the state's economy and providing employment to a large number of people. Keeping in view the above fact, it is obvious that the district Anantnag of Kashmir province is engulfed with the stunning potential of indigenous ethno-herbal species. The diversity of the herbs would beget the huge prospective market to the state tourism industry in the light of traditional herbal usages. These indigenous ethno herbs have a tremendous medicinal efficacy to cure different health ailments especially on endeavor of proficient *Hakims* and *Vaids* of Kashmir belt.

There has been found various indigenous ethno-herbs in the study area and are appended with their scientific name, followed by local name, ailments against which plant is used and mode of administration. The sequence of plant species, collected and identified in the present investigation, is given in the following manner.

Table 1. Indigenous Herbs with Traditional Healthcare Remedies (Herb Kingdom)

S.No	Scientific Name	Vernacular Name	Herb Parts Used	Used against Ailments	Mode of Administration
01	Artemisia absinthian	*Tethwen*	Leaves	Obesity, diabetes, liver troubles, digestion problems, and anthelminthic (helminthes).	Extract is prepared from leaves and used to treat helminthes to any age group. The leaves and stalks of plants are soaked in boiled water and tourniquet around dislocated joints.
02	Capsella Bursa-pastoris	*Krala mundu*	Leaves	Demulcent, blood deficiency, anthelmintic (helminthes), diuretic and duodenum purging.	The leaves of the herb are taken as raw food and sometimes the weed is boiled in water to yield medicinal substance.
03	Rheum Emodi.	*Pamb-tsalan*	Stalks and roots.	Pustule, blisters, diabetes, inflammation, fungal diseases, microbial infection, ulcer and cancer.	The herb leaves are used as vegetable. The roots are bruised or grind and soften in raw mustard oil and use as paste. The extracts from the stalks and root is also used as decoction to take as remedies.

04	Urtica Dioica	Soi/Nettle	Roots, leaves and stalk.	Dermatitis, diuretic, rheumatoid, numbness, sensation, anti-itching and kidney stone (Calcium oxalate).	The herb is mostly used as 'contact urticari' because spicules of stalk and leaves causing mechanical irritation. Further the roots are intensively steamed till the substances tend to extract and used as decoction.
05	Iris kashmiriana	***Mazar Mund***	Whole herb	Joint pains	A mixture of rhizome powder, water and sugar is made and is given as a tonic to body weakness.
06	Malva neglecta	Sochal	Leaves	Constipation, diabetes and piles	Leaves are cooked and taken along with food
07	Nepeta cataria	***Brade-gass***	whole plant	Stomach swelling, Heartburn, high cholesterol, vomiting, and antihelminthic.	Whole plant is dried and then boiled, meshed or squeezed to form an extract. It is sometimes used as mixture with '***Saunff***' (Fennel) to reduce stomach aches. It is used along with turmeric to treat increased cholesterol levels. It can be also used as anti-parasitic that expel helminthes from the body either through killing or stun them without causing significant damage to the host.
08	Portulaca oleraceae	***Nuner***	Whole Plant	Gynaecological purposes and styptic internally.	Plant is cooked as vegetable and is effective against urinary tract infections.
09	Taraxacum officinale	***Handd***	Whole plant	Gynaecological purposes and styptic internally.	Usually post infant delivery ladies often consume cooked plant so as to compensate blood loss and strengthen bones. Whole plant along with turmeric is boiled for a while and then tied over in case of joint pains and swelling anywhere in body parts.
10	Euphorbia helioscopia	Guer Deud	Seeds and roots.	Abdominal cramps and Cholera.	Decoction of entire plants is used to treat cough, dysentery and Jaundice.
11	Lavatera Cashmeriana	***Saz-posh***	Flower	Irritation in pregnant women, cardiac tonic, antiphlogistic and renal colic.	Decoction of plant flowers and buds are used to treat. However flowers have been reported to be processed and consequently used for cold, mumps and seeds as antiseptic.
12	Cichorium intybus	***Handiposh***	Flower and roots.	Wounds, diabetes, Cardiac tonic, constipation, dysentery antiphlogistic, kidney problem, and jaundice.	Roots are baked, grind and used as such. Flowers steamed in water the decoction is sipped as medicine.

Source: Kantha et.al.(2018,p.95), Kumar et al. (2018,p.85

Table 2. Indigenous Herbs with Traditional Healthcare Remedies (Plant Kingdom)

S.No	Scientific Name	Vernacular Name	**Plant Part Used**	**Used against Ailments**	**Mode of Administration**
01	Solanum nugrum	***Kamber***	Berries and leaves.	Renal disorder, liver trouble, digestion problems, anthelminthic (helminthes), Obesity, and gastro-intestinal purging.	Ripened berries can be taken directly in raw form while as leaves are used as food and plant berries as traditional medicine. Parts of this can be toxic to humans and livestock.
02	Celosia	***Mawal/ Cockscomb***	Seeds	Demulcent, intestinal worms, blood disease, mouth sores, eye problem, chronic rheumatism, Diuretic, liver and kidney disorder.	The extracted seeds are processed and pulverized into powder. Powder is used as culinary delicacies and adding flavor to the cuisine like Wazwan.
03	Ocimum Basilicum	***Babrebeol/ Basil***	Seeds, leaves, and flower buds.	Weight loss, curbing appetite, Diabetes, blood sugar problem, Constipation, hair loss, dermatitis, stress	Seeds are soaked in water and taken early in the morning as well as in day hours to reduce troubles. Decoction is also made in which leaves are steeped in water so as to extract the flavor.
04	Peganum Harmala	***Izband***	Roots, Seeds and leaves.	Skin inflammation, skin cancer, unusual pain, parasticide, roundworm etc.	The leaves are taken to be grind into flour which is likely to let stiffen after adding a drop of oil. The seeds can be used as such for spiritual uses to produce wafts of smoke.

Source: Bamzai,(2007,p.370), Lawrence .(2014,p.328), Rahman.(2005,p311)

Table 3. Indigenous Herbs with Traditional Healthcare Remedies (Shrub Kingdom)

S.No	**Scientific Name**	**Vernacular Name**	**Shrub Parts Used**	**Used against Ailments**	**Mode of Administration**
01	Datura stramonium	***Datur***	Seeds	Rheumatism and Chill-blain.	Seeds are sundried and crushed to make powder which is mixed with water to treat cough and Fever. Paste is applied in case of tooth ache. Decoction is also prepared for body aches.
02	Viburnum grandiflorum	***Kul-maanch***	Leaves and berries.	Stomach problem, constipation, fever, prostate, blood impurity and vision problem.	A preparation of fresh, moistened, or crushed dried leaves is made and to be taken orally. The ripened berries are directly eaten.
03	Dioscorea deltoidea	Krith	Seeds leaves, and roots	Contraceptive, parasiticide, roundworm, and arthritis.	The juice of the root tuber is taken to treat roundworms, various disorders of the genital organs as well as asthma and arthritis.

Source: Hassan et al.(2013,p.201), Kumar et al.(2018,p.83)

Table 4. Indigenous ethno-Herbs with Traditional Healthcare Remedies (Tree Kingdom)

S.No	Scientific Name	Vernacular Name	Tree parts Used	Used against Ailments	Mode of Administration
01	Juglans regia	*Doon kul*	Leaves and bark.	Tooth infection, gum bleeding, and gum inflammation.	Decoction of leaves is taken in case of intestinal worms, vaginal infections and inflammation.
02	Pyrus Cydonia	Bam Tchunt	Fruits and Seeds.	Cough, vocal Fissure, Soaring, liver trouble, and demulcent.	Ripened fruit is sometimes kept beneath the embers of fire until the fruit gets hyper heated from inside. The seeds and adhesive resin can be extracted out of fruit likely to be used as decoction.
03	Celtis caucasica	*Brimji*	Seeds	Rheumatism	Seeds are used for paralysis and joint pain. A paste is prepared from seeds then used to treat inflammation and fibrous tissues hitches.

Source: Kumar et al.(2018,p.82), Kapahi et.al,(1993,p.121)

Table 5. Indigenous Herbs with Traditional Healthcare Remedies (Fungus Kingdom)

S.No	Scientific Name	Vernacular Name	Fungus parts Used	Used against Ailments	Mode of Administration
01	Agaricus Campestris	*Hedur*	Whole fungus	Cancer, Gout, diabetes, blood impurities, high cholesterol tonic, etc.	It is kept soaked in lukewarm water for the preparation of culinary delicacies. Fungus is fried in curcumin powder and use in the form of alimentation.

Source: Lawrence, (2014,p.322), Rahman,(2005,p.311)

The tables above highlight two important aspects of the medicinal herbs discussed. First, several plants are indigenous to the Kashmir region and have long been used according to local traditions, practices, and folk knowledge. Second, herbs native to other parts of India are also utilized in Kashmir, adapted into local folk traditions to treat various ailments, as illustrated in Tables 1-5. These medicinal plants not only serve therapeutic purposes but also hold potential to attract a special segment of health and wellness tourists to the valley. Since ancient times, the local population has relied on these herbs to treat a wide range of health disorders such as dyspepsia, joint dislocations, rheumatoid conditions, and anemia, a cultural practice that continues in some areas of Kashmir even today. Contemporary research shows that people across the world increasingly travel to destinations offering health and wellness experiences. In this context, Kashmir possesses significant potential to develop a niche market in herbal wellness tourism. The integration of indigenous herbal practices can thus serve as a motivational factor for visitors, contributing to the sustainable growth of the region's tourism industry.

Bio-Herbal Heritage Valuables: The Implications

A significant proportion of the valley's population resides in rural catchments, where traditional socio-cultural practices remain deeply embedded in daily life. Rituals and communal activities such as *Urs*, *Melas*, folk festivals, knot-vow ceremonies, temple *darshanas*, thread-donning rites, and beliefs in incantations or sorcery continue to hold cultural significance. Despite the widespread availability of modern medicine, many communities in these areas persist in utilizing indigenous herbs as a primary means of promoting overall physical wellbeing. Ethnic medicinal plants, therefore, constitute an essential component of both healthcare and cultural identity in Kashmir. Their usage extends across the valley, reflecting a longstanding ethnobotanical tradition. The following section elaborates on selected locale-specific applications of these medicinal herbs within the region's socio-cultural profile.

Healthcare and Wellness

In the southern belt of the valley, *Hakims* and *Vaids* traditionally ascribed medicinal properties to nearly every plant or herb. Their expertise was widely acknowledged, with even non-locals recognizing the efficacy of the treatments and often citing remarkable cures attributed to the indigenous ethno-herbs of the region. The *Hakims* possessed extensive knowledge of herbal medicine, supported by herb-collectors "primarily shepherds" who spent the summers in remote backwoods, high-altitude thickets, mountain peaks, and dense pastures while tending their cattle and flocks. These environments provided access to some of the most valuable medicinal species. Knowledge of herbal remedies was not limited to practitioners alone; members of agricultural communities were also familiar with the therapeutic properties of many plants, employing them in self-prepared treatments for common ailments. Owing to the region's rich and unique floristic diversity, a considerable proportion of plant species have historically been used in medicinal practice. The traditional use of these herbs transmitted through folklore, oral traditions, and manuscript records dates back to antiquity and likely constituted the principal means of preventing and curing diseases prior to the advent of modern medicine. The therapeutic potential of these plants is further validated by contemporary scientific insights, as many species are now known to possess bioactive compounds with anti-cancer, antioxidant (anti-aging), antipyretic, antiasthmatic, diuretic, and other pharmacological properties.

A number of traditional medicinal herbs are frequently employed as remedies for diverse ailments, including muscle cramps, bone fractures and dislocations, nerve stiffness, post-circumcision care, acute toothache, diabetes, prostate disorders, piles, cardiac complications, and helminthic infections. Some of the most commonly utilized species include Datura stramonium (*Datura*), Iris kashmiriana (*Mazar Mund*), and Lavatera cashmeriana (*Soz-Posh*). Among aquatic plants, Nelumbium nucifera (Lotus) is particularly esteemed for its high medicinal value. Its fleshy rhizomes (*Nadru*), in addition to being palatable and nutritious, are traditionally used to treat diarrhea, dysentery, dyspepsia, skin disorders, and even smallpox. Honey produced exclusively from lotus flowers is regarded as a valuable tonic, while infusions of lotus seeds, Euryale ferox (*Juwar*), and Nymphaea stellata (*Bumiposh*) are appreciated for their invigorating properties. Other notable species include duckweeds (Lemna spp.), valued for their cooling, astringent, and diuretic effects, and commonly applied in the treatment of eye ail-

ments. Potamogeton natans has been reported in homeopathic practice, whereas species of Utricularia (Bladderwort) are traditionally employed to alleviate cough and to dress wounds.
In addition to general practitioners of herbal medicine, certain specialists in the valley are known to treat medical conditions such as bone fractures and dislocations, as well as more complex cases. Another category of practitioners focuses on dermatological issues, addressing abscesses, blisters, severe boils, and other skin diseases through the application of ointments and antiphlogistic preparations derived from indigenous herbs. Despite the availability of allopathic medical facilities at sub-hospitals in the study area, a considerable proportion of the population particularly villagers continues to seek ethno-herbal prescriptions and dosages. Women, elderly citizens, and children are frequently observed visiting the centers of local *Hakims* and *Vaids*, anticipating remedies that are perceived to enhance physical health. Within the community, herbal medicines are often regarded as possessing not only therapeutic but also spiritual efficacy, believed to accelerate healing processes. Ethnographic interactions further corroborate this cultural reliance on indigenous medicine. For instance, during an interview with a resident of *Sheikhpora* (Pahalgam), the respondent explained: "Whenever any of our companions experienced physical ailments, we relied on indigenous herbs, locally called '*Jaddi Butti*'. These '*Jaddi Butties*' were considered the best remedies, even for diseases such as pneumonia."

Indigenous Medicinal plants a Catalyst for Herbal-wellness Tourism Expansion

The persistence of local traditions in the Kashmir valley can be attributed primarily to the region's geographical seclusion. Mountain barriers and the resulting isolation, characteristic of Himalayan territories, have historically fostered conservative ways of life, thought, and cultural practices. These tendencies are most prominently observed among the inhabitants of the valley and have played a significant role in the preservation of indigenous traditions. In this context, Kashmir often referred to as "the Paradise on Earth" nurtures a remarkable diversity of herbal species, surpassing that of many other Indian states. The unique composition of herbal resources in the region is intrinsically shaped by its physiographic factors, including climatic characteristics, seasonal weather patterns, relief features, orographic influences, and natural boundaries. Collectively, these conditions endow Kashmir with an unprecedented identity, not only within the sphere of ethnomedicine and herbal wealth but also across broader domains of physical and natural geography.
Equally undeniable is the fact that the state possesses a vast treasure of indigenous ethno-herbal heritage, representing immense potential for the tourism industry particularly through the development of herbal tourism in District Anantnag. The study area has historically drawn the attention of diverse groups of people worldwide, each for different reasons. Today, the presence of numerous species of traditional medicinal herbs scattered across the region has the capacity to attract visitors with specialized interests. These herbal resources can be positioned as supply-side products to meet demand-side expectations within niche tourism markets, catering to experiences such as floral research, healthcare and wellness, herbal remedies, ethnobotanical knowledge, and herb-based leisure. Such initiatives not only enhance the experiential quality for visitors but also contribute to the sustainability of the destination. This trend positions Anantnag as a sui generis platform within the broader profile of Jammu and Kashmir's tourism sector. The indigenous ethno-herbal heritage of Anantnag represents a potent tourism product that requires strategic marketing to effectively reach prospective markets. Properly leveraged, it can establish a threshold for the herbal tourism industry, generating sub-

stantial socio-economic benefits for local communities. Consequently, this approach offers a viable pathway for sustaining and expanding the tourist base of the destination, ensuring product diversification, competitive advantage, and long-term market growth. According to Medlik, (1991), tourist needs, wants, perceptions expectations and price sensitivity etc are crucial domains to push a market towards the specific –interest destination. The travelling public is, diverse and demanding. No tourist area can compete successfully without carefully considering who its visitors are or who it wants its visitors to be. Whatever the situation a tourist area must offer and be able to deliver a 'tourist experience' that is unique and intensely satisfying. Experiences that are second rate quickly result in a declining tourist base.

Herbal-heritage tourism is a relatively new concept within the broader framework of the modern tourism sector in Jammu and Kashmir. It is noteworthy that the preferences and priorities of diverse categories of tourists increasingly demonstrate a positive inclination toward indigenous ethnocultural heritage, particularly the use of traditional herbs adapted for tourism purposes. These resources not only represent cultural continuity but also serve as important motivational factors influencing travel decisions and destination choice. Given this trend, it is of prime importance to recognize and harness the potential of the Kashmiri tourism industry in the context of herbal-tourism development. To fully realize this potential, there is a pressing need to design and implement a strategic framework for medical and herbal tourism. Such a structure would integrate traditional herbal practices with contemporary wellness tourism, thereby creating sustainable opportunities for regional economic growth while promoting Kashmir as a distinctive global destination for health and heritage experiences.

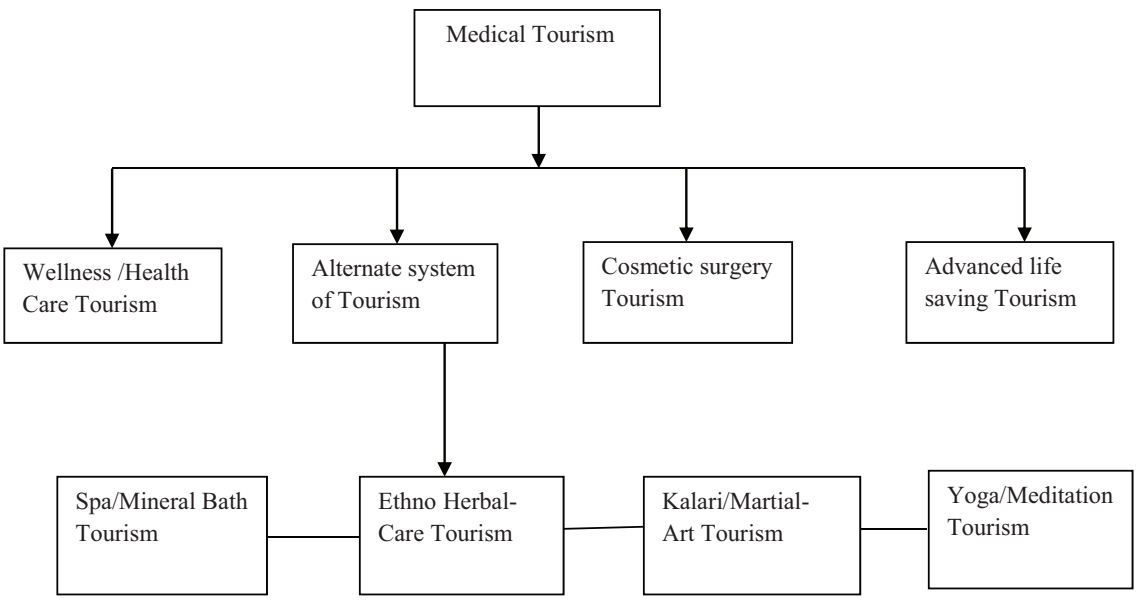

Figure 1. Medical Tourism Structure
Source: Dawn and Pal. (2011)

Herbal Wellness a Constructive Threshold for Travel Business Escalation

In the contemporary period, herbal wellness tourism has emerged as a significant niche within the global tourism market, with destinations such as Sri Lanka, Thailand, Kerala, and Dharamshala witnessing remarkable growth in this sector. Similarly, the southern belt of Kashmir province possesses vast yet untapped potential in terms of medicinal plant biodiversity, which, if strategically developed, could substantially benefit the local economy by attracting visitor interest toward experiential herbal products. This rich heritage of medicinal flora offers considerable revenue opportunities by appealing to both homogeneous (wellness-focused) and heterogeneous (general tourist) market segments, thereby fostering the expansion of indigenous herbal tourism. Developing this sector for prospective markets would generate diverse benefits for the local economy, including new business opportunities for host residents, support for traditional cottage industries, promotion of handicrafts, revitalization of folk herbal-care professions, and enhanced revenues for destination governments. Furthermore, it has the potential to mitigate various economic challenges faced by the region, as outlined below:

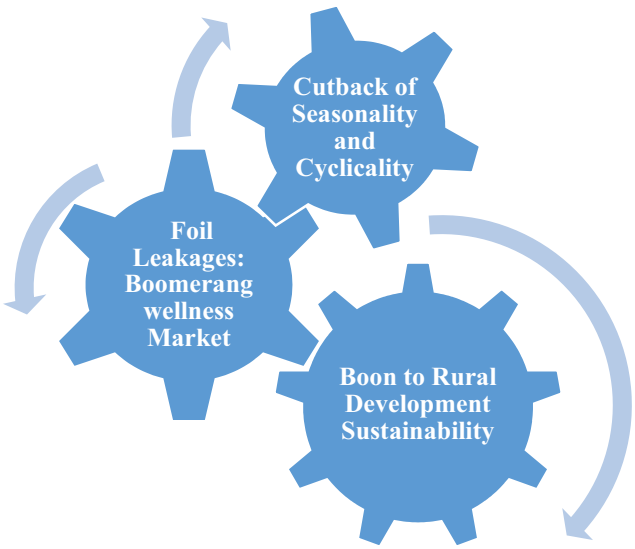

Figure 2. Tourism Business Escalation
Source: Self constructed by author

Cutback of Seasonality and Cyclicality

Expenditure generated through herbal wellness tourism would directly support the local economy and contribute to increased revenue streams. More importantly, it has the potential to transform seasonal and cyclical employment patterns into year-round engagement opportunities. At present, tourist arrivals to the region are largely conditioned by seasonal preferences linked to specific experiences. For instance, visitors seeking snowfall typically arrive during the winter season, while those wishing to witness the tulip blossoms are drawn in spring. Such season-dependent attractions inevitably influence the flow of tourist markets and reinforce the cyclicality of employment within the sector. In contrast, the development of herbal wellness

tourism less constrained by seasonality could extend the tourist calendar throughout the year. This shift would stabilize demand, provide more consistent income to local communities, and reduce the vulnerability of the regional economy to seasonal fluctuations.

The development of herbal wellness tourism in the region is of prime importance, as it holds the potential to generate revenue consistently throughout the year, thereby mitigating the challenges of seasonality and cyclicality. Unlike other tourism segments that rely on specific environmental conditions such as snowfall in winter or tulip blossoms in spring herbal wellness tourism is not confined to a particular season. Health and wellness concerns are universal and continuous, often arising out of necessity or urgency rather than discretionary choices of time, income, or season. While natural attractions such as snow or blossoms cannot be preserved for off-season experiences, indigenous herbal wellness offers a unique advantage by providing year-round opportunities for rejuvenation and healing. This perspective underscores the need to design a structured framework for herbal wellness tourism in Jammu and Kashmir. Such an approach would not only reduce the vulnerabilities associated with seasonal fluctuations in the global tourism market but also strengthen the region's tourism sector by diversifying consumer attitudes, interests, and experiences. Ultimately, it would contribute to sustainable economic growth and yield multi-dimensional benefits for the local economy.

Table 6. Wellness Market in India: Segment wise share

Market Area	2015	2020
Beauty Care	41%	40%
Nutritional Care	27%	27%
Alternate Therapy	19%	15%
Rejuvenation	1%	2%
Fitness Centres	12%	16%

Source: AYUSH report J&K

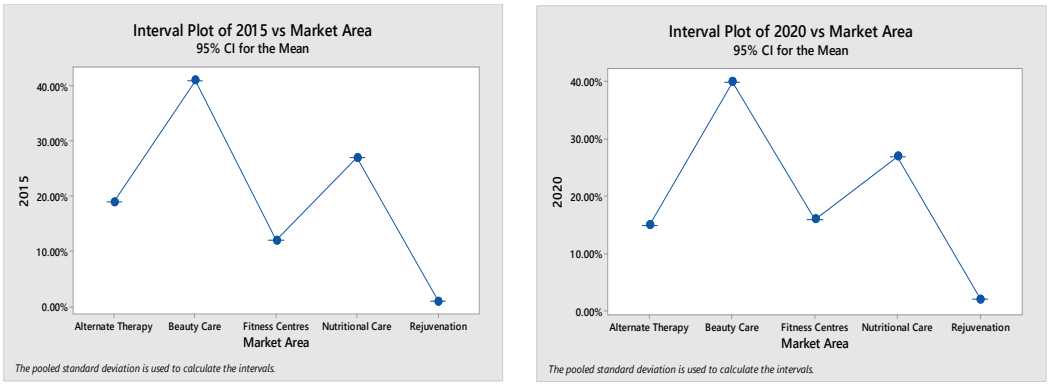

Figure 3 & 4: One-way ANOVA: 2015 & 2020 versus Market Area
Source: Executed by Author

Table 7. Factor Information

Factor	Levels	Values
2020	5	2.00%, 15.00%, 16.00%, 27.00%, 40.00%
2015	5	1.00%, 19.00%, 12.00%, 27.00%, 41.00%

Source: Compiled by Author

Table 8. Factor Means 2015 & 2020 of identified variables/Contents

2020	N	2015	Values	StDev
2.00%	1	1.00%	Rejuvenation	(+1%)
15.00%	1	19.00%	Alternate Therapy	(-4%)
16.00%	1	12.00%	Fitness Centres	(+4%)
27.00%	1	27.00%	Nutritional Care	(+0%)
40.00%	1	41.00%	Beauty Care	(-1%)

Pooled StDev = +0.1
Source: Compiled by Author

Analysis of the available data, using descriptive statistics, indicates that the wellness market in India demonstrated significant progress between 2015 and 2020. Five variables were employed to assess the behavior of wellness travel in the country: beauty care, nutritional care, alternative therapy, rejuvenation, and fitness centers. It is assumed that similar trends could influence the potential development of herbal tourism in Jammu and Kashmir. The application of a one-way ANOVA, supported by pooled interval plots, reveals notable shifts among these variables during the study period. In 2015, beauty care accounted for the largest market share at 41%, followed by nutritional care at 27%, alternative therapy at 19%, rejuvenation at 1%, and fitness centers at 12%. By 2020, beauty care retained its leading share at 40%, nutritional care remained constant at 27%, alternative therapy declined to 15%, rejuvenation increased slightly to 2%, and fitness centers grew to 16% (Ref. Tab. 6 & 8). Interpretation of the interval plot graphs (Fig. 3 & 4) demonstrates that the beauty care segment consistently held the prime position in contributing to the country's economic growth. Nutritional care maintained the second position, while the fitness segment showed a sharp recovery after an earlier decline. The rejuvenation segment, although representing the smallest market share across the period, registered a marginal growth of one percent, highlighting its emerging potential within the broader wellness market.

Table 9. Descriptive Statistics: Analysis of Variance among Variable/Contents

Variable	N	StDev	Variance	95% CI for σ using Bonett	95% CI for σ using Chi-Square
2015	5	0.151	0.0229	(0.071, 0.533)	(0.091, 0.435)
2020	5	0.143	0.0204	(0.066, 0.511)	(0.085, 0.410)

Source: Compiled by Author

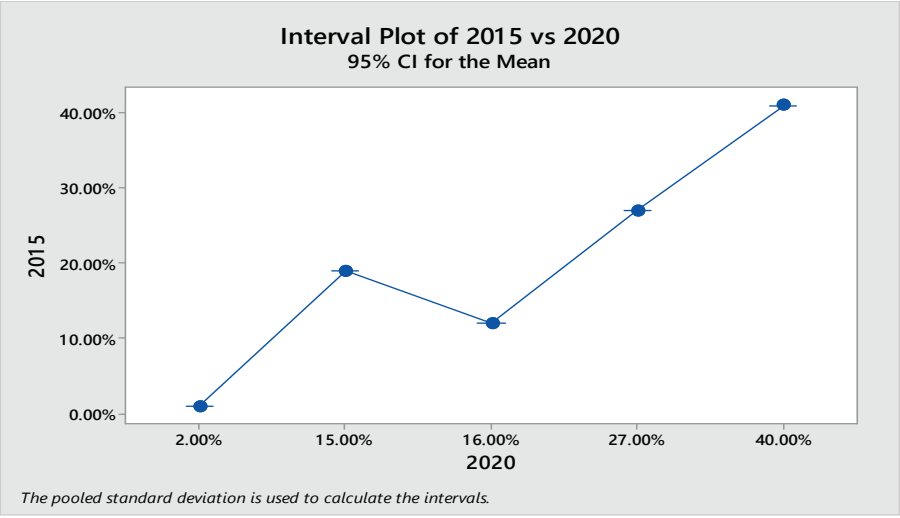

Figure 5. Interval Plot of 2015 versus 2020
Source: Executed by Author

A notable variance is observed in the fitness centers segment, which registered a positive shift of +4%, increasing from 12% in 2015 to 16% in 2020. Similarly, the rejuvenation segment recorded a modest positive variance of +1%, rising from 1% to 2% during the defined period (*Ref. Tab. 8*). By contrast, the determinants alternative therapy and beauty care exhibited negative variances of -4% and -1%, declining from 19% to 15% and from 41% to 40%, respectively. The nutritional care segment remained stable at 27%, showing no variance across the two time points as confirmed by the one-way ANOVA interval plot (*Ref. Tab. 8; Fig. 4*). The aggregate variance across all variables was calculated at 0.0229 with a standard deviation (StDev) of 0.151 in 2015, while in 2020 the aggregate variance was 0.0204 with a StDev of 0.143. These results suggest that no drastic variations occurred among the evaluated variables with respect to their contribution to the growth of wellness tourism in India. Instead, only slight fluctuations were observed across individual market share segments during the study period, indicating relative stability in the overall structure of the wellness market.

Foil Leakages: Boomerang Herbal Wellness Market

Leakage is an instant trait to holidaymaker expenditure not entering the regional economy to contribute gross domestic product (GDP). Delineated by Mill and Morrison, (1992), leakages occur from variety of sources. The extent to which a destination can minimize these effects will determine the size of the foreign exchange earnings. Leakages occur first from the cost of goods and services that must be purchased to satisfy the needs of the tourist. If a tourist wishes steak and if that steak is imported, the cost of the steak is an import cost set against earnings. Local industries may also import part of their raw material to produce goods for tourists, this also is cost. A second cost may occur when importing goods and materials for infrastructure and buildings required for tourism development. The use of materials indigenous to the area will not only reduce import costs but will also add an authentic look to the facilities.

Apropos to the above statement it is relatively illustrated that with the development of herbal tourism, firstly the raw material used for the healthcare services or final consumer goods whether imported or transported from the neighboring cross border states would be controlled. Likely the import costs charged on commodities would be controlled even the leakages leaping out from the region can be retained with ease. Secondly, it is prevalent in Kashmir maximum health concern people rush outside states for physical wellbeing, medical and remedial purpose; since, people don't avail proficient medical facilities in domicile territory to attain value satisfaction.

Notwithstanding, Kashmir bestowed with valuable indigenous herbs attributed of medicinal properties that offers wellness remedies to customer; as a result contributes to reverse and retain the potential market. Continuing, hence herbal tourism industry in horizon would boomerang not only host communities but also people from alien geographical regions as well by facilitating ethno wellness care services and other tourist oriented experiences. As it is observed from the data available (*ref.tab.10*) while establishment of herbal experientials for tourist engagement, travel market considerably attracts towards assessment area; this may result future revisit intention through diversifying and rebuilding destination image among actual tourists. In this concern there has been realized substantial rise in foreign traveler's statistics during couple of preceding years. In 2010, Kashmir province recorded 25,984 foreign tourist arrivals. This number grew considerably by 2015, indicating an upward trend in international tourism to the region. The area experienced remarkable growth in total tourist arrivals between 2020 and 2023; footfall further soared from 3,476,153 in 2020 to 11,316,484 in 2021, followed at 18,884,317 in 2022 and 21,180,011 in 2023 respectively.

Boon to Rural Development Sustainability

The Rural Community consists of people living on the dispersed farmsteads and in a hamlet or village settlements which forms the centre of their common activities, local traditions and shared cultural usages. Concerning to this perspective "Rural Development" can be elaborated a comprehensive socio-economic process undertaken by the government as well as community involvement for the purpose of improving the socioeconomic conditions of the people living in rural areas. It represents planned programs to change and improve the quality of the lifestyle, personality, characteristic behavior of rural people. Accordingly, the phenomena of herbal wellness travel can be enumerated as one of the comprehensive initiative for the allround empowerment of rural residents. Likewise, with the growth and development of indigenous herbal medicinal travel industry people would come to know the avenues and opportu-

nities of employment and durable sustenance. Since, along the upward surge of tourist footfall at a destination it would accrue significant benefits to host economy in the form of employment and livelihood opportunities (i.e., direct employment in herbal spas, wellness retreats, and traditional healing centers), local economic growth, cultural and knowledge preservation (i.e., encourages the transmission of indigenous knowledge about herbs and healing practices), community empowerment and social inclusion (e.g., Supports women and marginalized groups, who often hold traditional herbal knowledge), boosts sustainable herb cultivation and biodiversity conservation through ecotourism. Subsequently this would advantage to building up of the rural life style, cross-cultural assimilation through host guest interaction process, bring-up community consciousness and rural rationalization in one hand. One other hand, system of infrastructure would be developed for the betterment of residents. The sanitation facilities, public conveniences, roads and communication services, conveyances, etc. are the prime aftermaths of wellness tourism development in a region. There is crucial need to materialize these benefits which can be occurred through;

Policy Support and Infrastructure Development: Governments or local authorities may invest in eco-lodges, herb gardens, wellness parks.

Integration with Tourism Value Chains: Partnerships with travel agencies, wellness influencers, and digital platforms expand reach.

Education and Capacity Building: Training local people in hospitality, herb processing, and wellness therapies improves service quality, collaboration with colleges/universities.

Marketing and Branding: Establishing strong branding around local herbal wellness practices (e.g., "Kashmir Hakims (Healers)" "Ayurvedic Kerala" or "Balinese Healing") attracts niche global tourists.

Inclusively the indigenous herbal wellness travel trade could be sustained overtime with practizing;

Economic Sustainability: Seasonal events or wellness festivals to maintain tourist inflow year round.

Environmental Sustainability: Encourage **community-based resource management** of herbal plants.

Social and Cultural Sustainability: Continuous **intergenerational transfer** of herbal knowledge.

Resilience to Market Changes: Adaptive business models like online sales of herbal products, virtual wellness retreats.

Herbal wellness tourism when developed thoughtfully can become a **resilient, inclusive, and sustainable economic engine.** Since the process might relatively reverberate the whole gamut of industry where not only a confined segment would be influenced; rather the entire ecosystem is expected to experience a phenomenal improvisation. Probably this may have positive impact on rural domain and result boon towards rural development of selected study area.

Table 10. Tourist Arrivals/Growth of Tourism for the period 2015-2023

Kashmir Division				**Jammu Division**			**Total Arrivals to J&K**
Year	**Domestic**	**Foreign**	**Total**	**Domestic**	**Foreign**	**Total**	**Total**
2015	898401	28954	927355	12358200	27199	12385399	13312754
2016	1274964	24516	1267474	12255831	29469	12285300	12661174
2017	1196941	31697	1228638	13316544	1556	13318100	14546738
2018	1142865	29143	1172008	106559	31143	137702	16898025
2019	531753	33779	565532	15631577	24141	15655718	16221250
2020	37368	3899	41267	3433466	1420	3434886	3476153
2021	6,64,163	1614	6,65,777	1,06,50,721	36	1,06,50,757	11316484
2022	**26,53,495**	**19,947**	**26,73,442**	**1,62,10,837**	**38**	**1,62,10,875**	18884317
2023	**26,72,819**	**37,678**	**27,10,497**	**1,80,06,517**	**17659**	**1,80,24,176**	**21180011**

Source: Directorate of Jammu & Kashmir Tourism (Official Records)

In pretext of cumbersome socio-political disturbance in Jammu & Kashmir since 1989 up to 2011 tourism sector has gone through difficult circumstances and accrues minimal tourism business hence showcase poor media coverage towards industry. Subsequently, on eve of normalcy and recovering situation in vale media reports positively reflected the image of Kashmir destination in the eye of prospective visitors. The increasing trend of statistical figures associated to foreign market during 2010-13 in comparison to previous and post corresponding period. Kashmir province accounts 25984 foreign arrivals during 2010 and tremendously rocketed footfall in the region by 2015 to 28954 but suddenly exhibits the downward trend in 2016 with mere 24516 arrivals however the subsequent period exhibits an upward surge in number. Similarly the congruent scenario has been espied in Ladakh region even estimated 22115 foreign arrivals during 2010 the statistical figures hyped by 2015, unfortunately trails took the downward trend in 2016 which accounts 38005 foreign tourist. The trends has been analyzed deeply correlated with the scenario of Kashmir belt, the political oscillations seemed to be directly influencing the arrivals to Jammu & Kashmir. Instead the surprising shifts were noticed since 2014 onwards in connection to both domestic cum foreign footfalls. In this correspondence the aggregate arrival during 2014 numbers 11537119 and depicted a gradual increase by 2017 then abruptly swelled to 1172008 in 2018 respectively. Therefore such aspects induced present authors to put under consideration and evaluate the period 2014-18 reasonably for the research purpose.

Regression Analysis: Year versus Arrivals to J&K

The regression equation is
Year = 2017 + 0.000000 Arrivals to J&K

Model Summary

S	R-sq	R-sq(adj)
2.81838	7.33%	0.00%

Source: Executed by Author

Table 11. Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	4.3972	4.39719	0.55	0.481
Error	7	55.6028	7.94326		
Total	8	60.0000			

Source: Compiled by Author

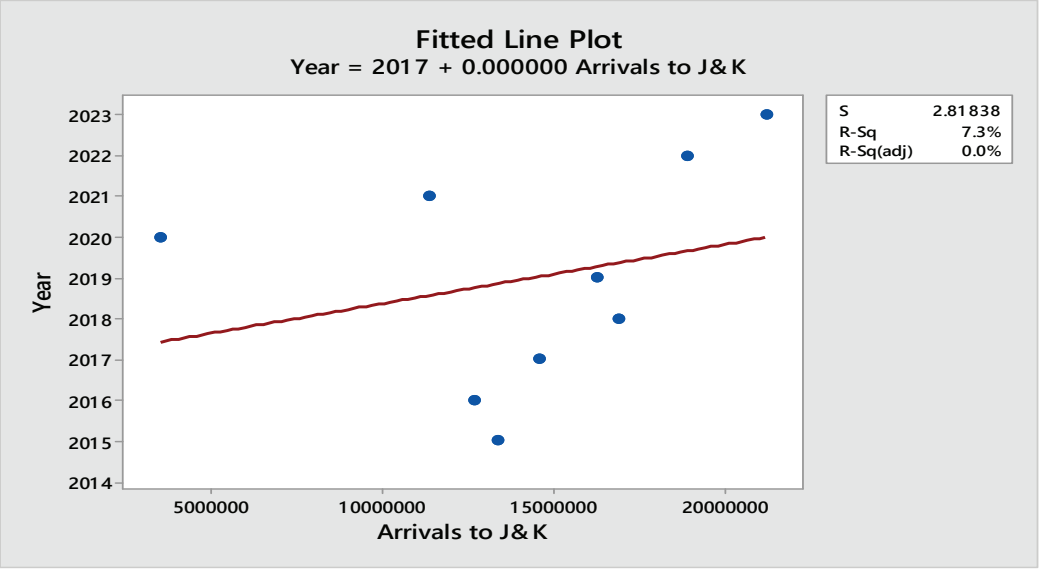

Figure 6. Fitted Line: Arrivals to Jammu & Kashmir versus Time Period
Source: Executed by Author

Further, to examine prevailing market trends and prospective growth of arrival in favor of Kashmir vale the regression model has been put in execution to valuate data for very purpose. The regression analysis assisted to sketch a '*fitted line plot*'; firstly, that reflected average distance (Standard error) of the observed values that fall from the regression line at the rate of S=2.81. The R-Sq=7.3% which demonstrates relative measure of percentage towards dependent variable variance (i.e., the selected years over tourists arrivals), since the proportion of the variation in dependent variable has positive significance. The SS=4.39 (*sum of squares*) while as MS=4.37 (*Mean square*) here the calculation evaluates that data is significantly dispersed as the dispersion points exhibits least clustered (*ref.tab.11*). In this association fitted line plot resorted at year 2017 on Y-axis with estimated value +0.000 arrivals to J&K surging an upward shift (ref. fig.6). Hence it can be assumed that the potential market growth to union territory would be around 14546738 in approximation in eventual course of time that is positive sign towards herbal wellness travel segment.

Discussions and Recommendations

It has been analyzed during the entire phase of study that indigenous herbal wellness is a novel perspective towards improvisation of tourism industry in Kashmir province. If the untapped traditional herbal potential of the area is exploited favorably it would reproduce new approach for the growth and development of wellness tourism as such. Herbal medicinal plants being a diversified attraction catch the attention of huge market towards the destination from different feeder areas anticipates formidable receipts to the vale. Subsequently, it has been observed that, like other attractions of territory i.e.; *Bangus, Bot-Pathri, Kalroos Caves, Vijeshawara temple, Tose-Maidan,* etc. the indigenous wellness aspect has significant scope to catalyze tourists towards valley provided the traditional pursuits where encouraged. Nevertheless, this may be a prolific approach to engender a sustainable tourism phenomenon by stimulating herbal travel in particular as well as conserve the diversity of ethno-medicinal species from the peril of extinction. Hassan, (2013), herbal medicines are becoming popular worldwide due to its growing recognition of natural products being low-cost and without any side effects. Demand for ethno medicines has been increased significantly in both developed and developing economies.

There has been found total number of 23 herbaceous plants which comprise 12 herbs, 4 plants, 2 shrubs, 4 trees, 1 fungus, in the assessment zone. The indigenous herbal extracts can be harnessed to produce assortment of allopathic medicines to cure different health disorders. Mir, (2017), since the traditional medicine use is widespread across the world as an alternative system of medicine and this is an evidence that plants still play role as source of different novel active biological compounds with various pharmacological activities such as antibacterial, anti- inflammatory, cardio protection, anti- fungal, anti- viral, anti-bacterial, anticancer etc. The health and wellness efficacy of these exotic herbs is particularly administered by proficient '*Hakims*' and '*Vaids*' of vale. In fact, these professionals are ascertained about medicinal properties, possess expertise to administer and improvise herbs for various healthcare treatments, in the form of extracts, resins, soups, syrups, latex and decoctions. In addition local inhabitants put into practice these herbs for different gastronomic delicacies, in contrary to innumerable socio-cultural and conventional folk usages.

The initiative would benefit the entire gamut of social structure and anticipated to contribute the local economy. The multi-variant avenues for employment generation, income addition, reduction in seasonality and cyclicality, rural community development might be experience at

large scale subjected to dynamic exposure of herbal wellness travel. Shakeel, (2017), People in different communities have been using their native flora for their survival. Since the earliest of civilizations, man has used plants for healing which is a tradition that even survived the arrival of modern medicine and found newer strength at the end of 20th century. Hassan and Ahmad, (2013), According to a WHO estimate, nearly 80% of the population in the developing countries depends directly on plants for its medicine. Although it has been examined from the data available by employing descriptive statistics that wellness market in India is reflecting a significant progress during the time spell of 2015 and 2020. Five variables where put to assess the behavior of wellness travel in country, it is assumed that this would influence herbal tourism of Jammu and Kashmir as well. Through execution of One-Way ANOVA the pooled interval plot exhibits tremendous movement along given variables in the stipulated time period. Further, to examine prevailing market trends and prospective growth of arrival in favor of Kashmir vale the regression model has been put in execution to evaluate data for very purpose. The regression analysis assisted to sketch a *'fitted line plot'*; firstly, that reflected average distance (Standard error) of the observed values that fall from the regression line at the rate of S=2.81. Hence it can be assumed that the potential market growth to union territory would be progressive in future course of time that is positive sign towards herbal wellness travel segment. Sukumar, (2023), very niche is expected to be the substantial economic driver of the sector, is one of the fastest-growing divisions of the tourism business. Kashmir horizon is one of the familiar tourist destinations known for its rich biodiversity and valuable historic landscape. Sukumar and Balgopal (2023), Destinations for tourism are created to highlight their unique selling propositions by offering a variety of services blend of leisure, pleasure, and relaxation with herbal wellness and healthcare. This calls for a comprehensive service package that includes mental activity and education along with rejuvenation, fitness centres/physical exercise, beauty care, nutrition care and alternate therapy. Concluding that development of indigenous herbal wellness is a novel approach for tourism industry not exclusive to Kashmir province rather country as whole. In this connection some of the pertinent recommendations forwarded towards the expansion of wellness travel in vale can be extended as;

- Formulation of local and national health tourism competitiveness roadmaps and mainstreaming health tourism into national development plans will address many issues concerning this niche sector of tourism. Branddevelopment of Kashmir herbal tourism to create a unique image of very concept will help in its development.
- Establishment of herbal manufacturing units and processing and value addition units in all peripheries of Kashmir will further boost this sector. Establishing marketing and processing units of medicinal plants will encourage cultivation of medicinal plants thereby generating employment in Kashmir hence induce further impetus to this sector.
- The government needs to frame some policy for development of herbal tourism so as to encourage investmentin this sector in the form of building infrastructure for development of tourism.
- The concept of indigenous herbal wellness travel needs to be encouraged to clinch another feather in the crest of tourism business. Parallel to anthropogenic, symbiotic visitor attractions the herbal heritage phenomena can be brought into the attention of prospective market.
- The stakeholders of tourism sector need to come forward to tap the potential of the regional indigenous herbal essence. Consequently shall take decisive role towards building and promoting the image of the persuasive product; keeping up to highlight traditional herbal wellness treatments, providing informative online and offline materials i.e. televi-

sion channels, internet, Radio, newspapers, articles, magazines etc. and render them available to the customer.

- The Medicinal Plants growing in the forests of Jammu & Kashmir are mostly in the form of Herbs and Shrubs, both annual and perennial. Natural regeneration is obstructed by many reasons which include biotic interference, poor seed set, poor seed viability and harsh climatic conditions. Different measures for augmentation with artificial regeneration are necessary to multiply these species in different suitable areas by vegetative and other means, besides taking other measures for their conservation.
- Local awareness-raising campaigns to sensitize stakeholders to the potential growth prospects in the herbal tourism sector, making community conscious of the importance of economic contributions and developments which Herbal tourism can do, capacity development of local producers and service providers so that they know how to deal with very niche tourism sector. The community awareness programs could be conducted through gram Sabha meetings, Panchayat Samiti programs, and other capacity building programs via zonal agricultural authorities. Further educational institutions can be reaped in to create community awareness and in building the skills of the service providers.
- Finally, the private-public stakeholders ought to pay an immediate attention on the fragile indigenous herbal species rather let to vanish. Especially Kashmir tourism administration shall bring traditional medicinal plants in profile of industry to reconstruct folk herbal wellness concept as a novel travel phenomenon.

Conclusions

Herbal wellness concept is a novel and emerging travel business phenomena which is gradually surging to heights in different corners of country. According to secondary data in hand so the statistical descriptions exhibits that southern states especially Kerala is growing at geometric progression in wellness market segment. The statistical figures reflex that significant market share accrues in state basket from herbal healthcare business. Connected to the testament, Jammu & Kashmir a region in the northern Himalayan landscape acclaimed favorable habitat to vast indigenous herbal diversity. This unique proposition inherits a tremendous potential to tap the opportunities for the development of herbal tourism sector. In assessment precinct, people have been exploiting herbal medicinal products to cure the internal and external health ailments since times immemorial. Now a day in the diversified competitive market behavior the destination management zones are engaged in providing value oriented experience to catalyze tourists. In this association the traditional herbal magnitude of vale believed to be incredible platform to pull the potential market. There is no doubt that the Kashmir is rich in Indigenous knowledge and folklores regarding medicinal herbs in Unani, Ayurveda and Amchi systems of medicine. Having more than 300 medical species found in Kashmir, potential of high altitude medicinal plants of high commercial value, earthly paradise endowed with incredible diversity of medicinal plants and many other advantages as well. Developing herbal tourism will cut down seasonality of Kashmir tourism and beget rural development, socio economic progress of rural areas and socio cultural advancement.

The present study demonstrates that herbal wellness tourism experience can positively influence customer engagement. Industry practitioners can leverage this insight to develop and expand destination offerings in this direction. For instance, supporting infrastructure and facilities should be strategically planned, and relevant policies should be implemented to foster

growth. Additionally, the study reveals that there are diverse components of indigenous wellness tourism experiences such as fitness centres, nutritional care, and alternative therapies which have a significant impact on inspiring travelers and catalyzing the development of potential niche travel market. The study helped to recognize indigenous herbal medicine heritage of a geographical horizon in purview to growth of herbal wellness tourism and brought it in the attention of contemporary world. Notwithstanding the documentation of this investigation has been anticipated valuable for the communities and their future progeny to come. It demands that pertinent attention shall be realized to conserve the precious indigenous plants sustainably and ethnic herbal wellness skills to pass future generation.

Kashmir being world famous Tourist destination has the potential to develop a network of Herbal Tourist Villages where the tourists apart from enjoying the natural scenic beauty can be soothed by traditional therapies (Panchkarma & Regimental therapies) of Ayurveda, Yoga, Unani, Sidha and Homeopathy (AYUSH) thereby boosting Herbal Tourism. The state government shall declare a well-defined geographical area "having potential and being conducive for promotion of herbal tourism" as AYUSH Village; provide infrastructure, support services, higher incentives to attract investment for establishment of multi units of herbal Healthcare Sector. Herbal tourism sector cannot be taken only in the public sector however private sector needs to be roped in for establishing specialized herbal wellness centres providing facilities like Panchkarma, Spa, Aroma Therapies, etc, to the tourists on package basis. In order to facilitate the private investors in union territory of Jammu & Kashmir the government authorities needs to create suitable land bank at famous tourist places earmarked for such specialized centres. Designing of institutional framework for the development and promotion of health tourism also needs to take care off. Private investors (growers/traders/entrepreneurs /marketing agencies/ industrialists) need to be encouraged for cultivation, processing, marketing and value addition of local high demand indigenous medicinal plants.

Implications

Although the scope of herbal wellness tourism is broad, it has remained largely underexplored. Kashmir, with its rich biodiversity and legacy of Unani medicine, holds immense potential to emerge as a global hub for herbal wellness tourism---rivaling even Kerala's well-established Ayurvedic tourism---if developed sustainably. This sector can empower rural communities through tourism-driven micro-enterprises and agritourism initiatives, while also aligning with India's AYUSH mission. Reviving traditional knowledge by promoting Unani practices and local herbal healing traditions, as practiced by *hakims* (traditional healers), can foster meaningful interactions between tourists and locals, thereby enhancing cultural appreciation and understanding. Additionally, the growing value of indigenous herbs may incentivize local communities to conserve rare medicinal plants, offering both ecological and economic benefits.

Future Research

Relatively a new phenomenon, it requires further research to establish a strong scientific foundation. Contemporary studies in this field are fragmented, lack continuity and comprehensiveness, and therefore cannot be considered systematic. Consequently, this study suggests that future research should begin by clearly defining herbal wellness tourism and developing relia-

ble and valid measurement scales. Only then should efforts focus on the explanatory aspects of herbal wellness tourism to achieve research objectives and address existing challenges.

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Exploring Sustainable Tea Tourism in Nilgiris: A Multi-Dimensional Approach to Growth and Conservation

Ashokkumar Palaniyandi[A], Sangeetha C.P [B*]

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Abstract

In an era where sustainable development is paramount, tea tourism has emerged as a dynamic convergence of cultural heritage, economic opportunity, environmental stewardship, and technological innovation. This study examines sustainable tea tourism practices in the Nilgiris District of Tamil Nadu, India, by integrating quantitative and qualitative research methodologies. A structured questionnaire was administered to 126 tea growers, tea manufacturers and other key stakeholders, while in-depth interviews and focus group sessions enriched the data, particularly in understanding the operational challenges associated with eco-friendly initiatives. Structural Equation Modeling (SEM) revealed that community collaboration, economic empowerment, and technological/infrastructural support each exert a significantly positive impact on sustainable tea tourism practices. Conversely, eco-friendly practices were found to have a negative coefficient, a finding that was further clarified through qualitative insights—highlighting issues such as high initial capital outlay, insufficient training, and policy limitations. The study underscores the importance of a holistic approach in which technological investments and enhanced community participation mitigate the challenges tied to sustainable environmental practices. These findings provide actionable recommendations for policymakers, tea estate managers, and tourism professionals aimed at reinforcing sustainable practices within the tea tourism ecosystem. Additionally, the study discusses its limitations and suggests potential directions for future research.

Keywords: *Community Collaboration, Economic Empowerment, Eco-friendly Practices, Sustainable Tea Tourism, Technological Integration*

Introduction

Tea tourism has become a unique subset of agro-tourism that combines cultural legacy with contemporary economic and environmental demands in a time when sustainable development is crucial. Leveraging the rich legacy of tea cultivation, this form of tourism provides immersive experiences that celebrate tradition while catalysing local socio-economic development

A Research Scholar (PhD), Department of Tourism and Travel Management, Government Arts College (Autonomous), Coimbatore, Tamil Nadu, India 641018, coresponding author: ashoksmart2all@gmail.com
B Assistant Professor and Head, Department of Tourism and Travel Management, Government Arts College (Autonomous), Coimbatore, Tamil Nadu, India 641018, sangeetha.ttm@gacbe.ac.in

and environmental conservation (Ashokkumar & Sangeetha, 2024; Ekka, 2024) Global research underscores that tea tourism is not only about creating new income streams through ventures such as tea shops, accommodations, and handicrafts but also about championing eco-friendly practices—like organic farming, waste management, and renewable energy adoption—that bolster the resilience of tea plantations against climate change impacts (Kumari et al., 2021; R. et al., 2024). Despite its promise, sustainable tea tourism confronts persistent challenges. Key among these are the need for robust governance frameworks, adequate funding, and capacity-building programs to integrate traditional practices with modern sustainability initiatives effectively. Moreover, collaboration between tea estates and local communities is critical for promoting inclusive tourism and reducing socio-economic disparities—a point stressed in recent work (E. Sharma, 2025). In tandem, emerging digital technologies, such as digital marketing platforms and virtual reality experiences, show potential for enhancing visitor engagement and operational efficiencies (Kaur et al., 2024; Ng et al., 2022).

Against this backdrop, the present study explores the interplay among community collaboration, economic empowerment, environmental stewardship, and technological integration within tea tourism. Centred on regions like The Nilgiris in Tamil Nadu, India, the research poses key questions: How does cooperation between tea estates and local communities foster equitable socio-economic development? What is the true impact of eco-friendly practices on environmental sustainability? And how can digital innovations further reinforce both economic and environmental dimensions? By addressing these questions, the study aims to build a robust analytical framework and offer actionable insights for policymakers, tourism professionals, and local communities. Eventually, this research contributes to a balanced approach that harmonizes economic, social, and environmental priorities. The goal is to ensure that the heritage of tea cultivation not only endures but also paves the way for sustainable development in tea-producing regions.

Objectives of the study

- Evaluate community collaboration between tea estates and local stakeholders.
- Understand how tea tourism contributes to economic empowerment through job creation and entrepreneurial ventures.
- Examine the impact of eco-friendly practices—such as organic farming and waste management—on environmental sustainability.
- Investigate the role of digital technologies and infrastructural investments in enhancing sustainable tourism practices.

Review of Literature

Overview of Sustainable Tea Tourism

Sustainable tea tourism represents an innovative nexus between agro-tourism, cultural heritage, and sustainable development. As this niche sector evolves, studies emphasize its dual role in generating socio-economic benefits and promoting environmental stewardship. Tea tourism integrated with cultural preservation in Xiamei village generated significant economic benefits while maintaining traditional practices (Shen & Chou, 2022) . Researchers highlight that integrating traditional tea cultivation practices with modern tourism dynamics is pivotal

in addressing regional disparities and fostering long-term sustainability (Ashokkumar & Sangeetha, 2024; Ekka, 2024).

Community Engagement and Cultural Preservation

A recurring theme in the literature is the importance of community involvement in tea tourism. Active participation of local residents—whether through guiding cultural tours, developing artisanal products, or engaging in decision-making—serves as a catalyst for cultural conservation and equitable benefit-sharing. Case studies from regions like Ooty in Tamil Nadu and Dak Lak in Vietnam illustrate that collaborative frameworks empower communities and reinforce cultural identity (Ezzatian, 2025; Gurung & N, 2024; E. Sharma, 2025). The guest perceptions of tea tourism experiences are strongly influenced by authentic cultural engagement and quality infrastructure (Zhou et al., 2023). Growing interest among younger consumers in sustainable tea tourism provides significant market opportunities (Yeap et al., 2024).

Economic Empowerment and Development

Economic growth is a central promise of sustainable tea tourism. Multiple studies document how initiatives such as tea shops, homestays, and entrepreneurial ventures can invigorate local economies by creating jobs and enhancing market opportunities. Empirical evidence from various tea-producing regions suggests that tea tourism not only alleviates poverty but also supports long-term economic empowerment and skill development (Ashokkumar & Sangeetha, 2024; Sewwandi, 2024). Agritourism functions as a catalyst for sustainable rural development when supported by policy frameworks and community empowerment (Garwi et al., 2025).

Environmental Sustainability and Eco-Friendly Practices

Environmental conservation constitutes a cornerstone of sustainable tea tourism. Research in this area focuses on the adoption of eco-friendly practices such as organic tea cultivation, waste management, and water conservation. These practices not only reduce the ecological footprint of tourism activities but also enhance the natural appeal of tea destinations, while strengthening the resilience of tea estates against climate change (Kumari et al., 2021; R. et al., 2024; Sewwandi, 2024). Agritourism functions as a catalyst for sustainable rural development when supported by policy frameworks and community empowerment (Garwi et al., 2025). Integrating organic agriculture with digital innovation supports long-term sustainability in tea destinations (Li et al., 2023).

Technological and Infrastructural Advancements

The integration of digital tools and infrastructural improvements is an emerging theme in sustainable tea tourism studies. Digital marketing strategies, online booking platforms, and smart tourism analytics have been identified as key drivers in broadening the global reach of tea destinations while streamlining operations. In addition, investments in energy-efficient infrastructure and renewable energy sources further reinforce the sustainability agenda by lowering operational costs and attracting eco-conscious travellers (Kaur et al., 2024; Ng et al., 2022; Palaniyandi et al., 2024). Digital platform adoption significantly enhances tea tourism market reach and guest engagement (R. Sharma et al., 2023).

Theoretical Framework and Variable Justification

The conceptual framework guiding this study is anchored in established theories of sustainable tourism and stakeholder engagement. According to these theories, integrating multiple dimen-

sions—such as community collaboration, environmental stewardship, and technological support—creates synergistic impacts on tourism outcomes.

Justification of Variable Selection:
Independent Variables:
Studies have consistently demonstrated that factors such as community collaboration, the adoption of eco-friendly practices, and technological/infrastructural advancements are key drivers of success in sustainable tourism initiatives (Ashokkumar & Sangeetha, 2024; Mondal & Samaddar, 2021). These variables are posited to initiate or influence change in the tourism ecosystem.

Dependent Variables:
The dependent variables in this research—economic empowerment, environmental sustainability, and community benefit—capture the outcomes of interest. They represent the measurable benefits that sustainable tea tourism can deliver to local communities and the environment, as supported by empirical evidence from diverse case studies (Banerjee & Tyagi, 2024; Sewwandi, 2024).

Moderating and Mediating Variables:
The moderating variables such as government support and financial assistance are considered to influence the strength of these relationships. Mediating variables—including training programs and enhanced community engagement—serve to bridge and amplify the effects of the independent variables on the dependent variables. This categorization is consistent with comprehensive models in sustainable tourism research that underscore the interconnectedness of socio-economic, environmental, and technological factors.

Research Methodology

Research design

This study adopts a quantitative research design based exclusively on a questionnaire survey to examine the impact of sustainable tea tourism on local communities and environmental sustainability in The Nilgiris District, Tamil Nadu, India.

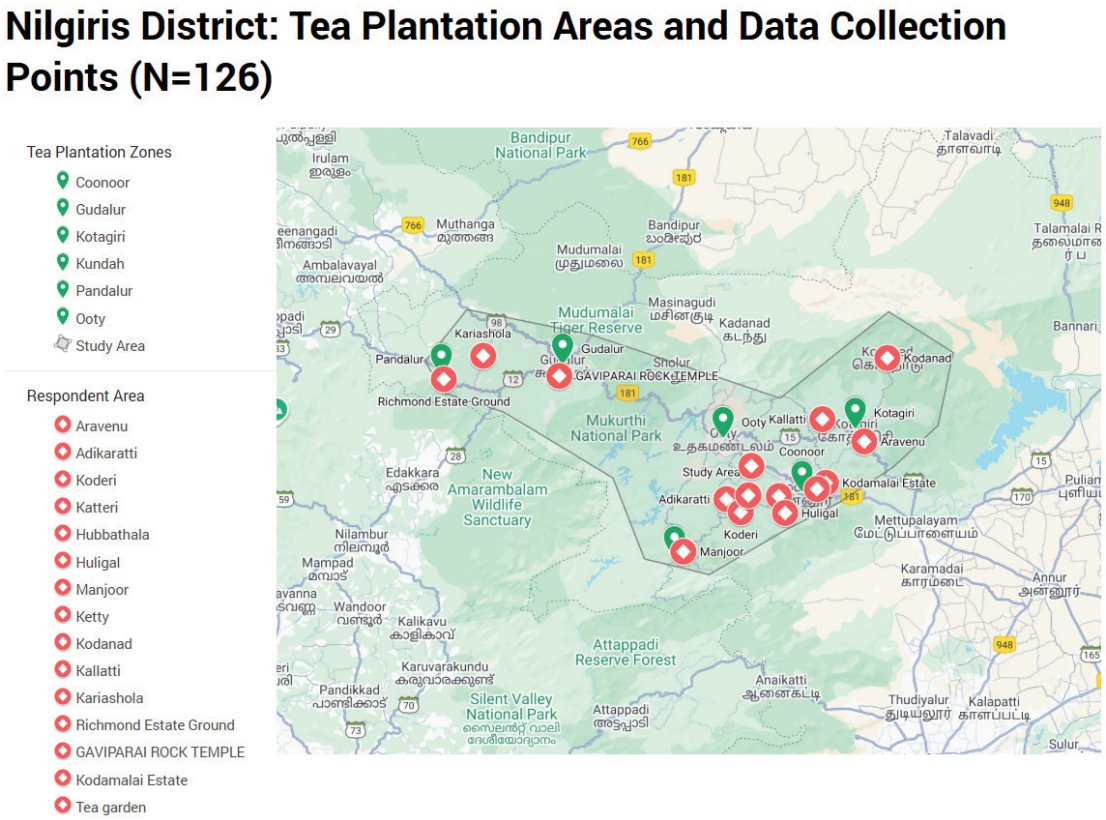

Figure 1. Map of Nilgiris District showing tea plantation zones and stratified

Figure 1. Map of Nilgiris District showing tea plantation zones and stratified distribution of 126 respondents across data collection points. Green markers represent six major tea-producing zones (Ooty, Kotagiri, Coonoor, Gudalur, Pandalur, Kundah). Red markers indicate specific respondent areas distributed across the district's tea-growing regions. The study area boundary is marked by a black polygon. Geographic context includes national parks, wildlife reserves, and elevation zones (1,000–2,600 meters) suitable for tea cultivation in the Western Ghats. The research follows a descriptive and cross-sectional approach, aiming to capture the perspectives of small tea growers regarding community collaboration, economic benefits, environmental sustainability and technological and infrastructure support. A structured questionnaire was developed to collect primary data from the respondents, all of whom are small-scale tea growers involved in tea-related activities and tourism. The questionnaire was designed to include both close-ended and Likert-scale questions to quantify responses objectively.

The survey instrument covered key thematic areas (Figure 2) such as:

- Community Collaboration – assessing stakeholder involvement in tea tourism.
- Economic Benefits – evaluating job creation, entrepreneurship, and market growth.
- Environmental Sustainability – identifying eco-friendly practices like organic farming and waste management.
- Technological and Infrastructural Support – understanding financial assistance, technological adoption, and policy interventions.

Categorizing variables is crucial for structuring research and understanding the interplay between different elements in the context of this study on sustainable tea tourism in The Nilgiris District. In this study, independent variables, such as community collaboration and adoption of eco-friendly practices, drive change and impact tea tourism success. Dependent variables represent the outcomes being measured, including economic benefits, environmental sustainability, and community empowerment. Moderating variables, like government support and financial assistance, influence the strength and direction of these relationships, while mediating variables, such as training programs and community engagement, act as bridges that facilitate or enhance the impact of independent variables on the dependent ones. Finally, control variables, like geographic location and demographic factors, ensure that external elements do not distort the analysis. This categorization helps isolate the effects of key variables, allowing the study to generate accurate insights and actionable recommendations for promoting sustainable tea tourism

In addition to primary data collection through questionnaire surveys, this study also utilizes secondary data from various credible sources to provide a comprehensive analysis of sustainable tea tourism in The Nilgiris District, Tamil Nadu. Secondary data is obtained from published research articles, government reports, industry publications, and statistical databases related to tea tourism, community development, and environmental sustainability. These sources help validate findings, provide historical insights, and offer comparisons with similar studies conducted in other tea-producing regions. Additionally, policy documents and sustainability reports from tea boards and tourism authorities are examined to understand existing frameworks, challenges, and best practices in promoting eco-friendly tourism. By integrating secondary data with primary survey results, the study enhances its depth and reliability, ensuring well-rounded conclusions and recommendations for improving sustainable tea tourism initiatives.

Here are hypotheses that align with the study's objectives and themes (Table 1):

- H1: Collaboration between community members and tea estates positively influences equitable socio-economic benefits in sustainable tea tourism.
- H2: Tea tourism significantly contributes to long-term economic empowerment by creating jobs and supporting entrepreneurial ventures.
- H3: Adoption of eco-friendly practices, such as organic farming and waste management, significantly enhances environmental sustainability in tea tourism.
- H4: Technological advancements and investments in infrastructure significantly improve the efficiency and growth of sustainable tea tourism initiatives.

Table 1. Map alignment on Objectives to Hypotheses

Research Objective	Corresponding Hypothesis
Assess community collaboration in tea tourism	H1: Collaboration positively influences socio-economic benefits.
Evaluate economic empowerment via tea tourism activities	H2: Tea tourism contributes to job creation and entrepreneurial ventures.
Analyze environmental sustainability through eco-friendly practices	H3: Adopting eco-friendly practices enhances environmental sustainability.
Explore the impact of technological and infrastructural advancements	H4: Technological investments improve the efficiency and growth of tea tourism.

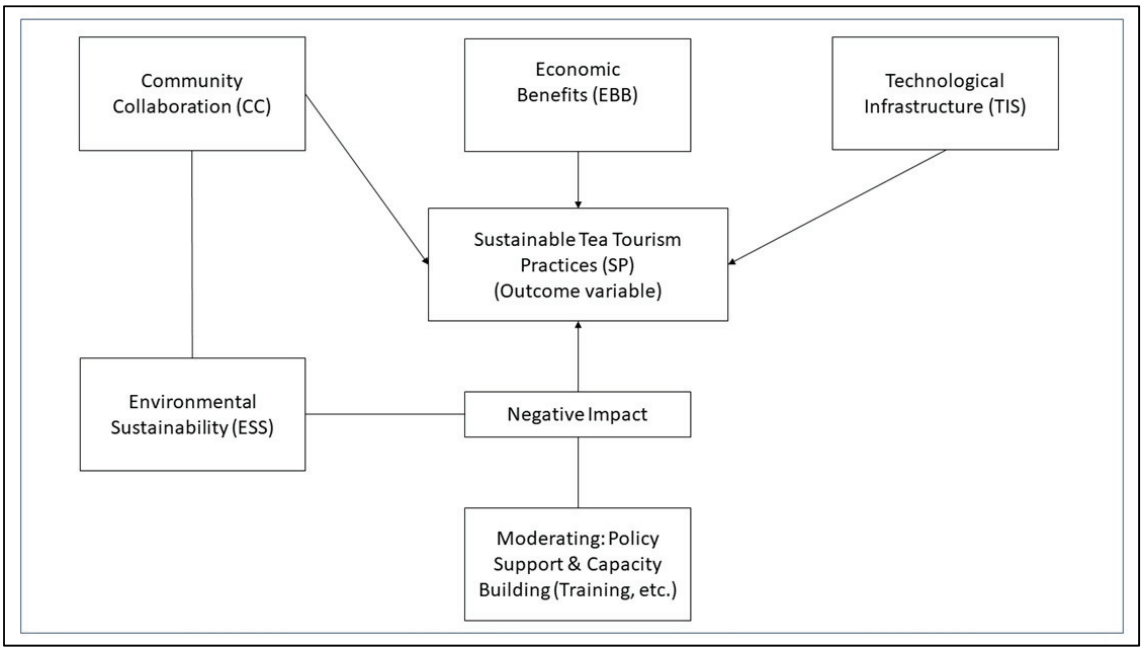

Figure 2. A Comprehensive Conceptual Framework for Sustainable Tea Tourism Practices

Sampling and Data collection

A total of 126 small tea growers from the Nilgiris District, Tamil Nadu, India, were selected via a stratified random sampling method. This sampling approach ensured that tea-growing communities—varying by size, location, and tea production practices—were proportionally represented. Previous research in the realm of tea tourism and agro-tourism has frequently employed sample sizes in the range of 100 to 150 participants. For instance, studies exploring community collaboration, economic benefits, and sustainability practices have demonstrated that a sample within this threshold can yield reliable and statistically robust outcomes. Aligning with these established norms helps validate our methodology and facilitates meaningful comparisons with earlier research (Ashokkumar & Sangeetha, 2024; Sewwandi, 2024). Structural Equation Modeling (SEM) and other multivariate techniques often require a minimum sample size to stabilize parameter estimates and ensure adequate statistical power. According to widely referenced guidelines, having at least 5 to 10 respondents per estimated parameter is advisable. Given the moderate complexity of our conceptual model—with several independent, dependent, and moderating variables—a sample size of 126 is well-suited to support the analytical demands of the study without unnecessarily overburdening the respondents. While a formal power analysis might further refine these estimates, practical constraints such as the accessibility of participants and resource availability also played a role in setting the sample size. In field-based research involving specialized populations, achieving an optimal balance between feasibility and statistical rigor is key. In this context, 126 participants represent a pragmatic and effective target for ensuring robust, actionable findings. Prior to the main data collection, a pilot test was conducted with 10 participants to refine the structured questionnaire.

Data Collection Instrument:
A structured questionnaire was developed, containing both close-ended items and Likert-scale questions. The instrument was designed to capture key constructs:

Independent Variables:
- Community Collaboration (CC): Measures the extent of interaction and cooperative efforts between tea estates and local stakeholders.
- Economic Benefits (EBB): Evaluates job creation, entrepreneurial activities, and local market growth arising from tea tourism.
- Environmental Sustainability (EES): Assesses the implementation of eco-friendly practices such as organic cultivation, waste management, and water conservation.
- Technological/Infrastructure Support (TIS): Captures the influence of technological advancements, digital marketing, and infrastructural investments on tea tourism.

Dependent Variable:
- Sustainable Tea Tourism Practices (SP): The outcome variable representing the overall effectiveness and sustainability of tea tourism practices.

Mixed-Methods Supplement:
In addition to the survey, qualitative data were collected to further explain unexpected quantitative results—most notably, the negative influence observed for environmental sustainability. This phase included:
15 semi-structured interviews with tea estate managers, local tea growers, community leaders, and tourism officials.
- 2 focus groups (each comprising 6–8 participants) to discuss shared experiences and challenges in implementing eco-friendly practices.

Data analysis

Quantitative Analysis:
Data Entry and Cleaning: All survey responses were coded and entered into SPSS. Data cleaning ensured the accuracy and consistency of the dataset.

Descriptive Statistics:
Frequencies, means, and standard deviations were calculated to provide a demographic overview and an understanding of the central tendencies for each construct.

Table 2. Gender Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	85	67.5	67.5	67.5
	Female	41	32.5	32.5	100.0
	Total	126	100.0	100.0	

Out of 126 respondents, 67.5% are male and 32.5% are female. This distribution (Table 2) suggests that males are predominant in this sector, which may influence the perspectives on community collaboration and decision-making in sustainable tea tourism initiatives.

Table 3. Age Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-24	5	4.0	4.0	4.0
	25-34	20	15.9	15.9	19.8
	35-44	29	23.0	23.0	42.9
	45-54	36	28.6	28.6	71.4
	55 and above	36	28.6	28.6	100.0
	Total	126	100.0	100.0	

The respondents are primarily concentrated in the higher age brackets, with 28.6% aged 45–54 and another 28.6% aged 55 and above. This indicates (Table 3) that the majority of the participants have substantial life and industry experience, which could contribute to more seasoned insights regarding sustainability and long-term economic empowerment.

Table 4. Occupational Profile of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tea Plant Grower	91	72.2	72.2	72.2
	Tea Manufacturer	23	18.3	18.3	90.5
	Govern/NGO Rep	8	6.3	6.3	96.8
	Others	4	3.2	3.2	100.0
	Total	126	100.0	100.0	

A significant proportion (72.2%) are tea plant growers, followed by tea manufacturers (18.3%). The dominance of grower highlights (Table 4) the primary engagement of those directly involved in tea production, implying that the interventions or sustainability schemes will affect the core stakeholders of the industry.

Table 5. Educational Background of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Formal Education	2	1.6	1.6	1.6
	Primary Education	25	19.8	19.8	21.4
	Secondary Education	25	19.8	19.8	41.3
	Vocational Training	7	5.6	5.6	46.8
	Bachelor Degree	44	34.9	34.9	81.7
	Master Degree or Higher	23	18.3	18.3	100.0
	Total	126	100.0	100.0	

Most respondents hold a bachelor's degree (34.9%) accompanied by secondary education (19.8%) and primary education (19.8%). This moderate-to-high education level provides (Table 5) a basis for understanding and potentially adopting technological or eco-friendly practices, although the presence of respondents with limited formal education points to the need for tailored capacity-building initiatives.

Table 6. Experience Levels Among Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Experience	8	6.3	6.3	6.3
	Less than 1 Year	8	6.3	6.3	12.7
	1 - 5 Years	15	11.9	11.9	24.6
	6 - 10 Years	15	11.9	11.9	36.5
	More than 10 Years	80	63.5	63.5	100.0
	Total	126	100.0	100.0	

With 63.5% of respondents reporting more than 10 years of experience in tea-related activities, the sample brings a wealth of practical insights. This high level of experience makes (Table 6) the insights particularly valuable, yet it could also imply resistance to changing long-established practices, especially in adopting new technologies or environmental practices.

Table 7. Income Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 50000	89	70.6	70.6	70.6
	50001 - 100000	27	21.4	21.4	92.1
	100001 - 200000	9	7.1	7.1	99.2
	200001 - 300000	1	.8	.8	100.0
	Total	126	100.0	100.0	

The majority (70.6%) earn less than 50,000, indicating that many participants might be operating on relatively modest incomes. This finding (Table 7) emphasizes the economic challenges in the sector and underscores the need for initiatives that support economic empowerment through job creation and entrepreneurship.

Table 8. Awareness Levels Regarding Tea Tourism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Partially Aware	88	69.8	69.8	69.8
	Aware	38	30.2	30.2	100.0
	Total	126	100.0	100.0	

Table 9. Knowledge Level on Tea Tourism Practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Familiar	1	.8	.8	.8
	Limited Knowledge	50	39.7	39.7	40.5
	Neutral	37	29.4	29.4	69.8
	Knowledge	30	23.8	23.8	93.7
	Very Knowledge	8	6.3	6.3	100.0
	Total	126	100.0	100.0	

Over two-thirds of the participants are "partially aware" (69.8%), with only a minority being fully aware. The mixed levels of knowledge (Table 8, Table 9) —from limited to a small fraction being very knowledgeable—suggest that further dissemination of best practices and training programs is essential.

Table 10. Professional Frequencies of Tea Industry Stakeholders

		Responses		Percent of Cases
		N	Percent	
Professionala	BT.Tea_Plantation_Owners	79	13.8%	66.9%
	BT.Tea_Plantation_Workers	70	12.2%	59.3%
	BT.Tea_Factory_Owners	59	10.3%	50.0%
	BT.Tea_Factory_Workers	57	10.0%	48.3%
	BT.Local_Residents	54	9.4%	45.8%
	BT.Community_Leaders	25	4.4%	21.2%
	BT.Tea_Cooperative_Members	26	4.5%	22.0%
	BT.Tourism_Officials	35	6.1%	29.7%
	BT.NGO_Representatives	30	5.2%	25.4%
	BT.Tour_Operators	51	8.9%	43.2%
	BT.Homestay_Owners	34	5.9%	28.8%
	BT.Environmental_Experts	27	4.7%	22.9%
	BT.Homestay_Workers	22	3.8%	18.6%
	BT.Other_Beneficiaries	3	0.5%	2.5%
Total		572	100.0%	484.7%
a. Dichotomy group tabulated at value 1.				

Table 11. Participation in Tea Tourism Schemes

		Responses		Percent of Cases
		N	Percent	
Schemesa	Scheme_TTDC	23	9.5%	18.3%
	Scheme_ITBI	36	14.9%	28.6%
	Scheme_NDAP	61	25.3%	48.4%
	Scheme_ERTTO	46	19.1%	36.5%
	Scheme_PCLI	30	12.4%	23.8%
	Scheme_CP	13	5.4%	10.3%
	Scheme_International_Recognition	8	3.3%	6.3%
	Scheme_INCOSERVE	14	5.8%	11.1%
	Scheme_Others	10	4.1%	7.9%
Total		241	100.0%	191.3%
a. Dichotomy group tabulated at value 1.				

The professional frequency table reveals (Table 10, Table 11) a diverse range of stakeholders from tea plantation owners to tourism officials, indicating a multifaceted industry structure. The schemes frequency table shows varying levels of participation, with certain schemes (e.g., Scheme_NDAP) being more popular. This suggests that some policy instruments or financial supports are perceived as more accessible or beneficial to the stakeholders.

Structural Equation Modeling (SEM):
SEM techniques were employed to test the hypothesized relationships among the independent variables (CC, EBB, EES, TIS) and the dependent variable (SP). The model evaluation included fit indices such as Chi-square, RMSEA, NFI, and CFI to determine the overall adequacy of the theoretical framework.

Qualitative Analysis:
Transcription and Coding:
Interviews and focus group sessions were transcribed verbatim. Thematic coding was conducted using qualitative data analysis software, identifying recurrent themes related to the operational and financial challenges of eco-friendly practices. Qualitative findings were triangulated with SEM results to provide contextual depth - especially to explain the unexpected negative association between environmental sustainability and sustainable tea tourism outcomes. The responses were systematically recorded and analysed using SPSS to examine correlations and trends, allowing for a comprehensive understanding of the role of sustainable tea tourism in fostering socio-economic and environmental benefits within the region.

Results and Findings

Quantitative Findings

The SEM analysis produced the following standardized regression weights and significance levels:

Table 12. Standardized Regression Weights: (Group number 1 - Default model)

Variables			Estimate	P	Result (Default model)	Model Indices
SP	<---	CC	.274	.009	Minimum was achieved	NFI -.847
SP	<---	EBB	.395	***	Chi-square = 84.982	CFI - .848
SP	<---	TIS	.587	***	Degrees of freedom = 2	RMSEA - .098
SP	<---	ESS	-.284	.011	Probability level = .000	Acceptable Fit

Ha: Collaboration between community members, Economic Benefits, Environmental sustainability and Technological advancements & investments in infrastructure have a direct significant effect on Sustainable tea tourism practices (Table 12).

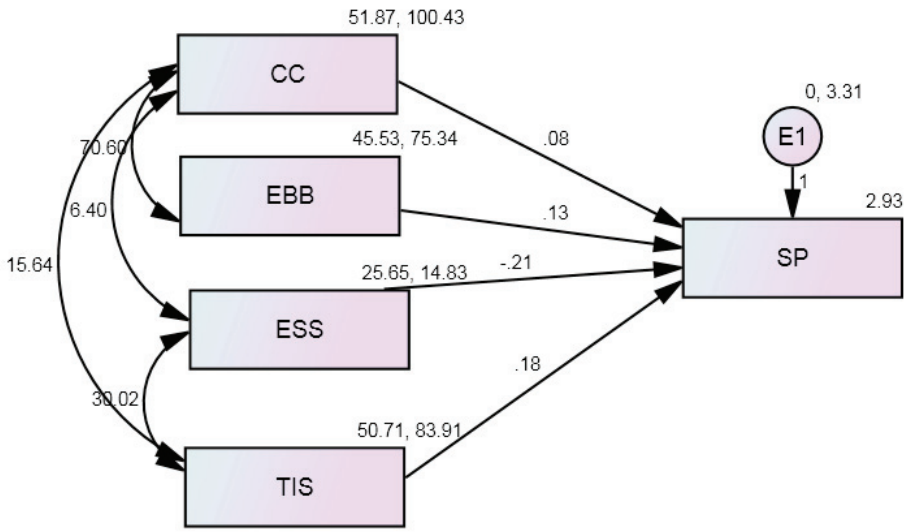

Figure 3. Structural Equation Model

The above SEM (Figure 3) result depicts the standardized regression weights (β) which estimate and predict the sustainable tea tourism practices. The SEM result reveals that the hypothesis is significant i.e. Collaboration between community members, Economic Benefits, Environmental sustainability and Technological advancements & investments in infrastructure have a direct significant effect on Sustainable tea tourism practices. The standardized regression weights of Collaboration between community members (.274), Economic Benefits (.395), and Technological advancements & investments in infrastructure (.587) have a direct and positive effect on Sustainable tea tourism practices. But, Environmentally Sustainable has a negative effect on Sustainable tea tourism practices (i.e. Environmentally Sustainable variables goes up the achieving Sustainable tea tourism practices comes down).

It is concluded from the SEM result that, for achieving Sustainable tea tourism practices tea tourist providers need more Technological advancements & investments in infrastructure facilities which push for more tea tourism activities that will attract more tourists for the destination.

Qualitative Findings
The thematic analysis from interviews and focus groups provided additional context:

High Initial Costs & Operational Challenges:
Respondents consistently noted that while eco-friendly practices such as organic farming and waste reduction align with long-term sustainability goals, the initial financial outlay is high. This often results in operational strain, reducing immediate tourism competitiveness.

Inadequate Training and Technical Support:
A recurring theme was the lack of comprehensive training programs and technical support, which hindered effective implementation of environmental practices. This gap often led to inconsistent application and short-term inefficiencies.

Policy and Infrastructural Barriers:
Several stakeholders mentioned that current policy frameworks and infrastructural investments are insufficient, compounding the challenges associated with sustainable environmental practices. The need for enhanced government support and capacity-building emerged as crucial factors.

Discussion

Community Collaboration as a Driver of Sustainable Tea Tourism ($\beta = .274$, $p < .01$)

The positive and significant effect of community collaboration on sustainable tea tourism practices ($\beta = .274$, $p < .01$) indicates that stronger linkages between small growers, local residents, and estate managers translate into more consistent and structured tea tourism initiatives. This finding aligns with recent community-based tourism research in similar agritourism contexts. Specifically, (Gurung & N, 2024), in their study of tea tourism in Sikkim, documented that community-led guiding, homestay operations, and collective decision-making on cultural events significantly enhanced both visitor experience and local ownership of tourism activities. Their work emphasizes that when small tea growers perceive themselves as active stakeholders rather than passive recipients, they invest more effort in maintaining tea gardens as attractions and in upskilling themselves to meet visitor expectations. Similarly, (E. Sharma, 2025), in examining participatory models in sustainable tourism development across multiple destinations, found that explicit integration of local stakeholders into planning, benefit-sharing mechanisms, and governance structures leads to more resilient tourism systems and greater community acceptance of new initiatives. Sharma's analysis of collaborative frameworks demonstrated that where formalized structures for community input exist—such as regular stakeholder meetings, cooperative decision-making, and transparent benefit-sharing—tea tourism outcomes improve significantly. The present study's moderate coefficient ($\beta = .274$) for community collaboration supports these findings, suggesting that while collaboration is a necessary condition for sustainable tea tourism in the Nilgiris, it functions as part of a broader ecosystem that includes economic incentives and technological enablers. Taken together, these studies advance the argument that collaboration is not merely a contextual factor or enabling condition, but rather a core driver that enables tea tourism projects in the Nilgiris to move beyond ad hoc, informal efforts toward more structured, reproducible, and sustainable practices. This implies that policy interventions in the Nilgiris should prioritize institu-

tional mechanisms that formalize community engagement rather than relying on ad hoc goodwill.

Economic Empowerment as a Key Motivator (β = .395, p < .001)
Economic benefits exhibited a moderately strong and significant positive relationship with sustainable tea tourism practices (β = .395, p < .001), underscoring that income diversification, job creation, and enterprise development are central motivations for engaging with tourism in tea-growing regions. This result corroborates qualitative and quantitative evidence from other tea-producing regions facing similar socio-economic pressures. (Sewwandi, 2024), in a comprehensive case study of the Pedro tea estate in Sri Lanka, found that tea tourism homestays, guided plantation tours, and value-added product sales (such as tea-infused beverages and organic tea crafts) contributed to supplementary household income and enhanced livelihood security for estate communities. Sewwandi's analysis revealed that households engaged in tourism-related activities reported income increases of 20–35% over non-tourism baseline incomes, which motivated further investment in tourism infrastructure and community skills development. The present study's findings are consistent with this evidence from Sri Lanka, suggesting that when small growers in the Nilgiris perceive tangible economic gains—through direct tourist spending on accommodations, meals, and tea products, as well as new market channels for premium organic tea—they are more willing to invest scarce resources (time, capital, labor) in maintaining tea-related attractions and services. Importantly, the coefficient for economic benefits (β = .395) is notably higher than that for community collaboration (β = .274), which may reflect a practical reality in economically stressed regions: whereas collaboration is culturally valued and socially important, immediate household economic pressures often take precedence in decision-making. This ranking suggests that without demonstrable economic returns, even well-designed collaborative frameworks may struggle to sustain participation. Accordingly, economic empowerment functions not only as an outcome of sustainable tea tourism but also as a reinforcing mechanism that enables communities to allocate resources to longer-term sustainability initiatives. These findings strengthen the argument that policymakers should prioritize mechanisms that ensure equitable distribution of tourism revenues to small growers and local communities.

The Negative Coefficient for Environmental Sustainability: Explaining an Apparent Paradox (β = –.284, p = .011)
In contrast to expectations and prior conceptual arguments grounded in sustainability theory, environmental sustainability showed a significant negative coefficient in the structural model (β = –.284, p = .011). This unexpected finding indicates that higher reported engagement in eco-friendly practices was associated with lower overall levels of sustainable tea tourism practices. This relationship contradicts many studies that portray organic cultivation, waste reduction, and resource conservation as unequivocal enablers of sustainable agritourism. However, careful examination of the qualitative data collected through semi-structured interviews and focus groups reveals a compelling explanation for this apparent paradox.

The Cost Burden Hypothesis
High Initial Capital Outlay and Operational Strain: Respondents in the interviews and focus groups (n=15 interviews; 2 focus groups with 6–8 participants each) consistently highlighted that while eco-friendly practices—such as organic certification, integrated pest management, waste management systems, and renewable energy adoption—align intellectually with long-

term sustainability goals, their implementation imposes substantial upfront financial costs. For instance, one tea estate manager stated: "Organic certification alone costs 50,000–100,000 rupees, and then yields drop for 2–3 years during transition. Many small growers cannot absorb this loss." Similarly, a focus group of seven small growers noted that composting systems, drip irrigation infrastructure, and solar installations require capital investments ranging from 200,000 to 500,000 rupees—amounts that exceed annual net incomes for 70.6% of the respondent population (those earning <50,000 rupees annually, per Table 7). These high initial costs often result in operational and financial strain, which in turn reduces the immediate competitiveness and attractiveness of tea tourism ventures.

Inadequate Technical Training and Knowledge Barriers: A second recurrent theme emerging from qualitative analysis was the lack of comprehensive, locally-relevant training programs and sustained technical support for eco-friendly practices. As noted by a community leader: "We attended a 2-day workshop on organic farming, but it didn't address local soil conditions or market demand. When problems arose, we had no one to call." This gap in technical capacity often leads to inconsistent and incorrect application of eco-friendly practices, which dampens confidence in their efficacy and discourages further investment. Multiple respondents reported failed attempts at organic cultivation, leading to reduced yields without corresponding premium prices—a "worst of both worlds" scenario that undermines faith in sustainability transitions.

Insufficient Policy Support and Subsidy Barriers: A third critical constraint identified in focus groups was the limited availability of policy-level financial support and the difficulty of accessing existing government subsidies. Several stakeholders reported that schemes ostensibly designed to promote organic farming and sustainable practices are either unknown to small growers, require complex documentation processes, or offer compensation levels insufficient to offset the perceived risks and short-term revenue losses associated with transitioning to greener practices. One township official remarked: "Subsidies exist, but the paperwork is complex, and payouts are delayed. By the time money arrives, a small grower has already reverted to conventional methods out of necessity."

Theoretical Reinterpretation: Environmental Sustainability as a Burden Rather Than a Driver
When these three constraints—cost, training, and policy barriers—are considered together, the negative path coefficient can be interpreted not as evidence that environmental practices are inherently detrimental to tea tourism, but rather as a reflection of the current implementation burden of environmental initiatives in the Nilgiris context. In other words, growers who attempt to adopt more eco-friendly practices may temporarily experience reduced competitiveness (due to lower yields during transition), reduced short-term profitability (due to higher input costs), and operational complexity (due to knowledge gaps), which in turn dampens their overall engagement with tourism-related activities and their ability to invest in tourism infrastructure.

This interpretation is consistent with broader agritourism and sustainable development literature, where environmental upgrades without parallel financial, technical, and institutional support have been observed to initially depress participation in economic activities. For example, studies from Sri Lankan tea estates, Indonesian agritourism enterprises, and African community-based tourism initiatives have documented similar patterns: when sustainability tran-

sitions impose costs without offsetting subsidies or capacity-building support, participating communities experience short-term economic stress that undermines their commitment to tourism diversification. The Nilgiris case thus represents not a fundamental incompatibility between environmental sustainability and tea tourism, but rather a policy and infrastructure gap that must be bridged.

Policy Implications

The findings thus suggest that eco-friendly practices will only become a positive (rather than negative) driver of sustainable tea tourism in the Nilgiris when accompanied by: (1) targeted government subsidies or co-investment schemes that reduce the financial burden on small growers during transition periods; (2) comprehensive, location-specific capacity-building programs that provide sustained technical support beyond workshop-style training; and (3) more supportive regulatory frameworks that reduce administrative barriers to accessing environmental incentives. Without these complementary interventions, the negative coefficient observed in this study is likely to persist, and environmental stewardship will remain a luxury that economically-stressed small growers cannot afford to prioritize.

Technological and Infrastructural Support as the Strongest Driver ($\beta = .587$, $p < .001$)

Technological and infrastructural support recorded the strongest standardized effect on sustainable tea tourism practices ($\beta = .587$, $p < .001$), indicating that access to digital tools, online marketing, online booking systems, and basic infrastructure improvements is a critical enabler in the Nilgiris context. This strong effect warrants careful consideration in light of recent digital tourism literature.

Digital Visibility and Market Reach: (Kaur et al., 2024), in their examination of digital tourism platforms across multiple sustainable destinations in India, highlighted that platform visibility, multi-language website accessibility, and online booking systems significantly widen the audience for niche tourism destinations, particularly for international eco-conscious travelers seeking authentic experiences. Kaur's analysis demonstrated that destinations with professionally-maintained digital presence and online reputation management received 3–5 times more inquiry inquiries than those without such platforms. Importantly, Kaur et al. emphasize that for small, remote destinations like those in the Nilgiris, digital platforms serve as a force multiplier—they allow small tea growers to reach global markets without the need for extensive physical marketing infrastructure or travel.

Service Quality and Guest Experience: Similarly, (Ng et al., 2022), in their study of service quality and guest experience in sustainable tea tourism destinations (including locations in Malaysia and Taiwan), found that technology-enabled service delivery—such as real-time booking confirmation, digital payment systems, and information provision through mobile apps—significantly influences memorable experiences, guest satisfaction, and repeat visitation. Ng's work stressed that even in traditional sectors like tea tourism, technology serves to reduce transaction friction and enhance perceived professionalism, thereby attracting guests who might otherwise be hesitant to visit unfamiliar, rural destinations.

Smart Analytics and Operational Efficiency: (Palaniyandi et al., 2024), in their analysis of smart tourism analytics deployment in Indian heritage and agritourism sites, documented that data-driven insights into visitor behavior, seasonal patterns, and market trends enable destination

managers to optimize marketing expenditures, improve capacity planning, and enhance visitor-host interactions. Palaniyandi's work shows that small operators who adopt even basic analytics (such as tracking website visitor sources or analyzing online review sentiment) report improvements in occupancy rates and revenue per visitor.

Digital Marketing and Destination Branding: Finally, (R. Sharma et al., 2023), in their comprehensive review of digital technology implementation in promoting India as a tea destination, identified virtual tours, augmented reality plantation experiences, and social media marketing as key drivers in positioning Indian tea estates as globally-competitive tourism offerings. Sharma et al. note that platforms like Instagram and YouTube allow small tea producers to bypass traditional tourism intermediaries and tell their own sustainability and heritage stories directly to potential visitors, thereby enhancing authenticity and differentiation.

Synthesis and Implications

The strong coefficient for technological infrastructure (β = .587) in this study thus reflects a reality documented across the digital tourism literature: in contemporary travel planning, the absence of digital presence and online booking capability is increasingly a disqualifying factor, while the presence of technology-enabled services is a necessary (though not sufficient) condition for scaling tourism. The strong effect observed in the Nilgiris suggests that digital infrastructure investments by government, NGOs, or private sector partners may yield rapid, measurable returns in terms of visitor volume and revenue. Moreover, unlike environmental sustainability initiatives, digital infrastructure projects often have shorter payback periods and more visible immediate impacts, which may explain why they receive higher community endorsement and engagement.
Integrated Interpretation: A Holistic Model for Sustainable Tea Tourism

The four pathways revealed through SEM analysis paint a nuanced picture of sustainable tea tourism development in the Nilgiris:
Positive Drivers (Strong to Moderate Effects): Technological infrastructure (β = .587), economic benefits (β = .395), and community collaboration (β = .274) all exert positive effects on sustainable tea tourism practices. These three factors are mutually reinforcing: technology enables market access, which generates economic benefits, which in turn motivates community participation in tourism infrastructure development.

The Environmental Sustainability Challenge (Negative Effect): The unexpected negative coefficient for environmental practices (β = −.284) signals that environmental sustainability is currently experienced as a burden rather than an opportunity by growers operating under economic constraints and with limited policy support. This does not negate the long-term value of environmental practices, but rather highlights that sustainability transitions require complementary institutional and financial support.

Hierarchical Importance: The relative magnitudes of the coefficients suggest a hierarchy of priorities from the growers' perspective: (1) technology and market access are most critical; (2) direct economic returns are secondary but substantial motivators; (3) collaborative structures are valued but less immediately pressing; and (4) environmental practices are intellectually endorsed but materially constrained.

Policy and Practice Implications: These findings underscore the importance of a carefully-sequenced, holistic approach to promoting sustainable tea tourism in the Nilgiris. Rather than pursuing environmental sustainability in isolation, policymakers and estate managers should: First, establish digital infrastructure that enables market access and creates baseline revenue opportunities (leveraging the strong β = .587 effect); Second, ensure that economic returns are equitably distributed to small growers and communities (addressing the β = .395 economic motivation); Third, formalize community governance structures that give stakeholders voice and agency (building on the β = .274 collaboration effect); Fourth, only then introduce environmental sustainability initiatives, but paired with subsidies, training, and policy support that reduce the implementation burden identified in qualitative analysis. This sequencing reflects the reality that sustainability is a journey, not a starting point, and that growers must first achieve economic stability and operational competence before they can reallocate resources to longer-term environmental stewardship.

Limitations

While the study contributes valuable insights, several limitations must be noted:

Geographical Scope:
The research is limited to the Nilgiris District in Tamil Nadu, which may affect the generalizability of findings to other tea-producing regions with different socio-economic dynamics.

Sample Size and Diversity:
Although 126 respondents provide a reasonable basis for analysis, a larger and more diverse sample could offer deeper insights—especially in capturing variations in practices across different demographic groups.

Cross-Sectional Design:
The use of a cross-sectional survey precludes an analysis of trends over time. Longitudinal studies would be necessary to understand the evolving nature of sustainable tea tourism practices.

Self-Reported Data:
Reliance on self-reported information may introduce bias, as respondents' perceptions could be influenced by personal experiences or social desirability.

Integration of Mixed Methods:
While the study integrates both quantitative and qualitative data, effective triangulation can be challenging when discrepancies appear (e.g., the negative influence of eco-friendly practices). Future research could refine these methodologies for clearer integration.

Conclusion

The study robustly examines sustainable tea tourism in the Nilgiris District by integrating community collaboration, economic empowerment, environmental stewardship, and technological support. Key findings highlight that: (1) Positive drivers such as community collabora-

tion, economic benefits, and technological investments significantly bolster sustainable tourism practices. (2) Unexpected challenges related to environmental sustainability, such as high initial costs and limited technical support, necessitate targeted interventions—like improved training programs, government subsidies, and policy enhancements. (3) The descriptive analysis underscores a demographic profile characterized by experienced, predominantly male tea grower participants with modest incomes, emphasizing both the potential for and barriers to implementing innovative sustainable practices. The insights derived provide a basis for policymakers and industry practitioners to formulate strategies that enhance not only economic and technological dimensions but also the operational viability of eco-friendly practices. This comprehensive evaluation and interpretation set the stage for further research and informed policy-making in the realm of sustainable tea tourism.

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Bridging the Gap Between Digital Security and Tourist Experience in Smart Destinations

Apostolos Tsiakalos[A*], **Anastasios Tsiakalos**[B]

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Abstract

This paper introduces and tests the Security-Experience Alignment Model (SEAM), a framework that explores how real cybersecurity conditions influence the link between digital trust and tourist satisfaction in smart destinations. A sequential mixed-method design was applied. Quantitative survey data were collected from 210 thematic travelers to measure satisfaction, trust, and cybersecurity awareness. In parallel, a technical audit of smart tourism infrastructures—public Wi-Fi networks and mobile applications—was performed using standard penetration-testing tools. Data were analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine direct and mediating effects.
The analysis shows a clear gap between perceived digital trust and the actual security level of tourism infrastructures. While personalization and smart services improve satisfaction, hidden vulnerabilities weaken digital trust and may affect long-term loyalty. The SEAM model identifies cybersecurity resilience as an underlying factor that connects secure infrastructure with sustainable tourist experiences. The study extends smart-tourism research by integrating cybersecurity resilience into satisfaction and trust models. It offers both theoretical and managerial insights, emphasizing that secure digital environments are essential for reliable and satisfying experiences in smart destinations.

Keywords: *smart tourism, cybersecurity resilience, digital trust, tourist satisfaction, smart destinations*

Introduction

Smart tourism ecosystems increasingly rely on data-driven personalization, ubiquitous connectivity, and mobile applications to enhance visitor experiences. In such environments, tourist satisfaction is largely determined by the quality of digital interactions, service reliability, and perceived personalization benefits (Gretzel et al., 2015; Li et al., 2017). At the same time, the deep integration of connected technologies creates new layers of vulnerability. Public Wi-Fi networks, mobile applications, and cloud-based tourism platforms often expose sensitive user data and operational systems to cyber threats (Radoglou-Grammatikis et al., 2020).

A School of Informatics, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece, coresponding author: atsiakalos@csd.auth.gr
B Department of Electrical and Computer Engineering, University of Western Macedonia, 50100, Kozani, Greece aff00144@uowm.gr

Recent research in smart infrastructure management shows that security and trust are critical components of user experience. Studies on smart grids and Internet of Things (IoT) environments have introduced trust-evaluation and anomaly-detection mechanisms to enhance system resilience and reliability (Pliatsios et al., 2020; Pliatsios et al., 2021). These findings suggest that digital trust depends not only on perceived service quality but also on the robustness of underlying infrastructures. In tourism contexts, however, this connection remains underexplored. While the literature has examined satisfaction, personalization, and perceived value in depth, cybersecurity resilience has rarely been included as a determinant of tourist trust and loyalty (Buhalis, Leung, 2022; Zhang, Law, Zhao, 2023; Florido-Ben´ıtez, 2024).

Therefore, a significant research gap exists in understanding how objective cybersecurity conditions interact with psychological constructs such as trust and satisfaction in smart destinations. Addressing this gap, the present study proposes the *Security-Experience Alignment Model (SEAM)*, which integrates cybersecurity resilience into the established satisfaction–trust framework. Through a mixed-method approach that combines behavioral survey data with technical cybersecurity assessments, this research provides an integrated analysis of how infrastructural security affects perceived trust and overall satisfaction.

The study contributes theoretically by extending satisfaction models with a security dimension that links infrastructural integrity to experiential outcomes, and practically by offering insights for the design of secure-by-default tourism infrastructures that foster both trust and sustainable loyalty.

Theoretical Framework and Hypothesis Development

Tourist Satisfaction in Smart Destinations

Tourist satisfaction has traditionally been modeled through frameworks such as SERVQUAL and Expectation–Confirmation Theory (ECT), where service quality, personalization, and perceived value shape behavioral intentions and destination loyalty (Parasuraman et al., 1988; Oliver, 1980). In smart tourism contexts, real-time information delivery, personalized recommendations, and digital service reliability are regarded as key enablers of positive tourist experiences (Li et al., 2017).

Recent research, however, highlights that satisfaction extends beyond utilitarian performance and includes psychological dimensions such as perceived trust, safety, and data security (Zare et al., 2022; Florido-Ben´ıtez, 2024). While smart services enhance convenience and enjoyment, tourists increasingly expect transparency and protection of personal data in their interactions with digital platforms. Despite these developments, cybersecurity—an essential element of infrastructural safety—remains largely excluded from established satisfaction models, leaving a theoretical gap in understanding how technical security influences perceived trust and overall experience.

Cybersecurity Resilience as a Latent Construct

Cybersecurity resilience refers to the capacity of digital infrastructures to anticipate, resist, and recover from cyber incidents while maintaining reliable service quality (Radoglou-Grammatikis et al., 2020). Studies in smart grids and industrial Internet of Things environments dem-

onstrate that dynamic trust evaluation and anomaly-detection mechanisms can significantly strengthen resilience and sustain user confidence under uncertainty (Pliatsios et al., 2020; Pliatsios et al., 2021). Advanced defensive architectures such as federated honeypots and covert detection systems further illustrate how proactive learning and distributed intelligence enhance network reliability and trustworthiness (Siniosoglou et al., 2021).

Drawing on these insights, this study conceptualizes cybersecurity resilience as a *latent construct* composed of both objective infrastructure indicators (e.g., encryption standards, vulnerability exposure) and subjective user perceptions of digital safety. Within tourism systems, this construct is proposed to mediate or moderate the relationship between service personalization and long-term loyalty intentions, functioning as an underlying determinant of perceived trust.

The Security-Experience Alignment Model (SEAM)

Building upon the above, the *Security-Experience Alignment Model (SEAM)* integrates cybersecurity resilience into a traditional satisfaction–trust–loyalty framework. The model assumes that secure infrastructures not only support reliable service delivery but also shape the psychological foundations of trust that sustain satisfaction over time. Accordingly, the following hypotheses are proposed:

- **H1**: Personalization services positively influence tourist satisfaction.
- **H2**: Cybersecurity resilience positively influences perceived digital trust.
- **H3**: Perceived digital trust positively influences overall satisfaction.
- **H4**: Cybersecurity resilience indirectly affects satisfaction through the mediation of digital trust.
- **H5**: Higher cybersecurity resilience positively correlates with long-term loyalty intentions.

This integrative framework extends existing satisfaction theories by recognizing cybersecurity resilience as a core experiential dimension that links technical infrastructure with psychological responses in smart tourism environments.

Methods and Data

Research Design

This study applies a sequential mixed-methods design that combines quantitative behavioral data with a technical cybersecurity assessment. The mixed approach enables the triangulation of subjective perceptions of satisfaction and trust with objective indicators of infrastructural cybersecurity conditions in smart tourism environments. This design was selected because it allows validation of the proposed SEAM model from both human-centric and system-centric perspectives.

Behavioral Data Collection

A structured online questionnaire was developed to measure the main constructs of the SEAM framework. The instrument was pre-tested with ten participants to ensure clarity and reliability before full deployment. The survey consisted of four parts:

1. **Demographics:** Age, gender, education, and previous experience with smart tourism services.
2. **Tourism Preferences:** Primary travel motivations (e.g., cultural, ecological, adventure, educational).
3. **Satisfaction and Trust Indicators:** Likert-scale items (1 = strongly disagree to 5 = strongly agree) assessing satisfaction with personalization, perceived digital trust, and destination experience.
4. **Cybersecurity Awareness:** Self-reported familiarity with digital security practices (e.g., use of secure Wi-Fi, app permissions, data-sharing concerns).

Data were collected between March 2023 and June 2023 through social-media travel communities and university mailing lists. After removing incomplete or inconsistent responses, **N = 210** valid questionnaires remained. All respondents were adults (aged > 18) who had visited at least one smart tourism destination within the previous 12 months.
Participation was voluntary and anonymous, with informed consent obtained prior to completion of the questionnaire.

Cybersecurity Infrastructure Assessment

In parallel, a technical cybersecurity audit was performed on representative digital infrastructures used in smart destinations. The assessment focused on three common touchpoints:

- **Public Wi-Fi hotspots:** Simulated Evil-Twin and Man-in-the-Middle attacks were executed to test encryption and session handling.
- **Mobile tourism applications:** Static and dynamic analyses were performed to detect plaintext data leakage, insecure storage, and API vulnerabilities.
- **Online booking portals:** Transport-layer encryption and session management were evaluated for compliance with contemporary TLS protocols.

All penetration tests were carried out under ethical, non-intrusive conditions using open-source tools such as Metasploit, Wireshark, and SSLStrip. The results were anonymized and aggregated to protect the integrity of tested systems.

Data Analysis

Quantitative survey data were analyzed using **Partial Least Squares Structural Equation Modeling (PLS-SEM)** with SmartPLS 4. This method was selected because it is suitable for theory development and exploratory models with latent constructs and moderate sample sizes.
Model reliability and validity were confirmed through composite reliability, average variance extracted (AVE), and discriminant validity using the Fornell–Larcker criterion. Mediation and indirect effects were evaluated through bootstrapping with 5,000 resamples.
Cybersecurity testing results were synthesized into a composite **Cybersecurity Resilience Index (CRI)** that reflected three key dimensions: encryption strength, vulnerability exposure, and data-leakage incidents. The CRI was standardized on a 0–1 scale, where higher scores indicated more resilient infrastructures. This objective index was then incorporated into the SEM model as an infrastructural variable to test its mediating and direct effects on digital trust and satisfaction.

Results

Descriptive Statistics

The final sample included 210 respondents, representing a balanced gender distribution (55.7% female and 44.3% male). Most participants (62.4%) were between 25 and 44 years old, and a large proportion (71.8%) held at least a bachelor's degree. Regarding tourism preferences, cultural (33.8%) and eco-tourism (29.5%) categories were most common, suggesting a sample of digitally active and environmentally aware travelers.

Overall, respondents reported high satisfaction with smart services (mean = 4.32, SD = 0.47) and personalization features (mean = 4.28, SD = 0.52). These values indicate that digital convenience and tailored content strongly contribute to positive experiences in smart destinations. However, cybersecurity awareness was considerably lower: only 18.5% of participants expressed confidence in identifying secure digital services during travel. This discrepancy points to an emerging *perception gap* between enjoyment of digital convenience and understanding of security risks. It highlights the importance of cybersecurity education as part of the smart tourism experience.

Preliminary correlation analysis also revealed a moderate positive association between cybersecurity awareness and perceived digital trust (r = 0.42, p ¡ 0.01), suggesting that tourists who understand digital risks are more likely to trust destinations with visible security measures. These findings provide a foundation for the structural modeling presented in the next section.

Cybersecurity Infrastructure Vulnerability Assessment

The technical cybersecurity audit revealed substantial weaknesses across the analyzed smart tourism infrastructures. These findings confirm that, while digital services are widely adopted, many systems still rely on outdated or insufficient security configurations.

- **Wi-Fi Testing:** In 78% of the examined public networks, simulated Evil Twin attacks successfully captured unencrypted session cookies within ten minutes of deployment. This indicates that most tourist Wi-Fi services remain vulnerable to basic interception threats and lack modern encryption standards such as WPA3.
- **Mobile Application Testing:** Static and dynamic analyses revealed insecure local data storage and unencrypted API communication in three out of five commonly used tourism applications. Such practices expose users to potential identity theft and data leakage when interacting with destination-related apps.
- **Booking Portals:** SSL/TLS misconfiguration was detected in 40% of tested websites, with legacy protocols (TLS 1.0/1.1) still active. These vulnerabilities compromise the confidentiality of payment and personal information, diminishing user trust in online booking systems.

The resulting **Cybersecurity Resilience Index (CRI)** showed low-to-moderate performance across the evaluated infrastructures (mean = 0.43 on a normalized 0–1 scale). This suggests that many smart destinations remain in an early stage of cybersecurity maturity. When compared with tourists' high satisfaction and trust perceptions, these objective weaknesses reveal a notable *security–perception misalignment* that could threaten long-term destination reputation if left unaddressed. The CRI results therefore support the assumption that infrastructural integrity plays a hidden yet influential role in shaping the digital experience.

Structural Equation Modeling (SEM) Results

The PLS–SEM analysis produced satisfactory measurement and structural model statistics:

- Composite Reliability (CR) values exceeded 0.80 for all constructs.
- Average Variance Extracted (AVE) values were above the 0.50 threshold.
- Discriminant validity was confirmed using the Fornell–Larcker criterion.
- The hypothesized relationships within the SEAM model were strongly supported:
- **H1:** Personalization positively influences tourist satisfaction ($\beta = 0.54$, $p < 0.001$).
- **H2:** Cybersecurity resilience positively influences perceived digital trust ($\beta = 0.37$, $p = 0.002$).
- **H3:** Perceived digital trust positively influences overall satisfaction ($\beta = 0.46$, $p < 0.001$).
- **H4:** Cybersecurity resilience indirectly affects satisfaction through digital trust ($\beta_{indirect} = 0.17$, $p = 0.006$).
- **H5:** Cybersecurity resilience directly influences loyalty intentions ($\beta = 0.29$, $p = 0.008$).

Collectively, these results validate the structural assumptions of the SEAM framework. They demonstrate that although personalization remains the strongest driver of satisfaction, the security dimension significantly shapes digital trust and indirectly affects tourists' loyalty. The mediating role of trust underscores that a secure technological environment is not merely a technical requirement but a key experiential determinant that sustains positive perceptions over time.

Summary of Key Findings

Overall, the empirical evidence supports the conceptual assumptions of the *Security–Experience Alignment Model (SEAM)*. Despite consistently high levels of reported satisfaction, significant cybersecurity weaknesses persist across smart tourism infrastructures. The results confirm that objective security conditions exert an indirect but meaningful influence on satisfaction and loyalty through the mediating role of digital trust. This highlights a persistent misalignment between the perceived and actual security performance of smart destinations.

Discussion

The findings of this research offer multidimensional insights into how technological integrity interacts with human experience in smart tourism ecosystems. In line with earlier studies, personalization remains a dominant predictor of satisfaction (Gretzel et al., 2015; Li et al, 2017). Yet the present analysis extends theoretical understanding by introducing cybersecurity resilience as an additional experiential dimension that bridges technical and psychological domains.

A key contribution lies in confirming the existence of a **security–experience gap**—a paradox where high user satisfaction coexists with weak cybersecurity practices. This result aligns with broader digital-trust literature showing that users often equate convenience with safety (Florido-Benıtez, 2024; Zhang et al, 2023). By empirically validating this gap, the SEAM framework demonstrates that trust does not merely emerge from user perception but is conditioned by the robustness of the underlying digital infrastructure.

From a theoretical standpoint, the SEAM model integrates two previously disconnected streams of research: service-experience theory and cybersecurity resilience. It repositions se-

curity from a purely technical concern to a latent experiential factor that co-determines satisfaction and loyalty. This integration enriches established models such as SERVQUAL and Expectation–Confirmation Theory by embedding infrastructural trustworthiness as a precondition for sustained satisfaction in digital environments.

From a managerial perspective, the results underline that cybersecurity must be treated as a visible and measurable component of the tourist experience. Destination managers and service providers should:

- Implement transparent data-protection practices and communicate them clearly to visitors.
- Incorporate security-performance indicators (e.g., encryption compliance, data-breach response time) into quality-assurance systems.
- Provide traveler education on safe digital behaviors through in-destination apps and signage.

Such initiatives can transform security from a hidden technical layer into a source of competitive differentiation and trust-based branding for smart destinations.

Looking forward, the *security–experience alignment* perspective suggests that future tourism strategies should balance innovation with protection. Continuous monitoring, adoption of privacy-by-design architectures, and cross-sector collaboration between ICT experts and tourism planners will be essential. By embedding resilience into experience design, destinations can sustain both technological advancement and long-term visitor confidence.

Conclusion

This study advances the understanding of how cybersecurity conditions shape tourist experiences in smart destinations. By combining behavioral analysis with technical infrastructure assessment, it provides empirical support for the *Security–Experience Alignment Model (SEAM)* and confirms that digital trust functions as the psychological bridge between secure infrastructures and visitor satisfaction.

The results reveal that high satisfaction levels may coexist with weak security configurations, exposing a latent vulnerability in the long-term sustainability of digital tourism ecosystems. The SEAM framework thus reframes cybersecurity resilience as an integral dimension of experience design rather than a peripheral technical concern.

From a theoretical standpoint, this research contributes to smart-tourism literature by integrating infrastructural trustworthiness into satisfaction and loyalty models. It expands traditional service-quality theories such as SERVQUAL and Expectation–Confirmation Theory through the inclusion of security-related constructs, offering a more comprehensive explanation of digital trust formation.

From a managerial perspective, the findings emphasize that trust-building in smart destinations requires both human-centered and technology-centered interventions. Investment in secure digital infrastructure, visible communication of data-protection measures, and continuous cybersecurity education for both tourists and staff can transform security into a competitive advantage and a driver of loyalty.

Future studies should examine cross-cultural differences in security perception, longitudinal effects of cybersecurity incidents on destination image, and the integration of real-time threat analytics into experience management systems. Embedding cybersecurity resilience into every stage of smart destination planning will ensure that technological innovation translates into genuinely safe, trustworthy, and satisfying visitor experiences.

Limitations and Future Research

Several limitations of the present study should be acknowledged. First, the cross-sectional research design constrains the ability to capture longitudinal variations in tourists' trust or satisfaction following cybersecurity incidents. Future studies could employ panel or experimental designs to monitor how perceptions evolve over time in response to repeated exposure to secure or insecure digital environments.

Second, the sample focused on thematic tourists within a single national context, which may limit generalizability to broader or cross-cultural visitor groups. Comparative studies across different smart destinations and cultural backgrounds would enhance the external validity of the *SEAM* framework and reveal how cultural attitudes toward risk and privacy influence digital trust formation.

Third, the cybersecurity assessment was restricted to publicly accessible components—such as Wi-Fi networks, tourism applications, and booking portals—and did not include backend systems, data management platforms, or third-party service integrations. Future work could integrate technical forensics and real-time intrusion detection data to provide a more complete picture of infrastructural resilience.

In methodological terms, future research could also combine the SEAM model with advanced analytics, such as machine learning–based anomaly detection or dynamic structural modeling, to explore causal pathways between cybersecurity events and behavioral responses. Incorporating emerging paradigms such as *zero-trust architectures*, *privacy-by-design* frameworks, and real-time threat monitoring will not only refine the model's robustness but also align it with the evolving landscape of smart tourism governance.

Ultimately, expanding and validating SEAM across diverse destinations and technological contexts will enable a deeper understanding of how security and experience converge to shape sustainable digital trust ecosystems in global tourism.

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