

# Study on the role of immersive technologies in Northeast India in making informed tourism decisions

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**Abstract:** Tourism sector is one of the largest foreign exchange earners. Tourist circuits Network of India open arms for exploration and experience its rich culture, religious heritage, and spiritual ambience. India has improved from 54th rank in 2021 to 38th rank Post revision in World economic forum Methodology in TTDI, 2024 out of 119 countries as per the released ranking of Travel and Tourism Competitiveness Index (TTCI). The study investigates the Role, potential and effectiveness of

Augmented reality (AR) and Virtual Reality (VR) technologies in making informed tourism decisions and promoting tourism in Northeastern states (NES) of India. An exploratory study of the facts and figures from the Government published reports highlight the Scope of tourism in Northeastern states (NES) of India for enhanced Tourism experiences via various Tourism circuits. Welcoming atmosphere, pristine environment, uniqueness of culture and cuisine are the important determinants of Tourist arrivals. Barriers of travel observed in study from the respondents are Time for travel, Mode of travel, accessibility of geographically dispersed locations, Safety and security, Weather conditions and difficult terrains of the tourist destinations etc. To obtain valuable insights, the study incorporates mixed methodology, i.e. both quantitative and qualitative research tools are applied. Data is gathered through on-site observations, Questionnaire focusing on tourist perceptions and behavior. The findings reveal that use of Augmented reality (AR) and Virtual reality (VR) significantly increase tourist engagement, knowledge acquisition, and overall satisfaction with their domestic travel experiences in Northeastern states (NES). The option of VR and AR can prove to be boon for the old aged travelers and in-accessible tourism destinations and can be considered as viable option especially to overcome the travel barriers to larger extent

**Keywords:** Augmented reality (AR) and Virtual reality (VR), Northeastern states (NES), Tourism circuits, tourist perceptions, travel experiences, Satisfaction.

## Introduction

Tourism is a dynamic and multifaceted industry involving leisure, recreation, business, education, and cultural exploration. It plays a pivotal role in the economic, social, and cultural development of countries worldwide. India the 4th largest economy has emerged as a popular tourist destination, attracting millions of domestic and international travelers each year. The country's wide range of cultural, historical, natural, and modern attractions with rich heritage, diverse landscapes, traditional hospitality, make it an even more enticing place to explore. The tourism sector contributes 5.22% to India's GDP, fueling economic growth out of which Domestic tourism and Inbound tourism has emerged as savior. Tourism sector is one of the fastest growing economic sectors with a significant impact on employment and accelerates regional development with a multiplying effect on the activity of related sectors. Among economically advanced states, domestic tourism has become a springboard to the development of tourism. It can generate resources for conservation of cultural and natural heritage and has huge potential to make positive contributions to sustainable development goals. The spring bounce influence of the tourism sector post covid as an economic powerhouse spearheading growth and its capability to excel further is indisputable. Tourism Industry has splendid potential with its capacity to create large scale employment and improving quality livelihood. Tourism supports sustainability of environment, culture and heritage and strengthens peace and Prosperity. In recent years, Ministry of Tourism has Augmented tourism infrastructure, Eased visa regime and strengthened quality standards in tourism services. Policy, promotion and projection of the country as a 365-day tourist destination, facilitates sustainable tourism in India. India has persistently grown from 1.68 million in 1991 to 2.54 million in 2001 to 6.31 Million in 2011 and reached the current status and strength even after nose dive fall in 2020 due to Covid -19. From an inbound tourism perspective FTAs (Foreign Tourist Arrivals) in 2025 got restricted to 9 million with approximate deterioration of 9.5 % w.r.t to 2024. Though the ratio of Non-Resident Indians (NRIs) Arrivals of increased from 9.4 million in 2023 to 10.62 million in 2024 but the ratio and figures were far higher post covid i.e. approximately 44% growth in 2022. Foreign Exchange Earnings (FEEs) dropped in 2025 and got restricted at Rs. 273638 crores with a decline of 6.6% in 2024 i.e. from 293033 crores. Whereas Outbound Tourism i.e. Indian National Departures (INDs) during 2025 were 32.71 million observing a marginal growth of 5.9% than 2024. However, Domestic tourism continued to be an imperative contributor right from 2024 reaching unprecedented levels with over 3 billion trips featuring revenge tourism and catch-up travels. According to data provided by State/UT and other reliable resources, in 2025 Indian cities witnessed 4132.8 million Domestic Tourist Visits (DTV) and 24.01 million Foreign Tourist Visits (FTV).

In order to have a competitive edge and promote India as round the year Tourism destination by overcoming 'seasonality' concerns in tourism, proper Identification, development, promotion and even diversification of niche tourism products like Adventure, MICE (Meetings Incentives Conferences and Exhibitions), Rural, Medical and Wellness, Golf, Cruise, Eco-Tourism, responsible and Sustainable Tourism, is practiced and promoted to attract tourists interests and ensure repeat visits. The MoT (Ministry of Tourism) launched its flagship scheme i.e. 'Swadesh Darshan' in 2014-15 with a motive to

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build tourism facilities across the country and complement the efforts of State Governments/ UT Administrations. It sanctioned `5290.33 crore for 76 projects, out of which 75 projects have been successfully completed. For development of tourism infrastructure in heritage cities and historical places, MoT (Ministry of Tourism) launched PRASHAD scheme i.e. Pilgrimage Rejuvenation and Spiritual, Heritage Augmentation Drive and sanctioned 54 projects worth Rs 1726.74 crore and released `1200.47 crore by 31 Dec 2025 and other 16 new sites are also identified for development in 12 States/UTs under PRASHAD Scheme. Our Digital Portal “Incredible India” is one-stop digital tourist-centric solution designed to boost the travel experience of Indian visitors. The revamped portal offers essential information and services related to fairs and festivals, destinations, attractions, crafts, culture etc utilizing multimedia content such as videos, images, and digital maps right from scratch to research planning, booking, travelling, till return. Bharat Parv 2025 organized from 26th to 31st January 2025 during Republic Day celebrations showcased India’s unity in diversity through cultural performances. Similarly, Dekho Apna Desh made extensive representation of regional cuisine and crafts to be Vocal for Local and the same was attended by approximately 4.22 lakh visitors. The “Dekho Apna Desh” scheme was launched by the Indian government to promote domestic tourism through various tourism circuits and encourage Indians to explore the diverse cultural, historical, and natural attractions within the country. The scheme’s focus on lesser-known destinations of India especially Northeastern states and has contributed to the economic development of these regions by generating revenue from tourism-related businesses and creating opportunities for local communities and local artisans. Additionally, the scheme has been instrumental in fostering a sense of pride and appreciation for the country’s rich heritage and has raised awareness about responsible and sustainable tourism practices paying respect for local cultures, traditions, and the environment.

The tourism potential of the North-Eastern India was highlighted at the 13th International Tourism Mart (ITM) 2025 i.e from 13 to 16 Nov 2025 was held at Gangtok, Sikkim Facilitating B2B interactions to over 500 delegates from around 19 countries and showcasing tourism products like river cruises, wildlife, culture, homestays, sustainability and adventure tourism. Paryatan Mitra/Paryatan Didi launched in Aizawl (Mizoram), apart from other 6 tourist destinations as a responsible tourism initiative. One of the 9 Tourist Facilitation and Information Counter is at the gateway of Northeast i.e Guwahati airport. Non-English-speaking tourists can get Guidance from foreign language agents in French, German, Italian, Portuguese, Russian, Japanese, Korean, Chinese and Arabic. For a better and smoother travel experience of Tourists in the Restricted/Protected areas of the country, Ministry of Tourism regularly coordinates with the Ministry of Home Affairs and as a result, Ministry of Home Affairs has relaxed the PAP/RAP for a further period of 5 years beyond 31st December, 2022 in the States of Manipur, Mizoram and Nagaland has already been approved by the Ministry of Home Affairs. The expansion of the internet and technological innovations have highly influenced the hospitality industry. Various artificial intelligence (AI) systems Like AI-powered site search, biometric data recognition, booking systems, chatbots, drones, kiosks/self-service screens, voice assistants, machine translation, QR codes, robots, and Augmented reality (AR) and Virtual reality (VR), are being used by tourism and hospitality organizations. Technological innovations like virtual reality, augmented reality and artificial intelligence have created opportunities for destination marketing companies to offer and attract potential visitors to experience diverse destinations. Virtual Reality (VR) and Augmented Reality (AR) has undoubtedly enriched consumer experience but has provided numerous opportunities and challenges recently. With rapid advancements in technology, AR and VR have emerged as promising tools to enhance tourist experiences and engagement. Virtual reality refers to interactive images or videos which enable the viewer to explore the entire 360 degrees of a scene. Unlike a regular image of video, which is shot from a fixed viewpoint, VR production captures every part of a location. In the travel industry, virtual reality can be used to capture tourism destinations in a unique and immersive way using specialist cameras, rigs, and software and can be viewed by regular computer or mobile devices. Immersive technologies such as augmented reality (AR), mixed reality (MR), and virtual reality (VR) are sparingly being applied in the Northeastern states of India to overcome connectivity challenges, promote tourism, and preserve cultural heritage. The Northeastern states of

India, with their distinctive geography, cultural richness, and ecological diversity, provide opportunity for exploration of immersive technologies. The region’s hilly terrain and geographical isolation have long posed challenges to connectivity, limiting access to opportunities and services. In this context, technology such as AR, VR, and MR acts as a social bridge to enhance accessibility, promote disability inclusion, and ensure safety, connecting communities to wider networks of knowledge and exchange. Virtual travel planning and digital experiences reduce costs, ease time constraints, and help navigate government restrictions, making tourism more inclusive and affordable. Platforms such as VRKshetra have already showcased immersive tours of Northeast India’s tea gardens and living root bridges, demonstrating how VR can expand tourism reach while lowering costs. Tribal heritage and festivals such as Hornbill and Bihu embody the identity of the Northeast. By using immersive technologies, the traditions can be celebrated and shared globally. Immersive technologies can act as catalysts for inclusive growth, sustainable tourism, and cultural preservation in the Northeastern states. The experience of eco-tourism is also transformed through immersive technologies. Virtual treks and explorations of Meghalaya’s caves, such as the 360° VR tour of Mawsmi Caves in Cherrapunji, foster emotional connections with nature while promoting environmental responsibility. Different generations respond differently to immersive technologies, younger groups prefer it for gaming, older generations enjoy virtual travel experiences. Surveys show that Gen Z and Millennials use it for VR gaming, while Gen X and Baby Boomers state stronger inclination towards travel planning and cultural immersion. The diversity of preferences emphasize the use of immersive tools in meet varied aspirations, from entertainment to virtual travel experiences.

Benefits of virtual reality in tourism	VR travel trends
Allows user to imagine him /her at a travel destination Showcase 360 degrees of a destination in high resolution Enables the user to explore a scene at their own will Helps in Creating memorable and unique experiences Creates unique brand engagement Allowing travel companies to stand out from the crowd Providing travel experiences to those who cannot travel Reducing impact of tourism on vulnerable destinations	VR travel experiences Virtual hotel tours Make VR travel more realistic VR travel experiences for old VR flight experiences Virtual booking interface Virtual experiences of landmark destinations

### Objective of the study.

- Study the contemporary status of tourism development of North-eastern States
- Study the effect of immersive technologies in transforming local tourism ecosystems
- Identify the challenges faced in adoption of these technologies,

### Literature review.

Immersive technologies such as Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), and Extended Reality (XR) are increasingly recognized as transformative tools in tourism. These technologies allow users to experience cultural heritage and landscapes virtually, creating a sense of “being there” while overcoming barriers of geography, accessibility, and cost (Springer, 2024). AR/VR offers unique opportunities to bridge infrastructural gaps and promote sustainable tourism For the

Northeastern states of India which is characterized by rugged terrain, ecological sensitivity, and diverse tribal culture.

### **Growth of AR/VR Research in Tourism**

Between 2015 and 2024, approximately 95 peer-reviewed studies have analyzed the application of AR/VR in tourism, contemplating a rapid expansion of scholarship in this field (Das & Dutta, 2021; Singh, 2023). Immersive technologies are being adopted in Northeast India for destination branding, in which previews of cultural and ecological sites strengthen regional identity and reduces travel ambiguity (Borah & Saikia, 2022). Role in immersive tours like VR explorations of Meghalaya's caves and AR overlays of Assam's tea gardens, elevate visitor engagement a part from promoting sustainable tourism practices (Kumar & Reji, 2022; Choudhury, 2024). AR/VR has been influential in preservation of cultural heritage, enabling tourists to participate in tribal ethnicity, fostering inclusivity and pride (Prakash, 2026; Saikia, 2023). The studies prove that AR/VR is reshaping tourism decision-making and positioning Northeast India as sustainable, and culturally sensitive destination focusing tourism development and innovation. AR/VR is offering immersive experience of destinations and transforming tourism decision-making by reducing travel uncertainty. AR and VR highlights the mounting role in destination marketing and sustainable travel planning. AR/VR applications induce tourist motive to visit by providing pre-visit experiences (Lim et al., 2024; Bretos et al., 2024). In India, initiatives like Augtraveler have showed how AR can conserve and showcase cultural heritage sites, while VR platforms have assisted in virtual participation in festivals like Hornbill, strengthening inclusivity and identity. Research on AR/VR's potential emphasizes eco-friendly tourism practices and promotion of sustainable travel behavior by reducing physical travel burdens and environmental impact (Samaddar & Mondal, 2024). In Northeast India, where terrain and isolation limit physical connectivity, so, immersive technologies engage emotionally to provide authentic experiences in bridging accessibility gaps and support cultural preservation and economic growth (Kumar et al., 2023). Research consistently shows adoption of immersive technologies in immersive tours, cultural heritage preservation and a game changer in shaping destination attractiveness and tourist decision making (Mukherjee & Majumdar, 2025). In Hospitality and tourism marketing, travelers engagement is enhanced by immersive technologies to reduce uncertainty (Dieck, Han, & Rauschnabel, 2024). In India, AR and VR is increasingly used to enrich heritage tourism. case studies show how virtual environment can help in preserving and interpreting historic sites like wooden temples of Chamba (Paradkar, Saraswat, & Bhattacharjya, 2025). Similarly immersive tours of Meghalaya's caves have been used to promote eco tourism offering sustainable ways to experience without physical visits (Suiam & Saha, 2022). Cultural festivals like Hornbill in India are increasingly projected into virtual spaces enabling global audiences to engage with tribal traditions. (Longkumer, 2016). AR and VR is recognized as a tool for development of sustainable tourism. Research shows that these technologies can help reduce environmental impact while encouraging eco-friendly travel planning (Rane, Choudhary, & Rane, 2023). All such studies highlight the growing importance of immersive technologies in shaping the future of tourism—especially in regions like Northeast India, where rich cultural heritage meets the challenges of limited connectivity.

### **Decision Making Benefits of Immersive Technologies in Northeast India**

Throughout Northeastern states of India, immersive technologies like AR and VR are being woven into tourism development helping travelers make more informed decisions by reducing uncertainty and enriching their overall experience. AR/VR helps travelers to cut down risks by previewing hotels, attractions in advance, routes before booking, reducing uncertainty and boosting confidence and gaining satisfaction in their choices (Mukherjee & Majumdar, 2025). Immersive technologies provide realistic expectations of destinations, reducing post-trip disappointment, and aligning experiences with promotional narratives (Dieck, Han, & Rauschnabel, 2024). AR enriches cultural immersion by overlaying historical and cultural narratives onto heritage sites, guiding tourist choices. Initiatives like virtual Hornbill Festival experiences in Nagaland let global audiences engage with tribal traditions online (Longkumer, 2016) Similarly, immersive cave tourism in Meghalaya shows

how AR/VR can blend ecological exploration with cultural storytelling (Suam & Saha, 2022). The studies show how immersive technologies cut risk, builds confidence, and deepen cultural engagement with traveler positioning Northeast India as a region where digital innovation can drive smarter tourism decisions and support sustainability.

### **Applications in Tourism**

Immersive technologies like AR and VR are applied in tourism development especially for Destination marketing which permits a prospective visitor to “get a primitive experience” before travel influencing tourist intention by reducing uncertainty and strengthening destination branding (Mukherjee & Majumdar, 2025)

interactive storytelling and reconstructions in AR applications benefits Heritage tourism. AR/VR platforms have been used to interpret cultural sites and festivals, such as the Hornbill Festival of Nagaland (Longkumer, 2016). Hospitality has also incorporated immersive technologies, for hotel tours assisting in booking decisions and AR for enhancing on-site guest services. Studies in hospitality show that AR/VR marketing boosts customer trust and satisfaction by matching expectations with real experiences. (Dieck, Han, & Rauschnabel, 2024).

"VR and 360° media are reshaping tourism marketing by allowing people ‘feel’ their presence at said destinations. From virtual hotel tours to full 360° previews, they addup emotional engagement to facilitate decision-making. Monoscopic 360° works easily on phones and desktops, while stereoscopic headsets deliver deeper immersion at higher cost. In this way the pressure can be eased on fragile sites if designed with accessibility, quality, and data ethics in mind." (Immersion VR, 2024; Dieck & Jung, 2017; Kourtesis et al., 2024). Wherever authenticity matters, "360° VR captures real places rather than computer-generated scenes, making it ideal for tourism. Using omnidirectional cameras, monoscopic videos intertwined with content is viewable on phones and desktops. ‘VR’s greatest strength is giving users the feeling of being there.’ When implemented responsibly. 360 VR enhances marketing impact, guides visitor decisions, and supports conservation by offering virtual alternatives to fragile sites.

"Tourism relies on VR video and photography to create immersive, place-based experiences. 360° media comes in two formats: monoscopic, viewable on phones and desktops with click-and-swipe exploration, and stereoscopic, designed for headsets with deeper presence but higher cost. These tools enable hotel tours, destination previews, and remote access for mobility-restricted visitors. Their impact depends on production quality, platform accessibility, and ethical use, including data handling and authentic representation." (Dieck & Jung, 2017; Kourtesis et al., 2024; Immersion VR, 2024)

"VR tourism photography creates 360° still photos that allows users to scroll or swipe through real locations, making the immersive content easy to access and operate on phones and desktops. these images balance with VR video: monoscopic formats and run on regular devices, while for deeper presence, stereoscopic headset versions are added to head-tracking and spatial audio at higher cost. 360° photography and VR video collectively provide hotel tours, destination previews, in-store travel experiences, and remote access for mobility-restricted visitors. They also support conservation by offering virtual alternatives to fragile sites when used responsibly with attention to quality, accessibility, and ethical data practices. (Dieck & Jung, 2017; Kourtesis et al., 2024; Immersion VR, 2024). "Virtual hotel tours and VR travel experiences use high-resolution 360° photography and video to create interactive walkthroughs of interiors and grounds. Monoscopic 360° tours are cost-effective owing to its use on phones and desktops. These Both are used for marketing, customer engagement, and remote access for mobility-restricted visitors if implemented with care for quality, accessibility, and ethical data practices."

"VR eases pressure on fragile landmarks by offering high-fidelity virtual visits, by recreating flight cabin experience, in-flight services, and even booking interfaces inside immersive environments. These features expand marketing reach, accessibility, and pre-visit decision making for both providers and travelers. (Dieck & Jung, 2017; Kourtesis et al., 2024; Tourism Australia, 2016).

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"Virtual booking interfaces extend VR tourism from single experiences to full customer journeys, by allowing users select, configure, and pay for travel inside immersive environments. VR renders strong social value for seniors and mobility-restricted users, offering travel experiences otherwise impossible. Healthcare and elder-care pilots (e.g., Viarama; Maplewood Senior Living) show therapeutic benefits for dementia and limited mobility, but success depends on careful content design, comfort, and ethical data use. Together, booking systems and senior-focused VR broaden access to tourism while demanding safeguards for usability, privacy, and inclusivity." (Dieck & Jung, 2017; Kourtesis et al., 2024; Tourism Australia, 2016).

AR applications permit users to merge computer-generated content and real-life to communicate with virtual elements in the real world (Shabani et al., 2018). The unique ways AR and VR are applied have sparked interest among hospitality and tourism marketing researchers, leading them to examine how these tools can strengthen e-marketing (Shabani et al., 2018), generating impactful advertising strategies (Phua and Kim, 2018), and designing compelling customer experiences.

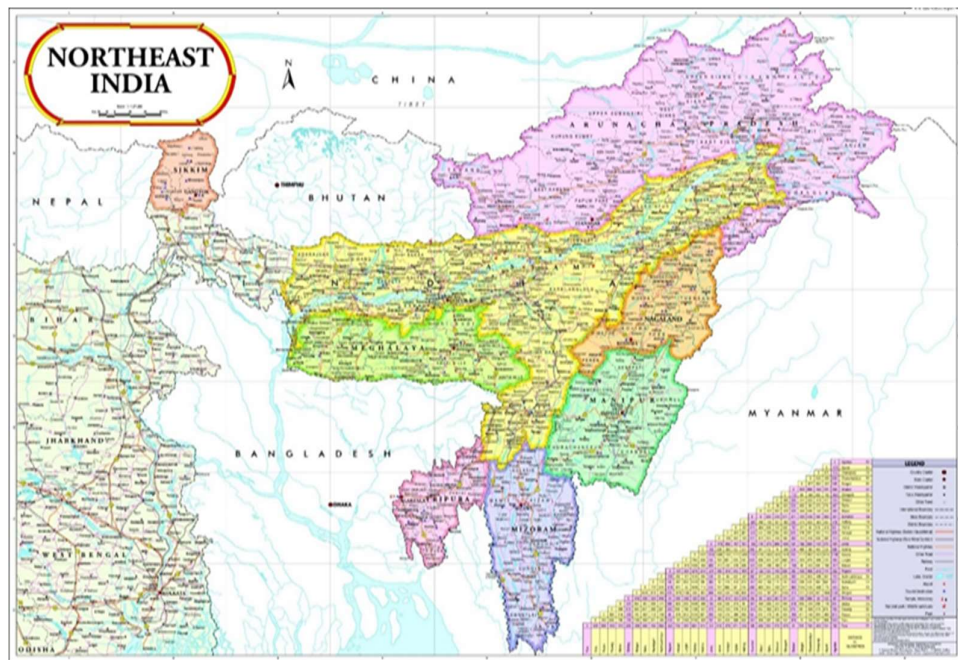
Various upscale hotels are gradually using the tours as a tool to present their locations and facilities online to be reached by a smartphone. After visitors make their reservations with the help of VR and start their dream vacation, then AR will be there with different applications to enhance real-life experiences (Marr, 2021).

Kourtesis et al. (2024) show that XR blends visual, auditory, and haptic inputs to create more realistic and inclusive experiences for destinations like Arunachal Pradesh's Ziro Valley or Meghalaya's cave systems. By opening access to differently-abled travelers and for people with time constraints, XR helps democratize tourism and makes immersive journeys available to more people. Lee et al. (2021) describes Metaverse as a continuous, shared digital world where avatars interact socially and economically. This concept could enable virtual eco-circuits like Mizoram's lush landscapes or Nagaland's tribal heritage tours while reducing physical pressure on fragile ecosystems. NVIDIA's Omniverse (2022) goes beyond individual metaverses by linking multiple digital ecosystems on a single collaborative platform to weave diverse cultural narratives together into a unified showcase. Festivals like Nagaland's Hornbill and Assam's Bihu, for instance, can be interconnected in a shared immersive environment, boosting cross-state cultural visibility.

Moreover, immersive tourism aligns with sustainable development goals. By reducing pressure on ecologically sensitive areas, AR/VR can mitigate environmental degradation while still fostering emotional engagement and cultural pride (Springer, 2024). This dual role of preserving nature while promoting heritage positions immersive technologies as valuable tools for tourism policy in Northeast India.

## Methodology

This research methodology adopted in the study is exploratory on the basis of the Data from the government sites, Previous researchers and Project Papers . the research delves into the need of integrating AR and VR in Indian tourism industry with a motive to elevate India's image as a technologically advanced, tourist-friendly destination, attracting tech-savvy travelers. Firstly, this research tries to study the impact of technological innovation on the competitiveness of the Indian tourism industry. Secondly, the study explores the economic implications of these technologies, including revenue generation through augmented experiences, increased tourist spending, and the creation of new job opportunities in the AR/VR sector. Additionally, the research identifies challenges faced in adoption of these technologies, such as age, familiarity with AR/VR, and cultural preferences.



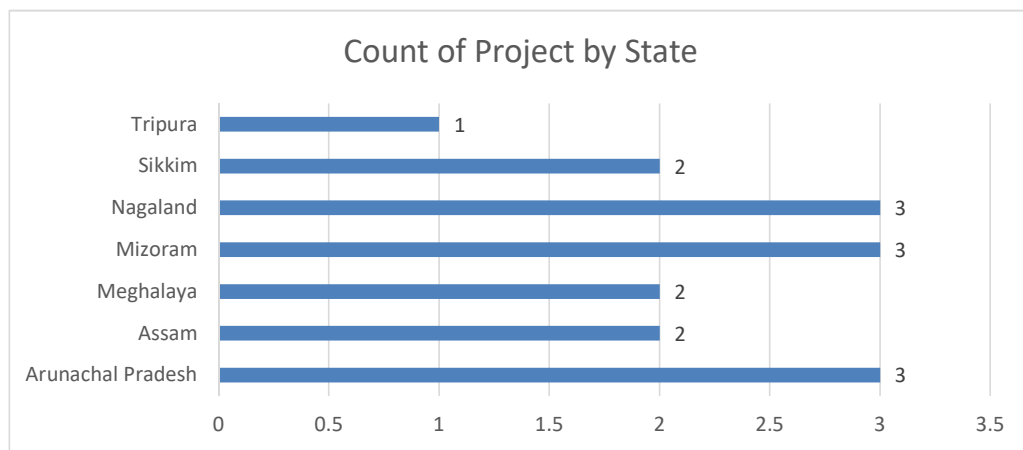
**Analysis and findings**

DESTINATION DEVELOPMENT				
State	Year	Destination	Project	Value
Mizoram	25	2024–	Champhai Eco Resort Experience at Keilungliah, Zote, Ngur & Mualbuhvum	38.85
Mizoram	25	2024–	Champhai Heritage and Cultural Centre, Champhai	33.87
Mizoram	26	2025–	Thingsulthliah Construction of Conference Centre	99.71
Nagaland	24	2023–	Chumoukedima Eco-Tourism Experience at Chumoukedima viewpoint	7.87
Nagaland	24	2023–	Chumoukedima Tribal Cultural Experience at Midway Retreat	21.56
Nagaland	25	2024–	Chumoukedima Adventure Tourism Experience at Jacob Village	32.54
Arunachal Pradesh	24	2023–	Nacho Unlock Nacho Expedition	14.02
Arunachal	2023–	Mechuka	Mechuka	18.48

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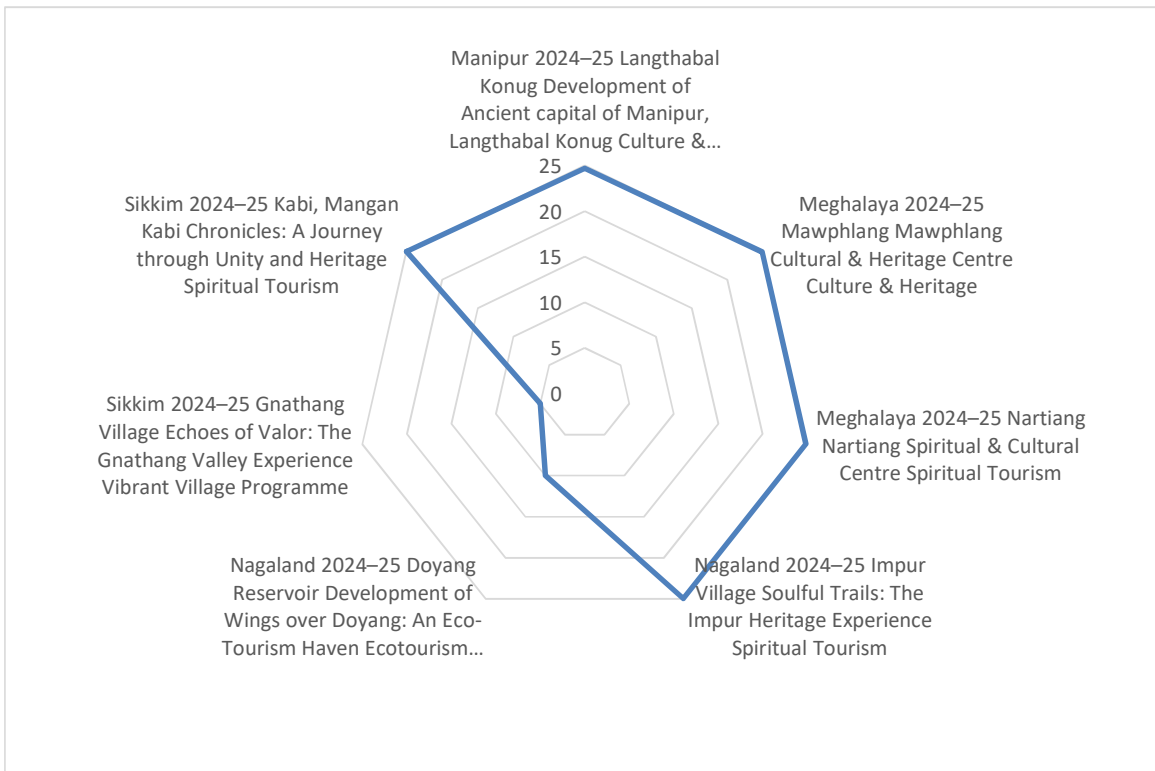
Pradesh	24		Cultural Haat	
Arunachal Pradesh	24	2023–	Mechuka	Mechuka Adventure Park 12.75
Assam	24	2023–	Kokrajhar	Kokrajhar Wetland Experience 26.67
Assam	24	2023–	Jorhat	Reimagining Cinnamara Tea Estate 23.88
Meghalaya	24	2023–	Sohra	Waterfall Trails Experience 27.6
Meghalaya	24	2023–	Sohra	Meghalayan Age Cave Experience 32.45
Tripura	25	2024–	Agartala	Tripura Heritage Village & Sangeet Experience (Phase-1 & 2) 48.95
Sikkim	24	2023–	Gyalshing	Eco-wellness Experience at Yuksom Cluster 15.41
Sikkim	24	2023–	Gangtok	Gangtok Cultural Village 22.6

Source:- Ministry of Tourism Annual Report\_2025-26\_english.pdf



State	Year	Destination	Project	Category	Value
Manipur	2024–25	Langthabal Konug	Development of Ancient capital of Manipur, Langthabal Konug	Culture & Heritage	24.69

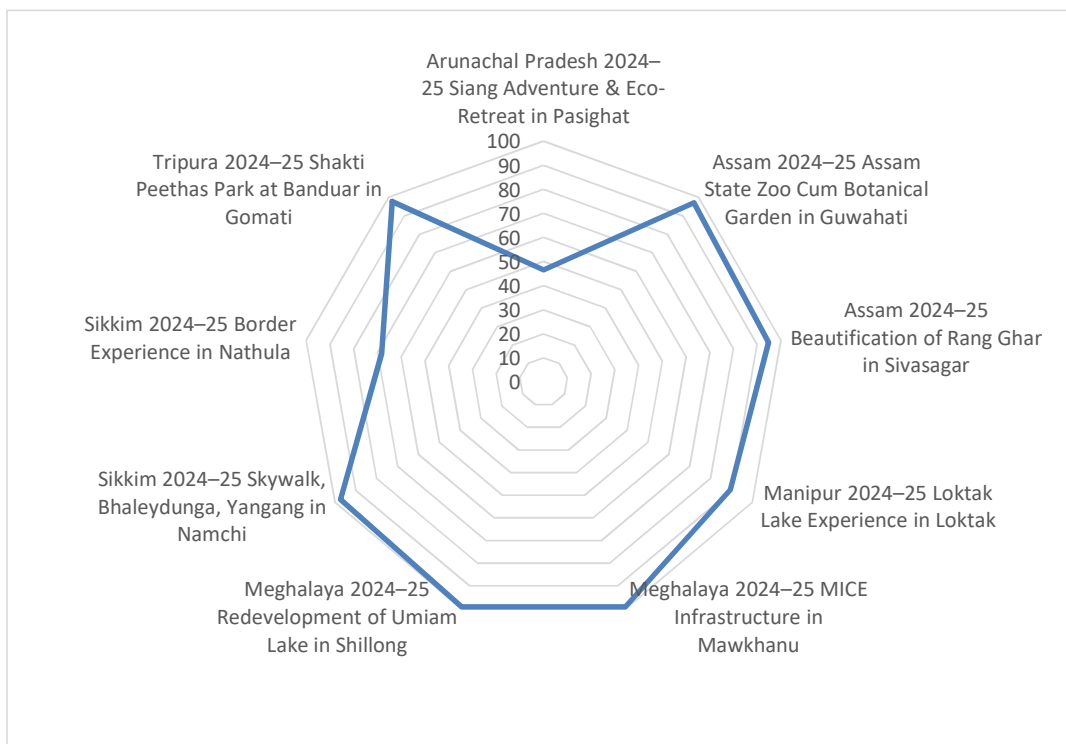
Meghalaya	2024-25	Mawphlang	Mawphlang Cultural & Heritage Centre	Culture & Heritage	7	24.8
Meghalaya	2024-25	Nartiang	Nartiang Spiritual & Cultural Centre	Spiritual Tourism	7	24.8
Nagaland	2024-25	Impur Village	Soulful Trails: The Impur Heritage Experience	Spiritual Tourism	4	24.9
Nagaland	2024-25	Doyang Reservoir	Development of Wings over Doyang: An Eco-Tourism Haven	Ecotourism & Amrit Dharohar Sites		10
Sikkim	2024-25	Gnathang Village	Echoes of Valor: The Gnathang Valley Experience	Vibrant Village Programme		5
Sikkim	2024-25	Kabi, Mangan	Kabi Chronicles: A Journey through Unity and Heritage	Spiritual Tourism	6	24.9



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Government of India has sanctioned 40 projects amounting to ₹3295.76 Cr. in consultation with the State Governments under SASCI Scheme (Special Assistance to States for Capital Investment) for Development of Iconic Tourist Centres to Global Scale out of which 9 projects are in the North eastern states of India amounting approximately 800 cr . The details of these projects are as under

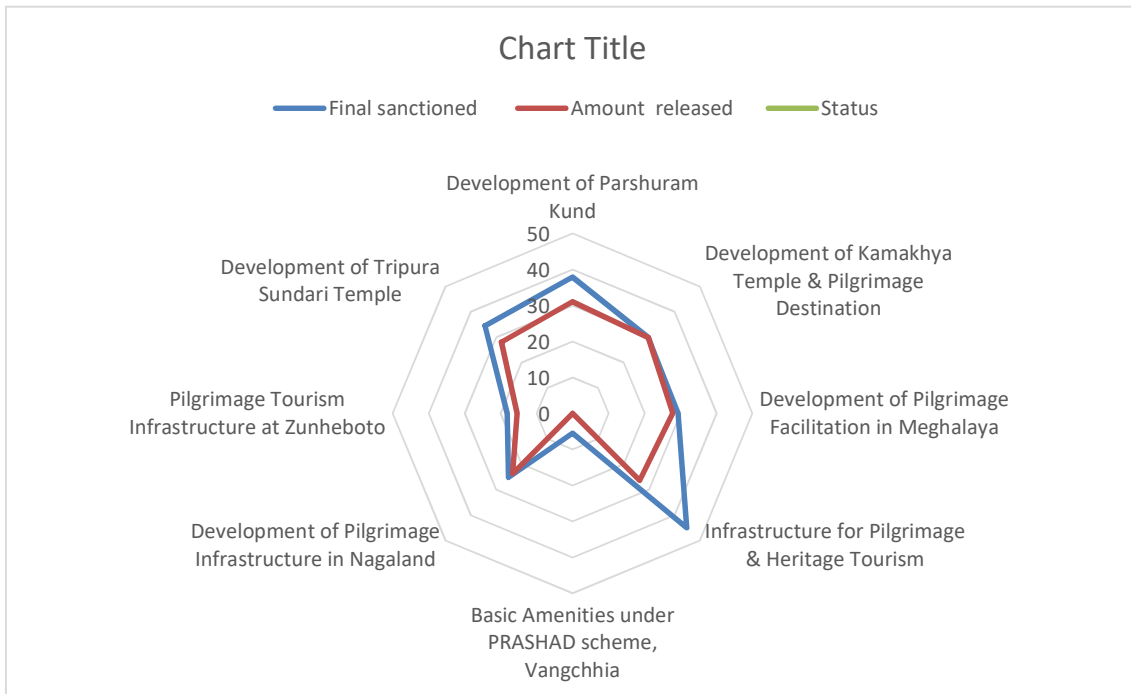
State	Year	Project	Value
Arunachal Pradesh	2024-25	Siang Adventure & Eco-Retreat in Pasighat	46.48
Assam	2024-25	Assam State Zoo Cum Botanical Garden in Guwahati	97.12
Assam	2024-25	Beautification of Rang Ghar in Sivasagar	94.76
Manipur	2024-25	Loktak Lake Experience in Loktak	89.48
Meghalaya	2024-25	MICE Infrastructure in Mawkhanu	99.27
Meghalaya	2024-25	Redevelopment of Umiam Lake in Shillong	99.27
Sikkim	2024-25	Skywalk, Bhaleydunga, Yangang in Namchi	97.37
Sikkim	2024-25	Border Experience in Nathula	68.19
Tripura	2024-25	Shakti Peethas Park at Banduar in Gomati	97.7



The “National Mission on Pilgrimage Rejuvenation and Spiritual, Augmentation Drive” (PRASAD) was launched by the Ministry of Tourism as a Central Sector Scheme with the objective of integrated development of identified pilgrimage destinations. The scheme aimed at creation of pilgrimage/spiritual tourism infrastructure development at the identified destinations.

State	Year	Destination	Project	Final sanctioned	Amount released	Status
Arunachal Pradesh	2020–21	Lohit District	Development of Parshuram Kund	37.88	31.02	Under Implementation
Assam	2015–16	Guwahati	Development of Kamakhya Temple & Pilgrimage Destination	29.8	29.8	Completed
Meghalaya	2020–21	Various	Development of Pilgrimage Facilitation in Meghalaya	29.29	27.78	Completed
Mizoram	2022–23	Statewide	Infrastructure for Pilgrimage & Heritage Tourism	44.89	26.37	Under Implementation
Mizoram	2024–25	Champhai	Basic Amenities under PRASHAD scheme, Vangchhia	5.47	0	Under Implementation
Nagaland	2018–19	Statewide	Development of Pilgrimage Infrastructure in Nagaland	25.2	23.56	Completed
Nagaland	2022–23	Zunheboto	Pilgrimage Tourism Infrastructure at Zunheboto	18.18	15.45	Completed
Tripura	2020–21	Udaipur	Development of Tripura Sundari Temple	34.43	28.01	Under Implementation

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Hub-and-Spoke Model: AR/VR in Tourism (Northeast India)

<p><b>Technology</b></p> <p><b>Accessibility:</b> Physical exclusion, i.e. physical nature of the transportation system. Overcoming physical barriers in hilly terrains and remote villages through virtual tours.</p> <p><b>Disability Inclusion:</b> Offering virtual experiences for differently abled visitors i.e. with physical, hearing, or visual impairments, mental health conditions, neurodivergent conditions, and long-term conditions.</p> <p><b>Geographical Isolation:</b> The dispersion of locations can make it difficult to undertake activities in specific areas and thus limiting AR/VR deployment. Connecting remote destinations like Ziro Valley or Mon district through 360° VR.</p> <p><b>Safety:</b> Providing secure, virtual previews of adventure routes and eco-trails to eliminate the concerns about personal safety and security when traveling in public spaces can be a barrier.</p>	<p><b>Economy</b></p> <p><b>Cost:</b> The cost of travel, including public transportation, taxis, petrol, and parking, can be a barrier for AR/VR affordability. Reducing travel expenses for tourists and locals via virtual exploration.</p> <p><b>Time Constraints:</b> Limited time off from work/school reducing willingness to engage in real travel. Allowing quick virtual visits for students and professionals.</p> <p><b>Government Restrictions:</b> Government legislation and restrictions can be a barrier to travel, impacting tourism and tech adoption. Navigating border-zone permits virtual access.</p> <p><b>Packing Challenges:</b> Costs and challenges of multi-climate travel (reduced incentive for physical travel, increasing VR's appeal).</p>
<p><b>Culture &amp; Society</b></p> <p><b>Travelling and dining alone :</b> Social discomfort like the thought of travelling and dining alone can be a barrier to solo travel which is mitigated by VR alternatives.</p>	<p><b>Experience</b></p> <p><b>Immersion:</b> Ability to replicate “being there” through VR storytelling and Simulating treks in Arunachal or river cruises in Assam.</p> <p><b>Virtual Accessibility:</b> Offering virtual tours for those unable to travel physically and</p>

<p>Community Acceptance: Willingness of locals to adopt AR/VR tourism tools. Involving local artisans and tribes in AR/VR storytelling.</p> <p>Cultural Authenticity: Ensuring AR/VR does not distort traditions. Digitally preserving dances, crafts, and festivals like Hornbill and Bihu.</p> <p>Inclusivity: AR/VR as a tool to involve marginalized groups and Empowering rural youth and women through AR/VR skill development.</p>	<p>Bringing Meghalaya’s caves or Mizoram’s hills to global screens.</p> <p>Sustainability: Reducing environmental impact by substituting virtual visits &amp; reducing ecological strain on fragile ecosystems.</p> <p>Emotional Engagement: Overcoming barriers like isolation or safety concerns with memorable experiences. Creating pride and connection through virtual heritage journeys</p>
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regionalized model shows how AR/VR can bridge isolation, preserve culture, and promote sustainable tourism across the Northeast



Figure:- immersive technologies transforming local tourism ecosystems.

### Challenges & Limitations of Immersive Technologies in Northeast India

#### 1. Technical Barriers

High Costs: VR headsets and AR-enabled devices are expensive, making them unaffordable for many tourism stakeholders (Mukherjee & Majumdar, 2025).

Device Compatibility: Limited compatibility across platforms and devices hinders seamless adoption (Mukherjee & Majumdar, 2025).

Infrastructure Limitations: Rural and hilly regions such as Assam and Meghalaya lack the necessary digital infrastructure to support immersive technologies (Mukherjee & Majumdar, 2025).

#### 2. Accessibility Concerns

Digital Divide: Many tourists and local communities do not have access to immersive devices, restricting participation (Dieck, Han, & Rauschnabel, 2024).

Uneven Reach: While AR/VR tools enhance engagement in hospitality and tourism marketing, their benefits are limited to digitally connected groups (Dieck, Han, & Rauschnabel, 2024).

#### 3. Authenticity Issues

Cultural Representation: Immersive recreations of festivals, such as the Hornbill Festival, risk presenting a polished, staged version of culture that may not reflect lived traditions (Longkumer, 2016).

Ecological Engagement: VR cave tours in Meghalaya highlight tensions between digital storytelling and authentic ecological experiences, raising questions about whether virtual simulations

dilute real-world connections (Suiaam & Saha, 2022).

### **Future Directions of Immersive Technologies in Northeast India**

Looking ahead, immersive technologies such as AR and VR are expected to play a transformative role in shaping tourism and cultural engagement in the Northeastern states.

Integration with sustainability will remain the key priority, as AR/VR can reduce environmental impact by minimizing unnecessary travel because immersive platforms promote eco-friendly and virtual access to fragile ecosystems, thereby reducing physical strain on destinations such as Meghalaya's caves and Assam's tea gardens (Rane, Choudhary, & Rane, 2023); Suiaam & Saha, 2022)

Personalized experiences by AR/VR is yet another emerging direction showing that immersive tools can be tailored to traveler preferences, offering customized narratives to enhance satisfaction and inclusivity (Dieck, Han, & Rauschnabel, 2024)

Hybrid tourism models combining physical travel with virtual enhancements for deeper engagement will remain the core focus. Scholars argue that VR previews and AR storytelling can complement real world visits, ensuring that tourists experience both authenticity and innovation. For example, virtual participation in the Hornbill Festival alongside physical attendance has been highlighted as a model for hybrid cultural tourism (Longkumer, 2016)

Hence, immersive technologies will not only enhance tourism decision making but also align with sustainability, personalization, and hybrid engagement models, positioning Northeast India as a hub for innovative and culturally sensitive tourism development.

### **Risks & Considerations of Immersive Technologies in Northeast India**

While AR and VR offer transformative opportunities for tourism in the Northeastern states, several risks and considerations must be addressed to ensure equitable and sustainable adoption.

Digital divide remains a pressing issue, as rural communities and older travelers may be excluded due to limited access to immersive devices and poor digital infrastructure. Uneven access to AR/VR technologies intensifies the existing inequalities in tourism participation, particularly in remote regions such as Nagaland and Arunachal Pradesh (Mukherjee & Majumdar, 2025).

Over commercialization is another probable concern, as excessive VR marketing may prioritize spectacle over authenticity. Studies in hospitality marketing emphasize that immersive campaigns, if not carefully designed, may risk commodifying cultural heritage and reducing genuine engagement with traditions such as the Hornbill Festival (Dieck, Han, & Rauschnabel, 2024) Longkumer, 2016)

Data privacy is a critical issue, as AR/VR applications will accumulate sensitive user data including location, biometric inputs, and behavioral patterns and thus requires strong safeguards and ethical frameworks to protect users, especially in emerging tourism markets where regulatory mechanisms may also be developed (Rane, Choudhary, & Rane, 2023)

Together, these risks highlight the importance of balancing innovation with inclusivity, authenticity, and privacy, ensuring that immersive technologies complement rather than compromise tourism development in Northeast India.

## **Recommendations:**

### **Policy implementation for AR/VR Tourism in Northeast India**

#### **1. Digital Infrastructure & Connectivity**

Public Access Points: Set up shared AR/VR kits in libraries, tourism kiosks, and community centers so rural and low-income visitors can experience immersive tourism.

**Affordable Access:** Reduce the device gap by letting people use AR/VR without buying expensive equipment.

**Community Benefit:** Turn these hubs into learning spaces for youth, artisans, and travelers.

**Open Standards:** Mandate interoperability so AR/VR content works across devices, avoiding vendor lock-in.

**High-Speed Networks:** Prioritize low-latency connectivity in tourism hubs and deploy local edge servers to cut streaming costs.

## **2. Skills, Awareness & Local Content Creation**

**Awareness Campaigns:** Showcase AR/VR tourism applications like virtual treks and cultural festivals to spark interest.

**Training Programs:** Provide workshops and state-level XR training for youth, artisans, guides, and small businesses.

**University Partnerships:** Integrate AR/VR modules into universities and vocational institutes in Assam, Meghalaya, and Sikkim.

**Micro-Grants:** Offer seed funding and mentorship for community teams, especially women and indigenous groups, to create authentic AR/VR experiences.

## **Cultural Preservation & Safeguards**

**Digitization of Traditions:** Capture tribal dances, folklore, and festivals (Hornbill, Bihu, Sangai) in immersive formats.

**Virtual Museums:** Build archives for endangered crafts and oral traditions.

**Consent Protocols:** Require community approval and benefit-sharing before digitizing rituals or sacred sites.

**Authenticity Guidelines:** Establish standards for attribution, metadata, and limits on commercial re-use.

**Community Archives:** Fund local repositories where communities control their digital heritage.

## **Economic Development & Market Enablement**

**Policy Incentives:** Provide subsidies or tax breaks for startups and MSMEs developing AR/VR tourism platforms.

**Community Enterprises:** Support cooperative AR/VR business models that share revenue with local custodians.

**Tourism Portals:** Integrate verified AR/VR experiences into official state tourism websites to boost visibility and demand.

## **Accessibility, Inclusion & Sustainability**

**Universal Design:** Ensure AR/VR experiences include accessibility features (audio descriptions, simplified controls, multilingual options).

**Inclusive Storytelling:** Involve women and rural artisans in AR/VR content creation.

**Remote Connectivity:** Use AR/VR to bring isolated destinations (Ziro Valley, Mon district, Meghalaya caves) closer to visitors.

**Virtual Conservation:** Offer virtual alternatives for fragile ecosystems (Kaziranga, Loktak Lake) to reduce tourist pressure.

SDG Alignment: Embed sustainability criteria into funding so projects support conservation and resilience.

## Governance, Privacy & Roadmap

Data Protection: Enact rules for biometric, location, and behavioral data collected by AR/VR apps, including consent and retention limits.

Certification: Create a “Responsible XR Tourism” label that audits authenticity, accessibility, privacy, and environmental impact.

Pilot Projects: Launch 12–18 month pilots in representative sites (one hill valley, one wetland, one cultural festival), then scale based on lessons learned.

KPIs & Monitoring: Track metrics like local jobs created, share of community-owned content, device access rates, reduced footfall at fragile sites, and user satisfaction.

Global Collaboration: Exchange knowledge with countries experienced in immersive tourism (Norway, New Zealand, Iceland) to adapt best practices.

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