

(RESEARCH ARTICLE)



Immersive augmented reality strategy in digital smart tourism: A case study of Fujian Province, China

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GSC Advanced Research and Reviews, 2024, 21(03), 425-431

Publication history: Received on 18 November 2024; revised on 26 December 2024; accepted on 28 December 2024

Article DOI: <https://doi.org/10.30574/gscarr.2024.21.3.0517>

Abstract

The immersive augmented reality of digital smart tourism is a relatively new tourism strategy that has not been fully explored in tourism academic research. However, it is unclear why the immersive AR strategy of digital smart tourism has attracted so many tourists. Due to our lack of clarity on the strategies that drive tourist behavior, we believe it is crucial to explore these strategies in order to gain a deeper understanding. The purpose of this study is to explore in depth the special context and unique strategy of immersive augmented reality in digital smart tourism, and to propose an insight into interpreting the contextualized experience model. This study conducted field observations through interviews and personal travel to Fujian, China. Research has found a contextualized experiential orientation. The theoretical contribution is the insight into establishing an immersive augmented reality experience model for digital smart tourism.

Keywords: Immersive augmented reality strategy; Digital smart tourism; Fujian; China

1. Introduction

Dwivedi et al. (2023) pointed out that the use of cutting-edge technology such as augmented reality (AR) can indeed enhance and increase the value of the overall passenger experience, provide strategic impetus for smart tourism, and generate positive word-of-mouth. At tourist attractions, visitors can instantly access and unlock historical knowledge and reveal hidden stories, while avoiding interrupted or overcrowded physical spaces. This effectively bridges the gap between exploring innovative AR technologies and personalized experiences, as visitors can customize AR experiences, explore and discover personal interests. The industry has long understood the importance of creating unforgettable experiences (Koparan et al., 2023). Therefore, the AR strategy for digital smart tourism has become increasingly important.

The initial concept of the experience economy proposed four areas of tourist experience: involvement (from passive to active participation in tourism consumption), participation (tourists participating in consumption objects), desire (from absorption to entry), and immersion (to addictive situations) (Kang et al., 2023). Escaping reality is also another experiential field, referring to tourists actively participating in the provision of products and services, as well as their willingness to temporarily forget events from normal life by fully immersing themselves in AR experiences (Um et al., 2023).

Despite the popularity of immersive AR experiences in digital smart tourism and a significant increase in the number of participants (Jafar et al., 2023), it is still unclear why AR experience strategies attract so many tourists? This question has not been well answered in previous research. What factors drive tourists in scenic spots to like, share, and comment on immersive AR. Previous studies have not provided clear explanations, resulting in theoretical gaps. In order to

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enhance understanding, the purpose of this article is to address this gap in the literature. Therefore, this study delves into the characteristics of digital smart tourism strategies and provides insights into their interpretation.

2. Literature review

2.1. Digital smart tourism

There is currently no unified and relatively standardized definition for digital smart tourism. Researchers believe that digital smart tourism fully integrates and utilizes tourism information resources based on technologies such as the Internet of Things, mobile communication, cloud computing, and artificial intelligence, providing high-quality tourism models for governments, businesses, and the public (Hollensen et al., 2023). In terms of connotation, digital smart tourism refers to the application of smart technology in the tourism industry, including information and communication technology. Aiming to improve tourism services, enhance tourism experience, innovate tourism management, optimize the utilization of tourism resources, enhance the competitiveness of tourism enterprises, improve the management level of the tourism industry, and expand the scale of modernization projects. Unlike general information engineering technology, it is an integrator of new ideas, new technologies, and new forms. It can meet the personalized needs of technology services in the new era, enabling people to achieve intelligent perception and flexible utilization of various types of information. It can create social and economic effects and value (Monaco and Sacchi, 2023).

Napier and Lee (2023) pointed out that in the management of digital smart tourism scenic spots, the characteristics of intelligence, digitization, integration, interactive coordination, and sustainable development should be highlighted. Integrating scientific management with modern information technology to achieve the goal of harmonious development between people and scenery, low-carbon and intelligent operation of scenic spots, providing satisfactory services for tourists, and creating enormous value for society. Digital smart tourism is a subsystem of the smart city system and its specific application and expansion in tourist cities. Siriaraya et al. (2023) Study the vertical market system of new digital smart tourism cities, highlight the vitality of the vertical market of smart cities, and promote the development of smart cities.

Yoo (2023) exploring digital empowerment of smart tourism points out that promoting the deep integration of immersive industries and cultural tourism, developing immersive scenic spots, immersive museums, immersive vacation areas, immersive leisure (street) areas and other scenes. Shouman et al. (2022) emphasize that smart experiences include VR AR The enhancement of experience through technology in tourism, the improvement of digital infrastructure, and the enhancement of citizens' digital literacy are important for the development of smart tourism. Kang et al. (2023) The emerging form of providing tourism information is intelligent, timely, and humanized services to promote the upgrading of the tourism industry. In addition, the digitization of the cultural and tourism industry also faces challenges: (1) the phenomenon of digital overheating and the transformation of cultural and tourism industries; (2) There is a contradiction between culture and tourism consumption; (3) Insufficient supply of high-quality digital products and services; (4) The homogenization of cultural and tourism product information is serious; (5) The digital governance system for cultural tourism is not perfect. Hollensen et al. (2023) It was found that immersive experiences mainly manifest in immersive experiences, immersive cultural tourism, immersive art exhibitions, themed murder mystery games, themed VR experiences, etc. Dwivedi et al. (2023) It is pointed out that red tourism is an experiential experience that combines museums, revolutionary sites, rural tours, study tours, and night tours, breaking the shackles of traditional explanations.

2.2. Immersive augmented reality (AR) strategy

Immersive AR achieves borderless interaction between the physical world and the digital world by embedding virtual objects into the real environment. In recent years, the development of mobile devices such as smartphones and tablets has made immersive AR possible and widely applied in fields such as education, tourism, and entertainment. The combination of fast CPU, camera, compass, GPS, and even gyroscope makes mobile devices a powerful AR platform (Hollensen et al., 2023).

This article redefines context and context awareness in immersive AR strategies. For immersive AR strategies, context refers to all the information that immersive AR devices can collect, including environmental information, visitor information, and device information. Environmental information refers to the information about the physical environment in which tourists are located, which can be divided into physical information and semantic information. Physical information refers to the physical properties of the environment, including forces, sound, light, etc. Semantic information refers to the content and meaning of the real environment, which can be understood through 5W1H (time, place, people, events, reasons, and ways of the environment) (Siriaraya et al., 2023).

Tourist AR experience refers to the physical, physiological, and conscious states of tourists. The physical condition includes the position, posture, and movements of the tourist. Physiological status includes tourists' gender, body shape, appearance, etc. The state of consciousness includes tourists' emotions, intentions, etc. Device information refers to the software and hardware state of AR experience, such as AR computing capability, sensor capability, etc. In the case of sufficient AR device capabilities, this article mainly focuses on AR environment information and tourist experience information in context (Napier and Lee, 2023).

3. Methodology

3.1. Immersive netnography

The greatest contribution value of immersive netnography is its ability to present the results of a holistic research methodology. The use of immersive netnography as an important research method in this project is because it is a theoretical paradigm of "construction theory" in academia (Kozinets, 2023), and this method is based on the concept of "real entry into tourism fields and practical operational practice".

3.2. Focus groups

Representatives from AR travelers, government policy experts, and industry scholars will conduct in-depth attribute discussions, providing group discussions on integrating AR strategies into the rich history, culture, knowledge, services, major challenges, business development, resource advantages, management models, cultural and tourism strategies of the local area. AR tourist representatives, government policy experts, and industry scholars will conduct in-depth attribute discussions.

3.3. Participant observation, in-depth interview

Stage 1: Concealed observation (also known as diver observation); (2) Stage 2: Adopt open observation (using both long-distance and close range observation); (3) Semi-structured interview; (4) Draft interview outline; (5) Guided interview; (6) Conduct interview logs that are attribute based, observational, methodological, and introspective in nature; (7) The first stage adopts a target oriented field description; (8) The second and third stages adopt reflective field descriptions (Kozinets, 2023).

3.4. Research object

The research subjects include 50 tourists from AR scenic spots in Fujian Province, China, 3 government policy experts, 4 industry scholars, 7 leaders of the Fujian Provincial People's Government, including 12 party members from the Provincial Department of Culture and Tourism. A total of 76 people.

4. Text analysis

Text Analysis aims to extract machine-readable information from unstructured text in order to enable data-driven approaches towards managing content. Text Analysis is about parsing texts in order to extract machine-readable facts from them. The purpose of Text Analysis is to create structured data out of free text content. The process can be thought of as slicing and dicing heaps of unstructured, heterogeneous documents into easy-to-manage and interpret data pieces (Kozinets, 2023). The central challenge in Text Analysis is the ambiguity of human languages. Text Analysis technology provide background knowledge, human-alike concept and entity awareness, to enable a more accurate interpretation of the text; The results of the analysis are semantic tags that link references in the text to specific concepts in the graph. These tags represent structured metadata that enables better search and further analytics; Facts extracted from the text can be added to enrich the Knowledge Graph. QSR Platform implements all flavors of this interplay linking text and big Knowledge Graphs to enable solutions for content tagging, classification and recommendation (Kozinets, 2023).

Text analysis and contextual induction are qualitative research methods related to theoretical construction of conceptual ideas. Text analysis and contextual induction are the concepts of data analysis. Word for word recording is generated from digital recordings. Text analysis was conducted using QSR NVIVO12 software. All variables were obtained using theoretical encoding (Kozinets, 2023).

5. Result and Discussion

This project starts with the basic status quo of the development of Fujian's tourism industry characteristics and the advantages of integrating digital resources. Combining with the main theory of immersive AR integration, it explores

the main difficulties in the development of Fujian's tourism industry under the strategic orientation of expanding and strengthening Fujian's cultural and tourism. It further clarifies the significance and necessity of Fujian's tourism evolution from digital integration to smart tourism integration. By expanding and strengthening Fujian's cultural and tourism strategy and target requirements, it clarifies the positioning and goals of Fujian's digital and smart tourism, and constructs a model idea for the deep integration development of immersive AR, which is based on the transformation towards digitalization and smart tourism integration, and centered on the innovative reshaping of smart tourism that focuses on content and tourist resource integration. The overall research paradigm follows the approach of problem posing, theoretical analysis, practical demonstration, and policy recommendations, as shown in Figure 1.

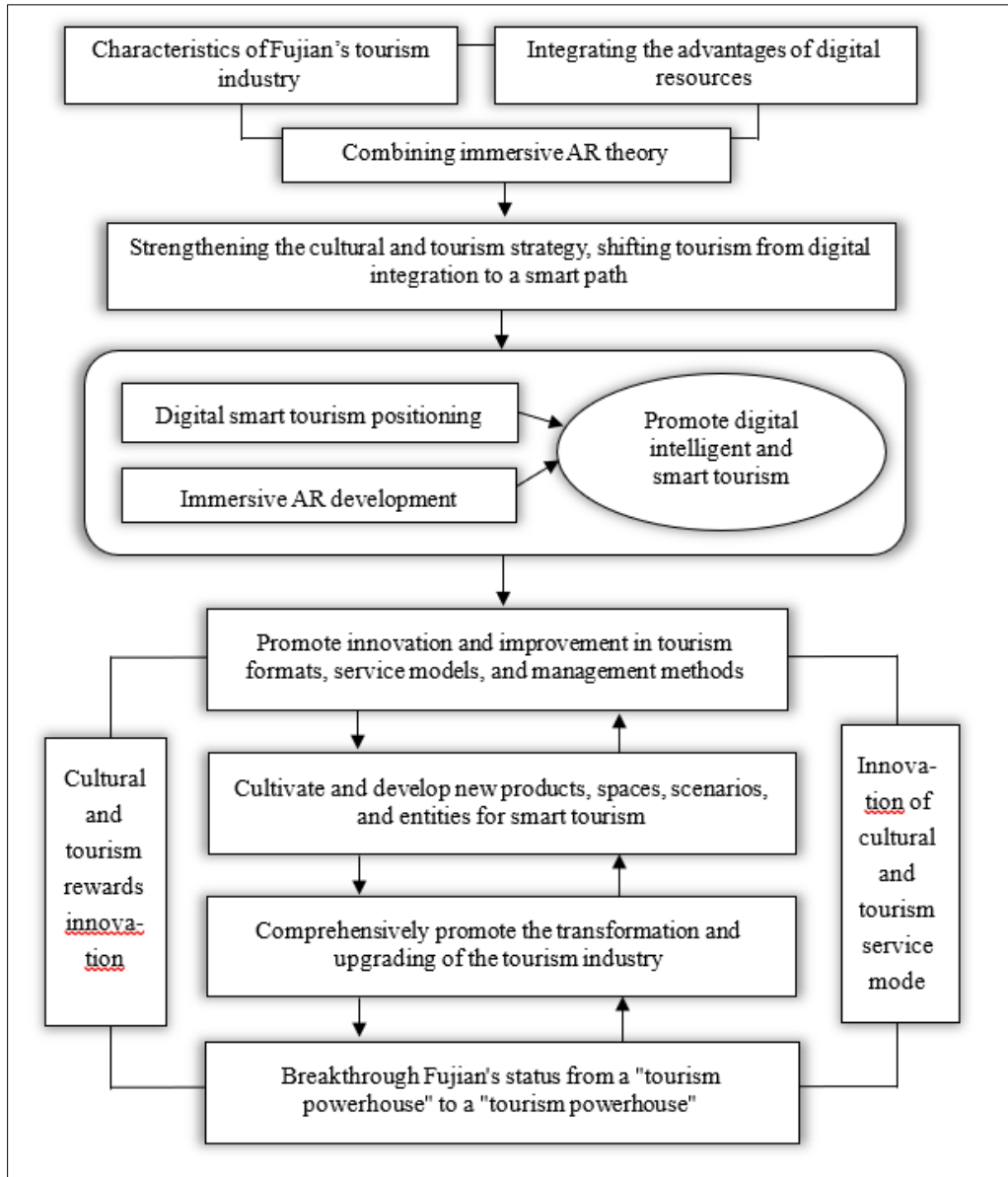


Figure 1 The model of immersive AR strategy in digital smart tourism

The model idea of immersive AR deep integration development is based on the transformation towards digitalization and smart tourism integration, including (1) policy support; (2) Planning leads the development direction; (3) Digital development supports industry upgrading and innovation; (4) The core of smart tourism innovation is focused on the integration of attributes and tourist resources.

5.1. Policy support

The Fujian Provincial Government has successively issued multiple policies and documents aimed at stimulating the development of new cultural and tourism industries, among which digital smart tourism has become a key promotion

attribute. In 2024, the General Office of the People's Government of Fujian Province issued a notice on the Implementation Plan for Promoting the High Quality Development of Digital Culture and Tourism. The plan firmly regards the construction of digital culture and tourism as the foundation and leading project for promoting the development of cultural and tourism economy, with the aim of making Fujian Province a leading national level in the field of digital culture and tourism, and thus helping Fujian Province become a world-renowned tourist destination. The transformation of Fujian from being regarded as a "major tourism province" to being promoted to a "strong tourism province", as well as the reputation won by tourism brands such as "Fresh Fujian", "Quanfu Tourism, Youquan Fu" and "Fu" culture at home and abroad, all rely on the support and promotion of national and provincial policies.

5.2. Planning leads the development direction

Fujian Province is expected to successfully cultivate 100 smart scenic spots and create 10 cultural industry demonstration parks (bases) led by digital industries by 2025. Meanwhile, with the help of AR VR、 AI We plan to build a number of digital museums, libraries, cultural centers, and art galleries using advanced digital technologies, and create a number of nationally renowned smart tourism demonstration villages and towns, thus creating an immersive digital cultural and tourism consumption experience space.

In addition, the Plan also details seven key projects to promote the high-quality development of Fujian's cultural and tourism economy, namely: the integration and aggregation of cultural and tourism data resources project, the improvement of digital cultural and tourism government management platform project, the improvement of digital cultural and tourism comprehensive service platform project, the digital empowerment project of cultural heritage, the digital empowerment project of cultural and tourism industry, and the integration and innovation project of digital cultural and tourism application scenarios. The release of this 'Plan' not only provides clear ideas for the development of cultural and tourism economy in Fujian Province, but also points out the direction for the vigorous development of digital cultural and tourism in the province.

5.3. Digital development supports industry upgrading and innovation

Relying on big data, artificial intelligence, Internet, virtual reality, 5G, Internet of Things and other cutting-edge information technologies, Fujian Province has created an innovative platform of "Changyou Bamin". The platform is led and implemented by the Department of Culture and Tourism of Fujian Province, and jointly constructed by Fujian Tourism Development Group and Tongcheng Travel. This platform gathers high-quality cultural and tourism resources from across the province, providing a one-stop solution through standardized integration, resource sharing, and enhanced interactivity to meet diverse needs such as intelligent and personalized recommendation of tourism products, immersive tourism experience, interactive navigation of scenic spots, and interactive experience of key attractions. This enables tourists to more deeply utilize Fujian's digital tourism technology and fully appreciate the beautiful scenery of Fujian. The "Changyou Bamin" WeChat mini program was officially launched in August 2023.

5.4. Developing a smart tourism marketing system

With the support of national and provincial policies, combined with the construction of digital platforms and the application of digital tourism marketing methods within the province, the tourism industry in Fujian Province is showing a thriving development trend. Data shows that the added value of cultural and related industries in Fujian Province reached 257.605 billion yuan in 2022, accounting for 5% of the province's GDP during the same period. In the same year, the added value of the tourism industry was 246.33 billion yuan, accounting for 4.64% of GDP. By 2023, the total number of tourists received in Fujian Province will surge to 572 million, and the total tourism revenue will reach an astonishing 698.108 billion yuan, an increase of 45.9% and 61.3% year-on-year, respectively. In this year, the total output value of cultural and tourism economy in Fujian Province reached 1.38 trillion yuan, an increase of 8.8%, while the added value of cultural and tourism economy increased by 9.5%, accounting for nearly 10% of the province's regional GDP. Overall planning scheme for developing smart tourism marketing scenic spot application system.

During the May Day holiday in 2024, the number of tourists received in Fujian Province exceeded 27 million, with a total tourism expenditure of nearly 21.4 billion yuan, indicating that the cultural and tourism market is moving towards a trend of efficiency oriented development. According to statistics from Ctrip platform, the number of tourists who pre booked travel itineraries in various parts of our province during the May Day holiday increased by 25.57% compared to the same period last year. On the first day of the holiday, Fuzhou ranked among the top 4 provincial capitals in terms of tourism order growth, while Quanzhou ranked among the top 5 popular tourist cities in terms of tourism order growth.

In summary, macro policies and technological progress have jointly promoted strong support for the tourism industry from the national to provincial levels. Taking the tourism evolution trend of Fujian Province as an example, the province relies on its unique geographical location advantages and clear strategic planning to continuously strengthen investment in information technology infrastructure and marketing, and is committed to building a dual platform of public services and smart tourism. These strategic measures not only significantly improve the informatization level of tourism in the province, but also greatly optimize the tourism experience of tourists, thereby promoting the long-term and deepening development of smart tourism.

6. Conclusion

The continuous development of technology has promoted the innovation of digital tourism products and the construction of immersive AR strategies, which not only helps to protect local culture, but also transforms local tourism resources into permanently preserved product forms through digital means. With the passage of time, Fujian's profound cultural heritage has been revitalized with the help of technology.

The application of immersive AR strategy closely integrates virtual scenarios with the diverse tourism resources in Fujian Province, providing tourists with an unprecedented immersive experience. This integration has not only become a major promotional highlight of scenic spots, but also a hot topic in the field of digital smart tourism research in recent years. Tourists can easily and joyfully appreciate the unique charm of Fujian style culture while visiting the scenic area. In the intertwined experience environment of virtual and reality, tourists can have a deeper understanding of the cultural connotations of scenic spots, while enhancing the entertainment value of the tour, achieving a dual effect of "education and entertainment".

In the context of the increasing homogenization of scenic spots, using immersive AR strategies to inject new elements into local tourism attributes and enhance the overall experience of Fujian tourists in China can help explore new tourism resources and further expand tourists' tourism experiences in the increasingly saturated tourism industry, thereby more effectively utilizing the province's tourism resources and protecting and spreading Fujian's unique culture.

Funding Project

This paper is the preliminary research result of Minnan Normal University's acquisition of the Fujian Provincial Social Science Fund project in China, titled "Immersive Augmented Reality AR Research on Fujian Digital Smart Tourism" [Project Number: FJ2024T004].

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