

# *Study on the influence of the application of tourism technology on the independent tourists*

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**Abstract:** With the continuous advancement of cultural and tourism integration, the consumption perspective of Chinese tourists is progressively maturing and rationalizing. Furthermore, the younger age demographic among tourists has led to a surge in popularity for independent an increased demand for immersive, autonomous, and personalized travel experiences. From the perspective of practical application in tourism technology, this study explores how to utilize tourism technology to influence tourists' choices regarding space and time based on six fundamental needs (food, accommodation, transportation, shopping, and entertainment). It takes into consideration the characteristics and requirements of four different types of tourists. The paper further examines the accessibility of tourism information, the availability of tourism destinations, and the overall satisfaction of tourists' experiences from a multidimensional an increased number of independent travelers to visit destinations and fulfill their consumption demands in order to enhance their travel experience

## 1. Introduction

As a form of spatial displacement activity, tourism aims to address issues related to destination accessibility and transaction information symmetry. With the continuous growth of China's tourism market, there has been ongoing development in tourism technology. Notably, these advancements have subtly influenced consumers' travel intentions and behaviors. For instance, progress in transportation technology has resolved spatial constraints in tourist travel; advancements in artificial intelligence and digital technology have empowered tourists with enhanced skills for accessing comprehensive tourism information; and the evolution of communication technology has addressed long-distance communication challenges in tourism. The development of has propelled independent travel to become an increasingly popular choice among tourists

As China's economy transitions from a phase of rapid growth to one of high-quality development, Chinese consumers are increasingly inclined towards adopting a more personalized mode of travel known as 'self-driving tourism'. Furthermore, the '14th Five-Year Plan' tourism development in China explicitly emphasizes the need to build a culturally strong nation and promote the high-quality advancement of the cultural tourism industry. The application of tourism technology serves as a

crucial driving force for fostering innovation and the development of the modern industry.

Therefore, based on a comprehensive review and analysis of existing research on tourism technology and independent travel, incorporating the historical origins and background of China's tourism development, as well as drawing insights from practical applications of tourism technology, it is imperative to conduct an in-depth analysis of the influence mechanism that tourism technology ex and explore its future prospects.

## 2. Overview of Related Research on Tourism Technology and Independent Travel

Based on the relevant research conducted both domestically and internationally, this paper presents an introduction to tourism technology and independent travel. Furthermore, building upon this theoretical framework, impact of implementing tourism science and technology on independent tourists is further examined.

### 2.1. Research on Tourism Technology

Tourism technology is not simply "tourism + technology" in the sense of text, but refers to the combination of artificial intelligence and tourism elements and technology to build a data ecosystem, so as to optimize and improve tourism experience and tourism products in tourism activities, better capture the consumption demand of tourists, and solve the problems of intelligent, personalized and collaborative supply of tourism supply chain management. At present, domestic and foreign scholars' research on tourism science and technology mainly focuses on three aspects:

Firstly, the primary focus lies in elucidating the concept and essence of travel technology. Yin Lijie and Cui Zhongqiang (2019) argue that integrating tourism elements with scientific and technological advancements can establish a data ecosystem to capture customer demands, thereby shaping an emerging development paradigm<sup>[1]</sup>. Tang Xiaoyun et al. (2020) have summarized the essence of tourism technology encompassing Internet, high-speed transportation, big data, and artificial intelligence by reviewing its historical evolution<sup>[2]</sup>. However, these aforementioned studies are somewhat time-constrained and may not be promptly updated to reflect developments in tourism technology. Furthermore, practical discussions remain predominantly living deeper into exploring the application or impact of tourism science and technology.

Secondly, research on the impact of tourism technology primarily focuses on the synergistic effects resulting from the integration of technology and tourism. For instance, Chen-Kuo Pai (2020) employed a structural equation method to investigate the correlation between attributes of smart tourism technology and travel satisfaction, happiness, as well as re-visit intention<sup>[3]</sup>. Lei Xiaopeng and He Zhili (2019) examined the integration of information technology and the tourism industry the emerging "information + tourism" format<sup>[4]</sup>. However, Manuel Rivera (2016) collectively analyzed small island tourist destinations using TTF theory to evaluate mobile application preferences and their impacts<sup>[5]</sup>. Nevertheless, most of these aforementioned studies solely concentrate on specific applications of tourism technology within certain domains or populations while lacking a comprehensive understanding of its overall macro-level implications.

Thirdly, the case study on the practical application of tourism technology primarily focuses on quantitative research. For instance, He Xiaorong and Li Siqin (2020) conducted an analysis of the strengths and weaknesses of Hunan Museum as a case study, providing recommendations for enhancing the utilization of immersive technologies<sup>[6]</sup>. Li Yunpeng (2017) examined the driving factors in tourism experiences through digital technology based on big data, exploring its applications in areas such as tourism consumption, marketing, management, and service<sup>[7]</sup>. Yan Ying and Wang Fang (2020) assessed the innovation capability index related to tourism science and technology distribution characteristics across 17 prefecture-level cities in Shandong province during recent years.

They discussed suggestions for advancing innovation in tourism science and technology within this region<sup>[8]</sup>. However, these aforementioned studies generally employ single cases or limited research content without delving into a comprehensive exploration of how the application of tourism technology impacts various sectors within cultural tourism industry or different segments of tourist consumers.

In summary, the current research on tourism technology both domestically and internationally suffers from limitations such as a scarcity of relevant research findings, a narrow research perspective, and a concentration of case studies. By conducting an analysis of the latest application scenarios in tourism technology across multiple cases, this paper aims to provide a more comprehensive and timely examination.

## 2.2. Research on Independent Travel

The concept of independent travel originated in the United States as a distinct alternative to group tours, showcasing its fundamental characteristic of users autonomously designing travel routes and itineraries, engaging in self-service bookings for various travel products and services. This form of tourism epitomizes exceptional flexibility and freedom.

At present, scholars' researches on independent travel mainly focus on the three aspects of "definition, influence and travel motivation". For example, Liu Huigan and Yu Lixin (2020) explored how to better provide travel products and services for Internet group independent tourists by studying their travel psychology and motivation<sup>[9]</sup>. Zhao Hongjie and Wu Bihu (2013) studied the local identity and leisure benefits of mainland independent tourists to Taiwan, so as to grasp the behavioral characteristics of this group and ultimately promote the harmonious development of Cross-Strait relations<sup>[10]</sup>. Zhou Yongguang and Jiang Yifan (2008) made a comparative analysis of the "free travel" tourism products of travel agencies and explored the development trend of tourism products in the future<sup>[11]</sup>.

Although the number of independent tourists has been increasing in recent years, existing research generally suffers from deficiencies as inadequate accomplishments perspective. Therefore, this study adopts tourism science and technology as a novel research approach to investigate the actual impact of applying tourism science and technology on independent tourists, which possesses significant innovation and practical value.

## 3. Travel Status, Characteristics and Problems of Independent Tourists

According to the statistics from the Ministry of Culture Tourism of China for the first three quarters of 2019, independent travel dominates the domestic, with organized tours by travel agencies accounting for only 2.76% (127,033,900) of the total number of domestic tourists (4.597 billion). The Annual Report on the Development of China's Outbound Tourism 2019 also highlights that while group tours remain a popular choice for many outbound travelers, there is an increasing towards independent travel.

The "2019 Travel Preference Data Report of Free Travel Users" in the majority of independent travelers fall within the age range of 18-45, constituting over 80% of with women accounting for 53%. In terms of demographic distribution, independent tourists generally exhibit characteristics such as youthfulness and education levels (with a bachelor's degree representing 65%), displaying strong consumption demands for active participation in tourism activities and immersive travel experiences.

In addition, based on the initial number of participants in independent tourism, it can be broadly categorized into four groups: solo/friend travelers, couples, parent-child travelers, and families. The specific consumption needs of each group differ as follows: solo/friend travelers are primarily inclined towards unique experiential tourism; couples tend to prioritize environmental sightseeing

and the enjoyment of intimate spaces for two people; parent-child travelers seek leisure and comfort within a family-oriented environment; family travelers typically consist of two or three generations traveling together and due to a wide age range, they lean towards autonomous travel experiences and leisurely exploration.

The diversity of independent tourists' groups and needs has led to conflicts with the current development of the independent tourism market, resulting in various deficiencies in this form of tourism experience, such as uneven destination development levels, asymmetrical tourism information, and imbalanced tourist experiences.

#### 4. The Impact of Tourism Technology on Individual Tourist.

Based on the aforementioned distinctions, characteristics, and differences in needs of the four major consumer groups, this paper constructs a model illustrating "the impact pathway of tourism technology application on independent tourists" (as depicted in Figure 1) from three dimensions: pre-tourism, during-tourism, and post-tourism. It investigates the diverse influence pathways of tourism technology on independent tourists, primarily as follows:

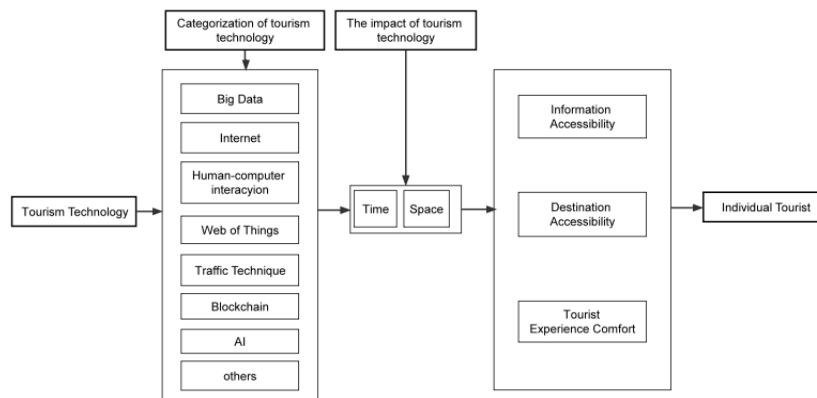


Figure 1: The impact pathway of the application of tourism technology on the independent tourists

##### 4.1. Pre-travel: Gathering and Utilizing Journey Information

In the pre-travel preparation stage, the primary demand of tourists lies in acquiring and utilizing journey information. The advancement of tourism technology, particularly the progress in information network technology, has the potential to alleviate the challenges faced by travelers obtaining timely updates on essential information due imposed by tourist destinations. The development of tourism information technology platforms such as websites, traffic information inquiries, OTA online bookings, etc., facilitates efficient planning and preparation for independent travelers prior to their journeys.

Furthermore, the promotion of data platforms will not only facilitate accurate dissemination of information to potential independent tourists at tourism destinations but also enhance accessibility to real-time destination updates for self-guided travelers, thereby facilitating travel itinerary planning.

##### 4.2. In Tourism: The Improvement of Tourism Experience and Perception

In the context of independent travel, tourism technology primarily impacts the spatial accessibility of tourist destinations and enhances tourists' comfort. On one hand, advancements in road information technology within the realm of tourism enable the integration of transportation and travel through technological empowerment. This not only caters to diverse travel preferences among

independent tourists but also strengthens the spatial accessibility of tourist destinations. Consequently, independent travelers are more inclined to consider longer distances and itineraries, thereby contributing to the development of remote tourist areas. On the other hand, upon arrival at their destination, tourists benefit from modern tourism technologies such as intelligent tours and smart ticketing systems that enhance their overall travel and comfort levels. Additionally, facilities like facial-ins and intelligent temperature regulation in hotels further alleviate past issues related to subpar travel experiences and low comfort levels.

Moreover, the tourism industry can leverage technology to create intelligent destinations, including smart scenic spots and hotels, as well artificial intelligence situational interaction, VR immersive experiences, holographic projections, and more. These advancements aim to enhance the interactive experience for tourists and eliminate the limitations of traditional journeys.

### **4.3. Post-Travel: Travel Experience Review and Sharing**

With the advancement and development of information technology particularly the progress in we-media technology, an increasing of independent travelers are inclined or willing to share their experiences on social networks during or after their journeys. Among these platforms, we-media channels such as WeChat, Xiaohongshu, Hornet's Nest, and Douyin have gained popularity for sharing travel-related content. These shared posts not enhance the appeal of tourist destinations but also serve as a driving force in attracting more independent tourists.

Simultaneously, for tourist destinations themselves, the data shared by tourists can be utilized for online public opinion analysis and management purposes to facilitate targeted developments.

## **5. The Practical Implementation of Tourism Technology in Independent Travel**

With the continuous advancement of tourism science and technology, coupled with the growing number of independent travelers, an increasing number of tourist destinations are becoming highly appealing to independent tourists. In order to effectively these individuals, this study focuses on three representative provinces in China that strategically employ diverse technological means to promote local tourism development and infrastructure. By summarizing and analyzing these exemplary practical applications, it is anticipated that more domestic destinations can adapt their tourism planning according to local conditions, integrating advanced technology into their offerings for enhanced free-travel experiences.

### **5.1. Chongqing, China: Smart Tourism Planning Based on Big Data**

According to the 2020 Chongqing Cultural Tourism Work Conference<sup>9</sup>, Chongqing witnessed a year increase of 10% in tourist arrivals from both domestic<sup>657</sup> million visitors. Additionally, the city experienced a remarkable growth rate of 32% in tourism revenue, reaching an impressive sum of 573.4 billion. In order to effectively promote smart tourism and global development in Chongqing, significant cutting-edge information technologies such as 5G, big data analytics, cloud computing, and artificial intelligence (AI) are required. Notably, the government has taken proactive by establishing a state-of-the-art smart tourism cloud computing center that leverages digital technology applications within the framework of big data while ensuring robust data security protocols are upheld. To cater to the needs of, platforms like China Unicom Tourism Command and Dispatch Center along with tourism information inquiry service centers and tourism digital marketing centers have been implemented to enable real-time monitoring capabilities for major tourist attractions across the city. These initiatives aim to enhance data collection and monitoring workflows related to tourism activities so as to optimal utilization of available resources while simultaneously elevating visitor

experiences.

Simultaneously, by leveraging digital technology platforms, it is imperative to establish tourist attractions, smart hotels, and advanced tourism platforms that seamlessly integrate the distinctive features of destinations encompass food, accommodation, transportation, shopping, entertainment and other tourism resources. This approach aims to overcome the challenges associated with traditional information collection for independent travelers while addressing issues as inconvenient travel arrangements and effectively resolving pre-travel concerns regarding destination selection and itinerary planning. For instance, Wuling Scenic Spot has successfully employed tourism technology to develop a comprehensive smart tourism service platform enabling visitors to experience "Wuling at their fingertips," thereby fully harnessing big data integration and utilizing internet technologies to facilitate seamless solutions for dining options, lodging accommodations, transportation arrangements as well as shopping and entertainment experiences within Wuling.

### **5.2. Guangxi, China: Smart Scenic Spot Development Based on Internet of Things Technology**

The development of Internet of Things technology plays a crucial role in the establishment of intelligent scenic spots. By intelligently and integrating various traditional artificial businesses such as smart ticket operation and management, smart parking lots, smart parks, and smart payment systems, our aim is to create an efficient, secure, and advanced intelligent scenic spot. For instance, the implementation of free WIFI coverage project in Nanning city and the "smart tourism Island" project on Weizhou Island in North Sea demonstrate practical applications like face recognition systems, intelligent, and intelligent park systems. These innovative tourism technologies significantly enhance the reception capacity of scenic spots while optimizing tourists' leisure experiences.

### **5.3. Hunan, China: Visitor Experiential Interaction in the Context of Artificial Intelligence Technology**

In the context of traditional independent travel, the limited interaction between tourists and scenic spots, influenced by subjective factors such as tourists' cultural level, sets it apart from group tours. However, advancements in artificial intelligence technology within the tourism industry can address this issue. For instance, through collaboration with Chinese telecom operators and leveraging 5G information, Changsha in Hunan Province has successfully employed VR, AR, and technologies to offer immersive experiences of Zhangjiajie's scenery for tourists. Moreover, these technological innovations also cater the needs of physically challenged travelers by providing AI-assisted live experiences and virtual mountaineering interactions—thus significantly enhancing the overall experience for independent travelers.

## **6. Summary and Recommendation**

With the continuous deep integration of cultural tourism and the expanding independent travel market, diverse scenarios and prospects have emerged for the practical application of tourism technology. However, in exploring how to better cater to future independent travelers, it is imperative to leverage all advantages and draw valuable insights from successful experiences in implementing smart tourism and global tourism using diversified technologies across different regions.

Firstly, in terms of the accessibility of tourism information, it primarily utilizes advanced information technology to establish a data service platform. This platform focuses on addressing challenges faced by independent travelers when gathering tourism-related information. Under government leadership and supervision, extensive data collection and monitoring are conducted on the tourism big data service platforms. On one hand, real-time data from various sources such as the

internet, operators, OTA (Online Travel Agencies), search engines are collected and organized. On the other hand, relevant data is obtained from government administrative departments including public security, transportation, meteorology among others. By establishing this robust tourism big data service platform, not only can it provide more abundant and accurate tourist destination information for independent travelers but also enable timely tracking of tourists based factors like tourist flow patterns, destinations visited, travel routes taken as well as their behaviors and characteristics. Ultimately, those will enhance the satisfaction of tourism services for independent travelers.

Secondly, from the perspective of spatial accessibility to tourism destinations, this study aims to address spatio-temporal issues such as inconvenient transportation for independent tourists from their departure point to the destination. The focus is on developing diverse modes of transportation including smart highways and parking lots for self-drive tourists, high-speed rail and aircraft for non-self-drive tourists. Intelligent highways can integrate tourist attractions along the way by constructing modern intelligent high-speed service areas with unique styles that provide free sightseeing and service information for tourists. The convenience of transportation and the reduction in travel time offer increased possibilities for independent travelers to visit destinations of varying distances.

Thirdly, from the perspective of enhancing tourist experience comfort, on one hand, scenic spots are dedicated toaphic projection, VR experiences, and AR guides. This includes implementing smart parking systems, advanced ticketing solutions, and interactive tours to address the issues of limited information availability and inconvenient communication faced by independent travelers during traditional self-guided tours. On the other hand, this also encompasses aspects like dining options, accommodations, and shopping opportunities within tourist destinations. These areas can benefit from technological advancements such as facial recognition technology payment methods to offer comprehensive and convenient services for independent tourists.

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