Research on the Development Path of Smart Tourism in Zhangye Two-aerospace Characteristic Town under the Background of Rural Revitalization

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Abstract—With the vigorous implementation of the rural revitalization strategy and the development of modern high-tech information technology, the construction of smart tourism in characteristic towns has increasingly attracted people's attention. Based on the research on the theories related to the construction of smart tourism in characteristic towns, this paper analyzes the advantages and existing problems of the construction of smart tourism in Zhangye Two-aerospace Characteristic Town, proposes the characteristic towns smart tourism construction path from the four aspects of the smart tourism service system, the tourism marketing system, the smart tourism facility system and the smart tourism management system, in order to provide reference for the other Characteristic Town’s development and construction of smart tourism.

1. Introduction
The strategy of rural revitalization is a major strategic measure proposed by our country on the development of China's urban and rural areas, and also a key measure for building a beautiful China. The main battlefield for the implementation of the rural revitalization strategy is not only in the countryside, but also the cities and towns that are in the upper level of the village cannot be ignored. In recent years, tourism has become an important window for characteristic towns to display their images and an important engine for driving their economic growth. In order to revitalize and develop villages and towns, the support and development of information technology are indispensable. Therefore, smart tourism came into being, and vigorously promoting the construction of smart tourism is of great significance to the implementation of rural revitalization strategy.

2. Two-aerospace characteristic town and smart tourism

2.1. Characteristic town and two-aerospace characteristic town
At present, most of the discussions on characteristic towns focus on industrial characteristics, and the four ministries also clearly stated in "Several Opinions on Standardizing and Promoting the Construction of Characteristic Towns and Characteristic Small Towns" that "characteristic town is an innovative and entrepreneurial platform on a few square kilometers of land, integrating characteristic
industries, integrating production, living and ecological spaces, and being different from administratively established towns and industrial parks. " It can be seen from this that the characteristic town is a new and innovative platform that was born following the trend of "Internet +".

The two-aerospace Characteristic Town is established with both tourism products of aviation and aerospace, and integrates cultural and creative industries, leisure and entertainment industries, the Internet, art, commerce, manufacturing, aerospace military and cultural science and patriotic education and other related industries. It is also an industrial cluster and innovation platform that takes into account value and efficiency, and has a new and lively system, which will eventually achieve the integration of regional resources and promote the integrated development of the town itself and the regional economy.

2.2. Smart tourism

The domestic reference to "smart tourism", Li Yunpeng and other scholars believe that in January 2009, the concept of "smart earth" evolved after it was approved by US President Barack Obama [1]. After that, Shao Qiwei, then director of the National Tourism Administration, formally proposed. "It will take ten years to basically realize the construction of smart tourism in China", and successively selected cities such as Beijing and Nanjing for pilots. The term "smart travel" has aroused extensive attention and discussion in the academic community. Through analysis and summary, it is found that it has the following characteristics: using smart phones, smart wearables, tablets, notebooks and other mobile devices as service terminals, through cloud computing, Big data and the Internet of Things and other new generation information technology methods to provide tourists and managers with tourism needs and management services [2]. Therefore, smart tourism can be understood as a new form of sustainable tourism produced by the integration of a new-generation of information technology and tourism, and it is an innovative management method for the smart collection, processing, decision-making, and release of travel information such as food, housing, travel, tourism, shopping, and entertainment.

2.3. Analysis on the necessity of developing smart tourism in characteristic towns under the background of rural revitalization

2.3.1. Smart tourism is an important way for characteristic towns to develop and upgrade

The characteristic town cannot be simply understood as "small towns with characteristics", but a new and innovative platform that follows the "Internet +" situation in the new era. In terms of industry types, it includes information technology, energy conservation, environmental protection and health maintenance, fashion tourism, finance, modern manufacturing, cultural creativity, business logistics, agriculture, forestry, animal husbandry and fishery, innovation and entrepreneurship, biomedicine, cultural and sports education, etc.; in construction, it emphasizes on the government as the guide, with the enterprise as the main body, and adheres to market-oriented operations. With the help of modern information technology, smart tourism can perceive, analyze, integrate and respond to various types of tourism activities and needs. It can not only provide tourists with intelligent information resources and a smart travel experience, but also provide references for tourism management and decision-making. Therefore, smart tourism meets the development needs of “Internet +” in characteristic towns and is an important way for the development and upgrading of characteristic towns.

2.3.2. The rural revitalization strategy provides good opportunities for the development of smart tourism in characteristic towns

The general requirements of the country's rural revitalization strategy are "prosperous industries, ecological livability, rural civilization, effective governance, and affluent living." This is also the general goal of rural revitalization. The characteristic town is the innovative exploration and practice of China in the new period and new stage, and its core is to adhere to the "three integration" of production, life and ecological space and the new model of the development of "four in one" of production, city, people and culture. The core connotation of the characteristic towns is in line with the goals and requirements of the rural revitalization strategy. Its mechanism of action is as follows: characteristic
industries are the carriers to promote the prosperity of the rural industry, characteristic towns are the windows to lead the prosperity of the rural culture, characteristic towns are the platforms to promote the affluence of rural life, and characteristic towns are used as demonstrations to promote rural ecological livability [3]. Zhangye two-aerospace characteristic town and surrounding areas are rich in natural tourism resources and historical and cultural tourism resources. At the same time, two-aerospace has distinctive characteristics. It is urgent to provide tourists with personalized, humanized and intelligent services through the development of smart tourism. The implementation of the country’s rural revitalization strategy also provides a good opportunity for Zhangye two-aerospace characteristic towns to develop smart tourism.

3. Analysis of the status quo of smart tourism construction in Zhangye two-aerospace characteristic towns

3.1. Overview of Zhangye two-aerospace characteristic town
Zhangye two-aerospace characteristic town is located in the north of Linze County General Aviation Industrial Park, Zhangye City, on the golden section of the Silk Road. It is only 35 kilometers east of the national outstanding tourist city and the national historical and cultural city of Zhangye, and only 8 kilometers south of Zhangye Danxia National Geological Park, which is the world’s top ten magical geographical wonders, and 10 kilometers north of Linze County. The G30 Lianhuo Expressway passes through the north of the town, and its south is adjacent to the Zhangye Danxia General Airport. The geographical location is significant. Relying on Zhangye Danxia General Airport in 2016, the town successfully held the first Silk Road International General Aviation Conference, which attracted many tourists from inside and outside the province to visit and have achieved a good social response.

3.2. Advantages analysis of developing smart tourism
Zhangye two-aerospace characteristic town has obvious advantages in developing smart tourism, mainly reflected in:

3.2.1. Zhangye is located in the middle of the Hexi Corridor. It is a node city of the Silk Road Economic Belt and an important transportation hub in the northwest. It is also a national historical and cultural city and an excellent tourist city in China. Both natural and cultural tourism resources are very rich and it is a rare high-grade comprehensive tourism resource-rich area in the country. In particular, the famous tourist attraction Zhangye Danxia National Geopark is only 8 kilometers away from the town. Zhangye Danxia Geopark has seen a spurt of tourism in recent years, with an average annual growth of more than 50% in tourist reception. The number of tourists in 2019 has reached more than 2.6 million, which will continue to boost the surrounding tourism industry.

3.2.2. The southern part of the town is adjacent to the Zhangye Danxia General Airport. Zhangye Danxia General Airport is the first general airport planned in Gansu Province. It mainly provides services such as aircraft trusteeship, low-altitude tourism, flight training, test flight and emergency rescue (TABLE 1). In August 2016, the town successfully hosted the first Silk Road (Zhangye) International General Aviation Conference relying on Zhangye Danxia General Airport. The number of tourists reached 50,000 per day, attracting 150,000 visitors in three days. At the same time, Zhangye Danxia General Airport has also been determined as a permanent meeting place by Gansu Province, which has brought huge development opportunities for the town’s tourism development in the future.

| Airport Type          | Number | Functional                          | Airport Name                                                                 |
|----------------------|--------|-------------------------------------|------------------------------------------------------------------------------|
| Transportation Airport| 10     | Take into account general navigation| Lanzhou, Jiayuguan, Jinchang Jinchuan, Dunhuang, Qingyang, Gannan Xiahe, Longnan Chengzhou (newly built), Linxia |
3.2.3. **Zhangye two-aerospace characteristic town** is about 350 kilometers away from the **Jiuquan Dongfeng Aerospace City**, both of which are located in the Golden Tourism Belt of the Silk Road, and can jointly create aerospace tourism boutique lines to achieve win-win development.

3.2.4. **Zhangye two-aerospace characteristic town** is the first town with aeronautical and aerospace features in Gansu Province. Its construction has a first-mover advantage, which will form a certain blocking effect on the subsequent development of such towns in the province.

3.2.5. **Starting from the "Eleventh Five-Year Plan"**, Linze County vigorously developed tourism, the level of tourism services continued to improve, tourism influence continued to expand, and the number of tourists and tourism income showed a trend of increasing year by year (Fig. 1).

During the "Twelfth Five-Year Plan" period, Linze County received a total of 6.86 million tourists and achieved a comprehensive tourism income of 3.31 billion yuan (TABLE 2), which is 7 times and 19 times that of the "Eleventh Five-Year Plan" period, with an average annual increase of 59% and 93%. During the "Thirteenth Five-Year Plan" period, the county continues to vigorously develop tourism, accelerate the construction of a comprehensive service platform, which provides favorable policy support for the development of smart tourism in small towns.

![Figure 1. Linze County tourism development trend (2011-2018)](image)

| Year | Tourists (million) | Tourism revenue (billion RMB) |
|------|--------------------|------------------------------|
| 2011 | 0.26               | 0.10                         |

**TABLE 2 LINZE COUNTY’S "TWELFTH FIVE-YEAR" TOURISM DEVELOPMENT STATUS**
3.3. Analysis of existing problems

In recent years, Linze County is vigorously implementing the action of "Internet + cultural tourism", and the tourism industry has developed rapidly and continues to grow. However, as a new type of technical means and innovative platform, smart tourism has just begun its construction and is still in the exploration stage. There is no mature model to learn from. Comprehensive analysis of the status quo of smart tourism development in Zhangye two-aerospace characteristic town, mainly facing the following problems: First, the tourism supporting facilities are backward and the smart foundation is relatively weak. The town is located in the north of the Zhangye Aviation Industry Park. The construction of the park has just started. The construction of road infrastructure, power supply, water supply, gas supply, and communication in the park is not perfect, and the development of intelligent level is lagging behind. In addition, the town is far away from the major cities in the region, and its ability to receive radiation is weak. In short, the weakness of regional smart supporting facilities will inevitably restrict the development of smart tourism in Zhangye two-aerospace characteristic town. Second, the product power is insufficient and the brand awareness is not strong. The town is located in the western region, and the environmental conditions are poor. The peak tourist season is mainly in the summer, and the winter tourism activities are sluggish, resulting in a weak adsorption capacity for tourists and insufficient product power. Although the development of general aviation tourism in the town is still in the forefront in Gansu, its weak awareness of brand marketing is not conducive to the expansion of the market and sustainable development in the later period. Third, the institutional mechanism is not smooth, and investment and financing channels are not smooth. Segmentation and multi-management are still the limiting factors for the town to become bigger and stronger, and it needs further breakthroughs and innovation.

| Year | 2012 | 2013 | 2014 | 2015 | Total |
|------|------|------|------|------|-------|
| Value | 0.44 | 0.73 | 1.2  | 1.72 | 5.23  |

3.4. The development path of smart tourism in two-aerospace characteristic town

The development of Zhangye two-aerospace characteristic town tourism has superior tourism resource advantages and distinctive two-aerospace features, but it also faces many problems. In the context of rural revitalization and the rapid development of modern high-tech information technology, Zhangye two-aerospace characteristic town tourism development should seize the opportunity to build a town's smart tourism management system to promote its intelligent development of tourism (Fig. 2). The town should focus on creating a smart tourism information management center to coordinate the tourism management of the entire town, and it should also focus on the construction of "three platforms and one system" (smart tourism service platform, smart tourism marketing platform, smart tourism management platform, smart tourism facilities system) to specifically manage township tourism development related affairs.
3.4.1. Smart tourism service platform construction

In order to enhance the tourists’ experience and improve the quality of tourism services, Zhangye two-aerospace characteristic town should establish a smart travel service platform, which includes smart travel office, VR video live broadcast, drone monitoring, smart broadcast and commentary, smart environment monitoring, smart transportation and smart travel service. The smart travel portal function serves the town management department, and it is expected to improve the work efficiency of the management department through functions such as bulletin board news, conference notices, event scheduling, and unified user management. The VR video live broadcast function, on the one hand, can use the panoramic camera to collect real-time information on important scenic spots and passenger concentration area to live VR video broadcast, giving tourists a different audio-visual experience; On the other hand, for the most cutting-edge aerospace technology and achievements, we can present it to tourists through VR video. The UAV monitoring relying on general aviation airports, can quickly and efficiently complete the work such as artificial rain increase, fire disaster relief, aerial reconnaissance, traffic management and emergency handling. The intelligent broadcasting and commentary function adopt audio processing technology, which transmits audio signals on the network, and solves the problem of emergency evacuation of town tourists and the unified mobilization of staff. At the same time, tourists can get an overview of the various attractions in the town through scanning the QR code with terminal devices such as mobile phones and tablets, which solves the problem of insufficient tour guides during peak periods. The intelligent environmental monitoring mainly monitors the town's environmental conditions, by setting resource monitoring sensors at the resource points of environment, hydrology, mountains, meteorology, and masters the changes in the environment of the town and collects the data returned by sensors, and can timely evaluate, make decisions, and take corresponding measures to protect the resources of the town and the safety of tourists' lives and property [4]. The intelligent transportation includes the road intelligent monitoring and the intelligent parking in the town. The road intelligent monitoring can grasp the traffic status of the vehicles on the road and the traffic flow status at the intersection in real time, so that the traffic management problems can be discovered and dealt with in a timely manner. The intelligent parking can realize fully automated intelligent management. For example, tourists can check the number of vacant cars in real time, vehicles enter and exit quickly, and pay bills quickly. The smart travel service function is to establish an online travel service platform in the form of online e-commerce, which is convenient for tourists to query travel information, and to use modern network information technology to realize online booking and trading of tourist products such as scenic tickets, hotels, and tourist routes [5]. Offline, in a prominent position at the entrance of the town, timely release information through various means such as LED large
screens, personalized display windows, which is convenient for tourists to grasp the scenic spot information in a timely manner and arrange travel reasonably. In addition, it is also a window for public welfare publicity, which can provide patriotic education, such as aerospace military culture popular science and red culture for young people.

3.4.2. Smart tourism marketing platform construction
In view of the problem of weak tourist adsorption capacity and insufficient product power, Zhangye two-aerospace characteristic town should fully rely on local rich tourism resources to build their own online marketing platforms, such as travel portals, mobile APPs, SMS push, etc., and provide tourism product promotion, guide information and high-quality information for tourists. In the future, we should realize the interconnection with Ctrip, Tuniu, Meituan and other international and domestic mainstream product marketing channels to continuously enhance our tourism brand effect. At the same time, it is necessary to realize the integrated development with offline physical tourist service center including self-service ticket vending machines and intelligent ticket checking systems, so as to bring tourists a convenient and intelligent travel experience.

3.4.3. Smart tourism management platform construction
The town's smart tourism management system is a smart tourism information management platform established with the town's spatial basic geographic information data and based on geographic information technology (GIS), remote sensing technology (RS), virtual reality technology (VR), multimedia technology and Internet technology (Web), which can manage the thematic data submitted by various departments in a unified manner, realize the connection with spatial data, provide multimedia and network real-time human-computer interaction, and can generate small town information layers or small town electronic maps through pictures, text, multimedia videos, sounds, remote sensing image maps, 360-degree look around, etc., showing the town overview and information of various tourist attractions and tourist facilities in all directions [6]. The intelligent tourism information management platform can collect real-time Internet of Things perception data, such as traffic, resource and environment data, monitoring data, network public opinion data, etc., while analyzes the basic data and provides a reference for scientific decision-making.

3.4.4. Smart tourism facility system construction
The smart tourism facilities system of Zhangye two-aerospace characteristic town mainly includes two aspects: the construction of smart municipal infrastructure and the construction of smart public service facilities. The construction of smart municipal infrastructure in small towns should include traffic, water, electricity, gas, heating, communications, environmental sanitation and comprehensive disaster prevention, etc. In the long term, it is best to build integrated pipeline corridors for unified management and maintenance to improve infrastructure management and service levels. Smart public service facilities should be combined with the characteristic activities and contents of town tourist attractions to create smart shopping, accommodation, catering, leisure and entertainment facilities with aerospace characteristics. The construction of a smart tourism facility system is the basis for the development of smart tourism in small towns and should be given priority. Government departments often play a leading role in the construction of smart tourism facilities in small towns. However, we should also actively expand financing channels, attract tourism enterprises, and continuously improve the management and service level of smart tourism facilities in small towns through government-enterprise cooperation.

4. Conclusions
In summary, the development of smart tourism in characteristic towns is an inevitable requirement for the country to implement the strategy of rural revitalization, and it is also a strategic requirement for the country to develop global tourism. With the development of a new generation of information technology and the transformation and upgrading of tourism, smart tourism will surely become the new
direction and trend of the development of characteristic towns in the future. The development of smart tourism in Zhangye two-aerospace characteristic town should be based on its endowment of tourism resources and the characteristics of two-aerospace tourism products. While laying the foundation of the smart tourism facilities system, it should gradually improve the smart tourism marketing system, management system and service system, continue to improve the tourism environment and service quality, and eventually achieve its rapid and healthy development.

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