

Research on the Countermeasures of Smart Tourism Construction in Sanya Under the Background of Free Trade Port Construction

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Abstract: By analyzing the current situation of smart tourism construction in combination with the actual tourism situation in Sanya, this study aims to find out the problems existing in the current smart tourism construction and understand the various factors affecting the smart tourism construction in Sanya. Then, relevant theories and practical applications were used to study the ways to carry out smart tourism construction with the help of policy, location, and other advantages to meet the needs of the development of the times. Based on the study, practical countermeasures and suggestions were given to provide reference for the construction of smart tourism, ensure the continuous improvement of smart tourism construction, and help the upgrading and transformation of tourism in Sanya. Based on the analysis of the construction and data of smart tourism and tourism informatization in Sanya, this article has formed a useful method to help Sanya build an international tourist island and a modern smart tourism city using the Hainan Free Trade Port construction policy.

Keywords: Smart tourism; Construction of free trade port; Traditional tourism; Sustainable development; Tourism informatization

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1. Introduction

In 2009, the first China Tourism Informatization Development Forum (Sanya) proposed the concept of smart tourism, marking its origin in China. Since 2010, the tourism industry has successfully launched the application practice of smart tourism. In 2011, the special plan for informatization of national tourism development plan during the 12th Five Year Plan period proposed to carry out smart tourism demonstration projects nationwide and strive to preliminarily realize “smart tourism” nationwide in about 10 years ^[1]. Mobile phone Internet plus TikTok has accelerated the development of smart tourism. In the era of “Internet plus”, with the emergence of electronic devices such as smart phones, palm computer, and other mobile devices, mobile apps such as micro-blog, WeChat, Xiao Hong, jitter and Alipay, WeChat payment, and other intelligent payment software have brought about constant changes in people’s tourism consumption concepts and methods. People focus more quality, convenience, and experience of tourism. Tourism management departments and tourism enterprises should focus on tourists’ experience and satisfaction, apply information technology industries such as Internet, big data, cloud computing and artificial

intelligence, and digital economy to the real economy, and meet the personalized needs of tourists through the rational use of “smart” means such as integrated communication technology, efficient information processing, and intelligent in-depth data mining. With the integration of information service and management of tourism, smart tourism came into being ^[2].

According to the current development trend of domestic tourism in Hainan province from 2017 to 2030, the development of online tourism market has promoted the upgrading and transformation of tourism industry. Smart tourism is gradually becoming a modern intelligent service industry through the innovation of “Internet plus”. With the emphasis on building a smart tourism service management system and developing smart tourism products, a pilot “travel bubble” (centered on Sanya City was created ^[3]. In July 2020, the office of the group for promoting the comprehensive reformation and opening up in Hainan issued the overall plan for smart Hainan (2020-2025), which proposed to make full use of the new generation of information technology to promote the social and economic development of Hainan, improve the construction of smart Hainan system, build an intelligent experience island for international tourism consumption, and upgrade the tourism service management and marketing model ^[4]. In March 2021, many important contents of the national “14th Five Year Plan” and the outline of long-term goals for 2035 once again involved in-depth smart tourism construction, improving tourism consumption experience, increasing the construction of smart scenic spots, standardizing online tourism services, building Hainan international tourism consumption center, developing digital smart consumption, and accelerating the integrated development of online and offline ^[5]. At present, the construction of smart tourism aiming at improving tourism management and service level in Sanya is ongoing.

As a benchmark city of Hainan free trade port and the only tropical coastal resort tourism city in China, Sanya has been actively exploring and achieved initial results in the construction of smart tourism. In 2017, it won the “China smart city demonstration city” award at the 8th smart city conference held in Beijing. In the same year, it also won the “China smart city innovation” award at the Asia Pacific Smart City selection and award ceremony. In 2020, Sanya was identified as the first batch of national cultural and tourism consumption pilot cities by the Ministry of culture and tourism, the national development and Reform Commission and the Ministry of finance. It can be seen that the information technology industry under construction, rich tourism resources, the booming tourism development status, and the support of various relevant policies have provided Sanya with the basic conditions for the construction of smart tourism. However, Sanya will inevitably encounter a series of problems in the process of carrying out the construction of smart tourism. Therefore, scientific and practical countermeasures need to be put forward to solve the problems existing in the construction of smart tourism in Sanya ^[6].

2. Definition of tourism

2.1. Traditional tourism

Traditional tourism refers to the recreational activities where people temporarily stay from their permanent residence to another place for the purpose of sightseeing, leisure, and entertainment, so as to meet the local knowledge, appreciation, enjoyment, and experience of cultural and natural landscape. There are few types of traditional tourism destinations with a high degree of homogenization of tourism products which are mainly scenic spots. The target market of traditional tourism is mainly the general public. Tourism information is mainly obtained through newspapers, television, and other traditional media by tourists before travelling. Travel agency is the main channel for tourism activities. Besides, tourism products are also ordered through travel agencies and tour groups. Traditional and classic scenic spots are the first choice for tourists. The quality of natural and cultural landscape determines the quality of tourism level. After travelling, tourists share their experience through conversations ^[7]. The operation mode and transaction mode are limited and lack of flexibility. The demand of tourists is not given priority, and the effect of

tourism activities underwhelming, which results in no improvement of the tourism experience. Traditional tourism took place before network information technology was integrated into tourism, and its development has limitations.

2.2. Tourism informatization

The scope of tourism informatization is greater than smart tourism. Tourism informatization is the digitization of tourism information. It involves integration of information technology in various fields of tourism. Tourism consists of traditional service industries such as catering, accommodation, transportation, shopping, and entertainment. Tourism informatization involves collecting and processing tourism information through information technology, and then converting it into words, numbers, graphics, and sound for storage, transmission, and application, so as to redistribute, combine, process, disseminate and sell the tourism industry chain ^[8]. By means of modern science and information technology, the tourism industry is transformed into modern service industry, which is displayed on tourism websites, tourism call systems, digital management, and infrastructure, so as to make the development of tourism more digital, networked, and improve the production efficiency of tourism. When tourism digitization appeared, it solved the problem of information sharing through new system integration technology, but it was only the flow of some system data, which could not fully produce the overall data regarding the demands of tourism. Tourism informatization is the basis for the development of smart tourism.

2.3. Smart tourism

Different from traditional tourism, smart tourism is a new concept derived from the continuous development of information and communication technology. It is not only an upgraded product of tourism informatization development, but also the strategic direction of tourism informatization development. The construction of smart tourism generally belongs to the scope of tourism informatization. The technical system of smart tourism consists of technical framework and technical elements. The technical framework is the collection and application of various information and data through the Internet, Internet of things, and mobile network communication to smart scenic spots, smart travel agencies, traffic command, smart hotels, and other industries. Technical elements include mobile communication technology, Internet of things technology, LBS technology, cloud computing technology, big data technology, and artificial intelligence technology.

The construction of smart tourism is specifically reflected in three aspects: tourism management, tourism marketing, and tourism services. New technologies such as the Internet, cloud computing, big data mining, and handheld terminal devices are used to help tourists, tourism enterprises, and tourism management departments to take initiative in mastering various tourism information resources in the whole tourism process. This improves the connectedness in every aspect of tourism like, food and accommodation, transport, item purchasing. Besides, it also improves the information exchange level and service management level of tourism management departments and tourism enterprises, meets the personalized needs of tourists, and improves tourist satisfaction ^[9].

Smart tourism focuses on people who are good at using smart mobile terminals to obtain public tourism information, and pays more attention to the interactive experience of tourists. Different from the traditional tourism mode of relying solely on tour guides and personal experience to obtain tourism product information and services, the tourism information of smart tourism is more comprehensive, and the sharing of tourism information services in the whole process of tourism is realized at a technical level. The service management system of tourism management departments and tourism enterprises are also more refined,

breaking through the traditional functions of enterprise informatization, e-commerce, and e-government at the application level. Smart tourism can not only realize tourism informatization, but also solve new problems in the process of tourism development, meets the new needs of tourism development, and helps to realize new ideas and ideas of tourism development^[10]. **Table 1** shows the list of the differences between traditional tourism, tourism informatization, and smart tourism

Table 1. List of the differences between traditional tourism, tourism informatization, and smart tourism

Timeline	Type	Access to travel information channels	Where to buy travel products	Share how the travel process
1980–1995	Traditional tourism	Newspapers, TV media	Travel group	Talk-style
1995–2010	Tourism informatization	Network	Network booking	Forums, blogs, and other websites
2010–2021	Smart tourism	Mobile phone	Handset provides overall information services	Weibo, WeChat, and other new media

3. Purpose and meaning of the research

3.1. The purpose of the smart tourism construction countermeasures in Sanya city

Due to difference in tourism resources, economic strength, and level of technical skills, the construction and development of smart tourism is also different. Sanya is located in the southernmost tip of China. It is a popular tourist city at home and abroad. It is also a well-known coastal resort. Its development prospect of tourism is unlimited. In recent years, tourism, as the leading industry in Sanya, is developing rapidly, but its economic benefits, social benefits, and resource and environmental benefits are facing challenges. Although it has been developing in an international tourism destination, the international tourist source is always insufficient, the quality of tourism experience is low, and the development of high, middle, and low-end tourism market is uneven. By analyzing the current situation of smart tourism construction in Sanya and combining with the actual situation of tourism, this study aims to find out the problems existing in the current smart tourism construction in Sanya, understand the various factors affecting the smart tourism construction in Sanya, and use relevant theories and practical applications to study the ways of carrying out smart tourism construction with the help of policy, location, and other advantages to meet the needs of the development of the times. Based on that, practical countermeasures and suggestions were put forward to provide reference for the construction of smart tourism in Sanya, ensure the continuous improvement of smart tourism construction, and help the upgrading and transformation of tourism in Sanya. Through analysis and comparison, and summaries of tourist experiences, we came up with methods to build Sanya into a high-quality, colorful, comfortable, and convenient international tropical coastal tourism city, an international tourism consumption center, promote the integration of industries in various fields, and truly integrate tourism into all walks of life and into the economic development of Sanya, improve the overall social and economic benefits of Sanya, and enable the tourism industry to truly achieve sustainable development.

3.3. Location based service (LBS)

LBS is a service derived from the ability to identify and transmit location information in e-commerce. LBS is defined as an application where the user's location determines the services and information provided. In other words, users can receive the most appropriate service provided by the service provider according to

his location at a specific time. Therefore, both the users and content providers can benefit from it. In addition to meeting business needs, its services can also be extended to general consumer applications, in which different services can be provided to consumers according to their different locations. Recently, telecom companies in many countries are actively introducing new applications of information services. Due to its location-tracking ability in mobile communication, LBS is expected to play an important role in the telecommunications industry. However, the problem with LBS is that it is aimed at mobile users. Because the operation interface of Web services of mobile devices is completely different from that of computer web services, any complex application services will lead to consumer resistance ^[11]. Therefore, the development of LBS must make effective use of mobile devices and correctly introduce recommendation mechanism.

$$ScoreR = \sum_{i=1}^n \sum_{j=1}^m W_{I_i} a_j \times I_i a_j \quad (1)$$

ScoreR represents the recommendation score given by the system. The number of attribute items is *n*, and the number of values of each attribute item is *m*. $I_i a_j$ represents the *j*-th attribute value in the *i*-th attribute item in the advertisement. $W_{I_i} a_j$ represents the user preference represented in the *j*-th attribute value of the *i*-th attribute item.

In addition, the recommendation system also has an important function, that is, the ability to record user behavior and build personalized “historical data”. By analyzing the “historical data”, the goal of making the recommended items closer to the actual user preferences can be achieved. In the design of recommendation mechanism, a recommendation equation with different recommendation scores based on item attribute form is proposed.

Location-based information is a set of items that portray location attributes. Assuming that H_{ik} is an attribute set of LBS items, and then datasets can be represented as follows:

$$\begin{pmatrix} (H_{11}, H_{12}, H_{13}, \dots, H_{1m},) \\ (H_{21}, H_{22}, H_{23}, \dots, H_{2m},) \dots \\ (H_{n1}, H_{n2}, H_{n3}, \dots, H_{nm},) \end{pmatrix} \quad (2)$$

$$i = 1, 2, 3, \dots, n \text{ (the number of data items)} \quad (3)$$

$$k = 1, 2, 3, \dots, m \text{ (the number of attributes)} \quad (4)$$

Data sets include dynamic and static attributes. Since static attributes do not affect user preferences, this search will not use static attributes when calculating recommendation scores. On the contrary, dynamic attributes can be simply divided into two types: digital attributes and directory attributes. Therefore, the recommendation scores will be calculated according to these two different attribute types ^[12]. The specific model structure is shown in **Figure 1**.

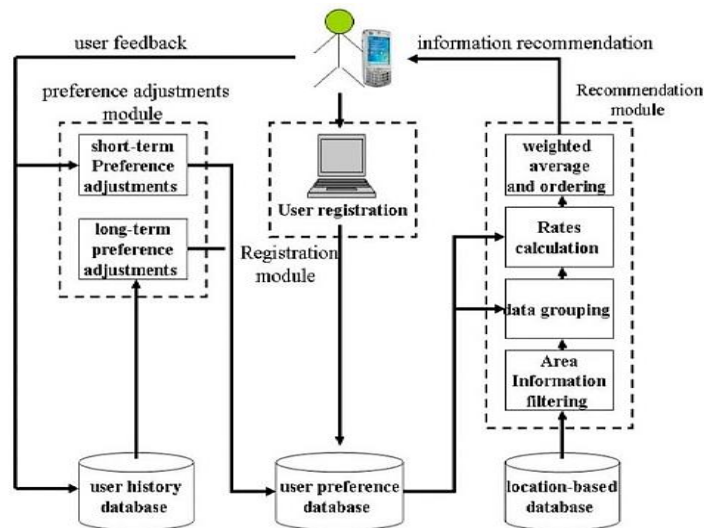


Figure 1. The architecture of location-based service recommendation model

The location-based service recommendation model can integrate mobile services and realize personalization and location-tracking. The model is divided into registration module, recommendation module, and preference adjustment module, which are interconnected through the database.

3.4. The significance of the smart tourism construction countermeasures in Sanya

The construction of smart tourism is the result of scientific and technological progress and the development of the information age. It is also an inevitable requirement for the transformation and upgrading of traditional tourism to modern tourism. The degree of smart tourism construction in a place determines the level of development of local tourism and also affects the level of local socio-economic development. Smart tourism can not only improve the service management level of tourism enterprises and tourism management departments, help tourists more convenient, personalized, and efficient to achieve tourism purposes and meet tourism needs, but also promote the construction of modern economic system and urban construction in Sanya, as well as improve the opening-up level in the field of tourism consumption and the comprehensive competitive strength. The construction of smart tourism in Sanya is in line with the spirit of the 19th National Congress of the Communist Party of China and the overall requirements and strategic direction of socialism with Chinese characteristics in the new era. It is an important deployment of China's reform and opening up 40th anniversary and Hainan Province's 30th Anniversary Special Economic Zone to adhere to reform and innovation, implement new development ideas and supply side structural reform. Therefore, it is imperative. This study can not only enrich the theoretical system of smart tourism construction in Sanya, but also has great practical significance to improve the smart tourism construction in Sanya and promote the economic and social development of Sanya.

4. Review of local and international research

4.1. Summary of local and international smart tourism research

Domestic scholars' research on smart tourism mainly focuses on two aspects: theory and practice. On one hand, it is about the concept of smart tourism, mainly from two angles: one is to discuss the concept of smart tourism from the perspective of means of tourism development and tourists; another one is to discuss the concept of smart tourism from the perspective of tourism management, service, and marketing. On the other hand, it is mainly about the construction and practical application of smart tourism system, focusing

on smart tourism public service system, smart tourism comprehensive management system, and smart tourism marketing system. Through reading and analyzing retrieved foreign literatures, it was found that foreign scholars' research on smart tourism also focuses on two aspects which are theory and practice.

4.2. Analysis of local and international research status

Scholars at home and abroad have studied smart tourism from both theoretical and practical aspects. In the research on the concept of smart tourism, the content ranges from the perspective of tourists to tourism service, management, and marketing, thereby putting forward the related research on practical application. By combining the core viewpoints of high-quality local literature and abroad, and classifying and comparing their theories, it can be found that the pertinence and practicability of foreign research on smart tourism are very prominent. First of all, smart ecotourism system for tourism destinations need to be formed, and the construction of smart tourism need to be combined with the construction of smart cities, so as to realize the integrated development of multiple industries. The sharing of tourism information resources needs to be maximized, the development of the whole tourism supply chain needs to be improved, and fair distribution of the benefits of tourism development in the local society needs to be ensured, which will more conducive to the harmonious and healthy development of tourism. Secondly, an integrity system of the tourism market needs to be established by using the network evaluation platform to help tourists in searching information before travelling through effective data exchange, reduce the risks encountered during purchase, improve tourism quality, and enable tourists to spend more in tourism destinations. Besides, it provides a service guarantee for tourists which will help in realizing a benign and sustainable development of a smart tourism industry chain.

In contrast, domestic research on smart tourism focuses on service, management, marketing, and other development models in theory and practice. Practice precedes theory. Most of them are through scientific demonstration, induction and summary of the existing service, as well as management and marketing technologies and methods in tourism scenic spots, hotels, and other industries. This creates a practice first technical system, causing lack of overall research, loss of direction in specific practices, and waste of resources. First of all, in practice, the pilot construction of smart tourism is mainly aimed at the scenic spot. Although it has achieved initial results, its practicability needs to be improved. Compared with the construction of smart tourism abroad, it is lacking in the development of ecotourism, does not integrate the resources of various industries in the city to form a complete tourism supply chain, and the sharing of tourism information and data is insufficient. Secondly, each research direction is also relatively independent, and there is a lack of detailed research on different aspects as well as combining different aspects as a whole. The wisdom of smart tourism should be based on data, integrating the services, management and marketing data of tourism, realizing "Internet plus" big data, and accelerating the integration of management and control platform. According to the current situation and development needs of smart tourism construction, attention should be given to the self-scalability of tourism information system design and development.

5. Research methods

The research methods mainly include literature research, comparative analysis, questionnaire survey and field interview. The specific research methods are as follows:

5.1. Literature research method

Literature research method is an investigation and research based on the collection of previous research results. In this study, the data was collected from China National Knowledge Infrastructure (CNKI), Baidu

Academic, VIP, and other foreign academic websites and library materials. Besides, a large number of relevant literatures and information regarding the development process of smart tourism at home and abroad were sorted out. The core concept connotation of smart tourism were studied and understood, and the achievements made in the construction of smart tourism and its related theories at home and abroad were summarized. Furthermore, the relevant reports on the construction of smart tourism in Sanya were comprehensively analyzed by collecting the mainstream media and official networks, as well as the relevant documents issued by the government on the construction of smart tourism in Sanya. In this way, more theoretical basis for this study can be provided thus ensuring the reliability of this study.

5.2. Comparative analysis

By analyzing the successful cases of domestic smart tourism construction, the success factors were summarized and used as references in this study. Through comparison and comprehensive thinking, it was found that there is a gap between Sanya’s smart tourism construction and other successful domestic smart tourist spots. Sanya’s own characteristics were incorporated to learn from each other and explore the path of smart tourism construction in line with the actual situation of Sanya.

5.3. Questionnaire survey method

Questionnaire survey is a research method widely used in the field of social science research. In this study, a Sanya smart tourism experience questionnaire were created using “questionnaire star” intelligent software and was distributed through WeChat. This platform was used due to its openness thus making the questionnaire data more comprehensive. With that, the current situation and existing problems of smart tourism construction in Sanya can be better understood. Then, the statistical data and opinions and suggestions in the questionnaire were sorted out for in-depth research.

5.4. Field interview method

By diving deep into tourism management departments, scenic spots, hotels, travel agencies, and other tourism enterprises, participating in observation and experience, interviewing relevant personnel, personally experiencing the construction of smart tourism in Sanya, more first-hand data were obtained, enhancing the credibility of the research, and providing an effective basis for this research and analysis. The detailed technical route is shown in **Figure 2**.

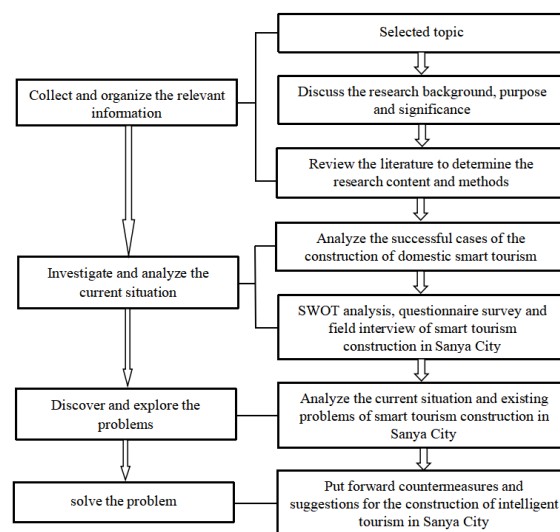


Figure 2. Technical route

6. Conclusion

From the above analysis, this study is mainly based on the new public service theory, new public management theory, AISAS (Attention-Interest-Search-Action-Share) marketing theory, and smart tourism 3S (Sun, Sea, and Sand) theory. The smart tourism construction in Sanya was used as an example, the current situation of smart tourism construction in Sanya was investigated through a variety of research methods, and the existing problems were analyzed. Countermeasures for the construction of smart tourism in Sanya were also put forward from the perspective of tourism management departments, tourism enterprises and tourists, as well as smart tourism service, management, marketing, and talent training. Based on the research on the construction of domestic smart cities, this paper draws a conclusion that the construction of smart tourism and smart cities should also learn from foreign experience, use the new generation of information technology, optimize the allocation of tourism resources, integrate resources, nurture professional talents, and realize the goal of Sanya's comprehensive development of tourism construction.

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Disclosure statement

The authors declare no conflict of interest.

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