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Satisfaction Evaluation of Wudang Mountain's Smart Tourism Construction

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***Abstract*—With the development of information technology and smart city, smart tourism has become a compulsory option for tourists. This work firstly analyzed the construction of Wudang Mountain's smart tourism and constructed an evaluation index system of smart tourism satisfaction, including 5 first-level indicators as follows: smart service experience, consumption experience, environment and traffic, information release and feedback, infrastructure of smart scenic spots, and 18 second-level indicators. Then questionnaire analysis and IPA analysis were used to analyze overall tourists' satisfactory level of Wudang Mountain smart tourism construction and importance-performance analysis. Finally, advice and suggestions were put forward from the aspects of guiding ideology, service system, portal website construction, travel early warning mechanism, information feedback, etc.**

Keywords—Wudang Mountain; Smart Tourism; Evaluation; IPA

I. INTRODUCTION

Smart tourism is not only the product of the times; it is also the requirement of the development of the tourism [1]. Smart tourism refers to a new tourism development mode supported by artificial intelligence, cloud computing and mobile terminal communication technology [2]. It is based on terminal tourists' demand for tourism information services, and provides multi-level, multi-carrier and multi-form tourism information services through perceptive, integrational and interactive utilization of tourism information and resources. In recent years, the construction and development of China's smart tourism has been constantly advancing. In 2010, Zhenjiang, Jiangsu province took the lead in putting forward the concept and implementation of smart tourism in China. In 2012, the National Tourism Administration identified 18 "National Smart Tourism Pilot Cities"; the State Council designated 2014 as the year of smart tourism; in 2016, the State Council put forward the "Internet plus tourism" innovation and entrepreneurship action plan in the 13th Five-Year Tourism Development Plan, intending to construct a batch of national smart tourism cities, smart tourism scenic spots, smart tourism enterprises and smart tourism villages.

The "Hubei Province Smart Tourism Construction Plan (2016-2020)" promulgated by the Hubei Provincial Department of Culture and Tourism proposes that through five years of tourism smart construction, it aims to form the tourism industry's intelligent pattern of self-driven and independent innovation, revitalize the tourism industry resources, break the barriers of information in the industry, and promote the integration and development of tourism industry chain. In response to the call, Wudang Mountain Scenic Area has aimed to build an "international high-end eco-cultural tourism destination" in recent years. It has built a strong "hardware" foundation through key projects, grasped the "software" platform construction optimization service, and accelerated the "touch network" upgrade of tourism, thus setting a new benchmark for smart tourism. By August 2017, Wudang Mountain has implemented 13 projects including the Intelligent Information Hall of Scenic Spots, Free WIFI Coverage in Core Attractions, and Urban Surveillance System of Scenic Spots. Currently, the construction of "face recognition ticketing system" and "inquiring tourism e-commerce platform" has provided assistance for the construction of smart tourism in Wudang Mountain. Smart construction, smart service and smart marketing have greatly improved the level of smart service in various scenic spots in Wudang Mountain. However, Wudang Mountain ranks 70th in the list of smart spots held by Internet Weekly in 2018. Compared with other famous mountains in China, such as Huangshan and Lushan, there is still huge gap in smart tourism construction. This paper aims to evaluate the satisfaction of the current situation of Wudang Mountain's Smart Tourism construction and put forward suggestions and strategies for improvement.

II. LITERATURE REVIEW

Gartner et al. (1993) [3] proposed Theory of Consistent Tourism Environment from the perspective of tourism environment (referring to tourism destinations, other intermediary channels such as tourism and transportation, and

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macro environment). Goossens et al. (2000) [4] believed that tourist satisfaction refers to the psychological state formed by the interaction between mentalities in the process of tourists purchasing tourism products. Kim et al. (2015) [5] focused on the satisfaction of smart tourism with attention on hotel satisfaction research, mainly through surveys to verify the impact of price and average quality on hotel satisfaction. Yoo et al. (2017)[6] studied the impact of the function of smart tourism technology (STT) on the satisfaction of tourism decision supportiveness.

In China, Wan Xucai et al. (2004) [7] defined tourist satisfaction as comprehensive evaluation of whether tourists meet the needs of their tourism activities in terms of tourism service facilities, service quality and landscape environment during the tour. Fu Quansheng (2005) [8] argued that tourist satisfaction refers to the degree of difference between the quality of tourist facilities, services, environment and landscape experienced by tourists and the expectations of tourists in the process of tourism activities in tourist destinations. Yao Guozhang et al. (2013) [9] concluded that the design of Intelligent Tourism evaluation index system can be divided into three levels, namely target level, system level, and state level. Cai Rongrong et al. (2015) [10] constructed a smart tourism satisfaction model ITSI based on the six elements of tourism and the theory of smart tourism, and conducted a questionnaire survey in Nanjing for empirical research. Liu Chao et al. Wang Xia (2015) [11] studied the evaluation index system of the smart scenic spot from the perspective of tourists, and used Factor Analysis Method and the Fuzzy Comprehensive Evaluation Method to conduct an empirical evaluation of the Nanjing Confucius Temple. Xu Chunhong (2016) [12] took Ningbo City as an example to obtain the evaluation model of urban tourism public information service system and the evaluation value of tourists by IPA method. Deng Zhaochuan (2018) [13] analyzed from four application systems contained in smart tourism including service, business, management and wisdom, and proposed the basic framework of the smart tourism evaluation system.

III. CONSTRUCTION AND APPLICATION OF EVALUATION MODEL

A. Evaluation Index System

Following the principles of being scientific, objective and maneuverable, this paper constructs an evaluation index system of tourist satisfaction in Wudang Mountain, which consists of 5 first level indicators and 18 two level indicators, as shown in Table I.

TABLE I. EVALUATION INDEX SYSTEM OF SATISFACTION DEGREE OF SMART TOURISM CONSTRUCTION IN WUDANG

Level 1 Indicator	Level 2 Indicator	Level 1 Indicator	Level 2 Indicator
Intelligent Service Experience(A)	Tourist Route Recommendation(A1)	Information Release and Feedback(D)	Tourism Culture Propaganda(D1)
	Digital Interpretation of Cultural Relics(A2)		Real-time Information Broadcasting in Scenic Spots(D2)
	Smart Service Facility Completeness(A3)		Teaching of Information Equipment Usage(D3)
Consumption Experience(B)	Convenience of Online Ticket Purchase(B1)		Complaint Management(D4)
	Online Cultural Products Recommendation(B2)	Smart Scenic Area Infrastructure(E)	Wireless Network Coverage(E1)
	Convenience of Online Accommodation Booking(B3)		Electronic Tour Guide(E2)
Environment and Transportation(C)	Vehicle Scheduling and Parking Management(C1)		Video Surveillance Coverage(E3)
	Statistics of Tourist Number and Tourist Guidance(C2)		Overall Construction of Portal Websites(E4)
	Natural Environmental Monitoring(C3)		Mobile Tourism Information Service(E5)

B. Questionnaire Design

According to the Wudang Mountain's Smart Tourism Construction Satisfaction Evaluation Index System we designed the questionnaire. The questionnaire was divided into two parts: the first part was the demographic characteristics, including gender, age, education, occupation, income, and source of tourists. The second part was the satisfaction after actual experience including 18 main indicators. By using Likert Scale, the grades were divided into five scales: "very unsatisfied, unsatisfied, normal, satisfied, very satisfied", and assigned score "1, 2, 3, 4, 5" respectively.

After the questionnaire design was completed, the pre-test is carried out. The reliability and validity of the questionnaire were analyzed by SPSS. The results show that the reliability coefficient α was 0.922, greater than 0.8, indicating that the results were consistent; the KMO value was 0.839, greater than 0.6, and the approximate chi-square test value calculated by Barrett spherical test was 3175.667, and the P value was 0.000 (less than 0.001). The Barrett spherical test was rejected, indicating that the sampling instrument of the questionnaire was highly consistent. Finally, 120 questionnaires were collected by means of field questionnaires and online questionnaires, of which 116 were valid questionnaires and reaching validity of 96.67%.

C. Analysis of survey results

1) Demographic analysis

According to the analysis of questionnaire, the proportion of males surveyed is 50.9%, and the proportion of females is 49.1%. The proportion is relatively balanced. The age distribution of respondents is as follows: under 24 (38.1%), 25-44 (28.1%), 45-64(22.8%), over 65(11%). The education level is mainly concentrated in bachelor degree and above (35.52%), and Junior college(20.34%), high school and below(19.83), master and above(24.31%). The majority respondents are from Hubei province, with the percentage of 60.34%. This indicates that Wudang Mountain tourists tend to be younger and local.

However, it is also necessary to consider the limitations of the questionnaire population and the limitations of the sample size; the occupations of the respondents are mainly students (30.03%) and enterprise employees (20.21%), self-employed(17.76%), official staff(8.72%), and others(23.28%); the income level is mainly concentrated in 3001-5000 (30.52%), 1001 -3000 (23.79%), and below 3000 accounts 31.38%, and over 8000 is 7.78% . Most tourists' income is at the middle level.

2) Descriptive statistical analysis

In this paper, the "Wudang Mountain Smart Tourism Construction Satisfaction" is taken as the dependent variable Y, and the value range is 1-5, which is expressed as "very unsatisfied, unsatisfied, general, satisfactory, very satisfied", with 18 evaluation indicators as independent variables, descriptive statistical analysis was performed as Table II.

TABLE II. ANALYSIS OF DESCRIPTIVE STATISTIC OF QUESTIONNAIRE ON SATISFACTION OF SMART TOURISM CONSTRUCTION IN WUDANG MOUNTAIN

Variable	Sample Size	Min value	Max Value	Average Value	Standard Deviation	Median
A1	116	1	5	3.37	0.94	3
A2	116	1	5	3.27	0.84	3
A3	116	1	5	3.28	0.93	3
B1	116	1	5	3.41	0.87	3
B2	116	1	5	3.05	0.85	3
B3	116	1	5	3.16	0.88	3
C1	116	1	5	3.4	0.97	3
C2	116	1	5	3.22	0.85	3
C3	116	1	5	3.42	0.81	3
D1	116	1	5	3.42	0.81	3
D2	116	1	5	3.45	0.86	3
D3	116	1	5	3.35	0.86	3
D4	116	1	5	3.2	0.85	3
E1	116	1	5	3.36	1	3
E2	116	1	5	3.29	0.86	3
E3	116	1	5	3.38	0.86	3
E4	116	1	5	3.21	0.8	3
E5	116	1	5	3.41	0.86	3

It can be seen from Table III that the average value of each evaluation variable is between 3-4 points and is at a medium level. To some extent, the satisfaction of tourists in Wudang Mountain smart tourism construction is between "general" and "satisfactory". Among them, the convenience of online ticket purchase, vehicle dispatch management, tourism culture publicity, scenic real-time information broadcast, mobile travel information service and other services are relatively highly marked, this benefits from the emphasis on the construction of smart tourism in Wudang Mountain in recent years. Since 2018, the Public Security Bureau in Wudang Mountain Special Administrative Region has invested 32 million yuan to build a video "Skynet" project, and established a flat command system of "up-down linkage, horizontal response, and efficient operation" to strengthen data integration and joint implementation, besides, it has also realized the predicting, directing, locating as well as tracking of the tourists, vehicles and other objects. The command center can monitor the scene in real time through the "Sky Eye" monitoring system according to the congestion index and emergency situation of the tourists, and guide the on-site police to deal with it quickly and effectively. In September 2018, the new ticket sales inspection system of Wudang Mountain came into operation. Visitors can purchase tickets directly by mobile phone or in the smart ticket vending machine system. You can enter the park with ID card, QR code, or by scanning your face, etc. This is of great convenience for tourists. However, services such as digital interpretation of cultural relics, the recommendation of featured cultural goods, electronic tour guides, complaint management, and overall construction of portals have relatively low scores.

3) IPA Analysis

IPA analysis method, i.e. importance-performance analysis method, takes importance (weight) as horizontal axis, performance (satisfaction) as vertical axis, draws two-dimensional plan, and divides the two-dimensional plane into four areas: advantage area (Area A), maintenance area (Area B), to be improved area (Area C) and particularly noteworthy area (Area D) according to the mean of horizontal and vertical coordinates (importance mean, satisfaction mean). Calculate the mean of importance and the mean of satisfaction before plotting the IPA analysis chart, as shown in Table IV, and then make an IPA analysis, as shown in Fig. 1.

TABLE III. ANALYSES ON THE IMPORTANCE OF THE ELEMENTS OF SMART TOURISM SATISFACTION IN WUDANG MOUNTAIN

Indicator	Mean of Importance	Rank	Mean of Satisfaction	Rank	Mean Gap
Tourism Route Recommendation	2.95	16	3.37	8	0.42
Digital Interpretation of Cultural Relics	2.8	17	3.27	13	0.47
Intelligent Service Facility Completeness	3.13	8	3.28	12	0.15
Convenience of Online Ticket Purchase	3.34	2	3.41	4	0.07
Online Recommendation of Cultural Commodities	2.7	18	3.05	18	0.35
Convenience of Online Accommodation Booking	3.18	6	3.16	17	-0.02
Vehicle Scheduling and Parking Management	3.09	9	3.4	6	0.31
Statistics of Tourist Number and Tourist Guidance	2.98	14	3.22	14	0.24
Monitoring of Natural Environment	3.16	7	3.42	2	0.26

Cont.to TABLE III					
Tourism Culture Propaganda	3.07	10	3.42	3	0.35
Real-time Information Broadcasting in Scenic Spots	3.42	1	3.45	1	0.03
Informatization Equipment in Teaching	2.95	15	3.35	10	0.4
Compliant Management	3.22	4	3.2	16	-0.02
Wireless Network Coverage	3.22	5	3.36	9	0.14
Electronic Guidance	3.06	11	3.29	11	0.23
Video Surveillance Coverage	3.25	3	3.38	7	0.13
Portal Website Construction	3	13	3.21	15	0.21
Mobile Service of Tourism Information	3.06	12	3.41	5	0.35
Overall Mean	3.09		3.31		

Generally speaking, the average satisfaction of tourists for Wudang Mountain smart tourism construction is 3.31, which is between “general” and “satisfactory”.

To be specific:

(a) The first quadrant, advantage area, is the area where the importance and satisfaction are higher than average. There are six variables in this area: the convenience of online ticket purchasing, vehicle dispatching and parking management, natural environment monitoring, real-time information broadcasting, wireless network coverage and video surveillance coverage. It proves that tourists pay more attention to these aspects and are satisfied with the current construction level of Wudang Mountain; this can be used as an advantage factor to attract tourists.

(b) The second quadrant, maintenance area, area where the importance line is relatively low and the satisfaction is relatively high. The area has tourist route recommendation, tourism culture propaganda, information technology equipment usage teaching, and mobile tourism information service, indicating that tourists pay more attention to the promotion of basic tourism information, and prefer personalized travel customization or deeper travel experience.

(c) The third quadrant, to be improved area, is the region where the importance and satisfaction are relatively low. The region has digital interpretation of cultural relics, online cultural product recommendation, tourist statistics and tourist guidance, electronic tour guides, and overall construction of the portal. Visitors hold that these factors are relatively less important and are less satisfied with these factors.

(d) The fourth quadrant, particularly noteworthy area, is an area of higher importance but lower satisfaction. The region has service variables such as the completeness of intelligent service facilities, the convenience of online accommodation booking, and complaint management. Visitors pay more attention to these services, but their satisfaction is relatively low. Visitors now pay more attention to the experience of service equipment and their own demands; therefore, construction in this area needs to be improved.

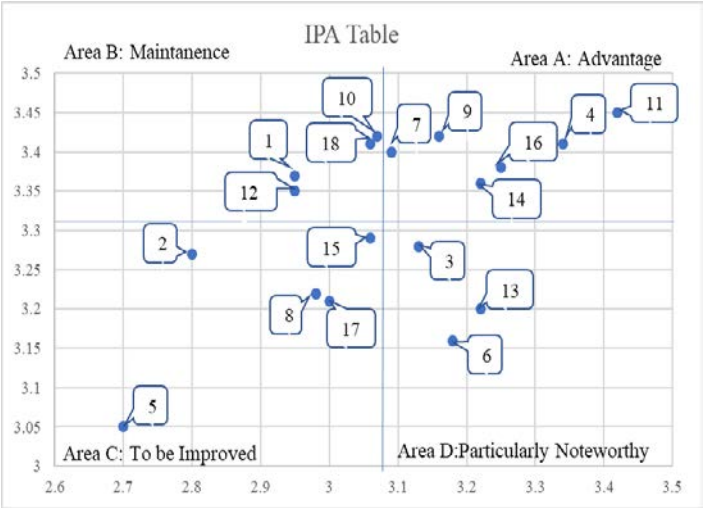

Fig.1. IPA Analysis of Satisfaction Degree of Smart Tourism Construction in Wudang Mountain

IV. SUGGESTIONS

A. Adhering to the Strategic Thought and Principle of National Tourism Informatization

In the process of informationization construction, Wudang Mountain should adhere to the policy of "overall planning, market-oriented, application-oriented, resource sharing, safety and reliability" of national informationization construction, take deepening information application as the main line of informationization construction, and comprehensively enhance the depth of tourism informationization in Wudang Mountain; Utilizing the latest information technology, taking the coexistence of efficiency and quality, the equal emphasis on management and construction as the basic principle, we can improve the level of tourism informatization in Wudang Mountain; Formulate and improve tourism informatization policies and norms, and provide a good policy environment for the construction of informatization; Intensify the construction of Wudang Mountain's cultural brand and expand the scope of publicity so as to promote the construction of Wudang Mountain's tourism informatization in an all-round way.

B. Optimizing tourism services and improve service system

In order to improve the overall service quality of Wudang Mountain Scenic Area, Wudang Mountain Scenic Area should formulate guidelines for tourism-related practitioners, provide

standardized pre-job training, and pay special attention to the use of tourism information-related facilities to provide accurate guidance and services. In order to improve the overall service quality of Wudang Mountain scenic spot, it is necessary for Wudang Mountain scenic spot to formulate guidelines for tourism-related practitioners, provide standardized pre-job training, and pay special attention to the use and teaching training of tourism information-related facilities, so as to provide accurate guidance and services for tourists and enhance their service and experience satisfaction. At the same time, the supervision of intelligent service equipment in scenic spots should be strengthened to prevent the occurrence of equipment being put into use but not being used, and special personnel should be set up to regularly repair the equipment in order to ensure its normal operation.

C. Strengthening the Construction of Portal Websites

Portal website is the most official and direct way for tourists to get information about Wudang Mountain tourism. Wudang Mountain Portal (http://ly.wudangshan.gov.cn/) includes navigation modules such as "Wudang Mountain Overview", "Wudang Information", "Impression Wudang", "Cultural Wudang", "Tourism Service", "Interactive World". It is difficult to distinguish the content of each module only from its literal meaning. The content of each module is rich, but the page is more cluttered and the focus is not prominent. It is relatively simple to click on the content of the secondary page. The construction of Wudang Mountain website can draw lessons from the construction of Huangshan official platform (http://www.huangshan.com.cn). The navigation bar of Huangshan official platform is clear and practical. It mainly includes "scenic spots", "hotels", "free travel", "catering", "commodities", "tours with group", "strategy" and so on. It provides services such as group tours booking; activity packages booking, hotel reservations and so on, providing the tourists with convenient and fast service. Based on the experience from Huangshan portal website, Wudang Mountain official website construction can highlight tourism route recommendation, tourism culture propaganda, tourism complaint management and other services, integrate the resources of "food, accommodation, transportation, traveling, purchasing and entertainment", build an online tourism mall, form a one-stop service of booking, payment, logistics and distribution, and make tourists feel the convenience of travelling.

D. Promoting new media and mobile applications

In today's society, micro-blog, micro-message and short video APP have been integrated into people's daily life. Through these software devices, Wudang Mountain culture can be widely publicized. For example, some short video collecting activities can be carried out to show Wudang Mountain's elegance and arouse people's interest in Wudang culture and landscape. Wudang Mountain can also cooperate with other well-known tourism APP platforms, such as Mafengwo and Tuniu, to formulate scientific marketing themes, innovate marketing concepts, highlight the unique tourism culture of Wudang Mountain, attract tourists to participate actively in it, and form new ways of communication and marketing.

In terms of mobile applications, Wudang Mountain launched the “Handheld Wudang” client and “Wudang Mountain Smart Guide App”, but in the process of downloading, this is not avaliabe in IOS system, and the update of the "Handheld Wudang" WeChat widget program is delayed, the travel reservation can only see several hotel reservation links, "Cultural products" and "Characteristic homestay" are empty links. In the construction of mobile applications, Wudang Mountain Scenic Spot needs to meet the personalized needs of tourists and provide more convenient services for tourists on the basis of complete basic functions.

E. Establishing tourism early warning mechanism

Travel safety is one of the most concerned problems for tourists. The construction of the scenic spot should include the following aspects as well: establishing a tourism early warning mechanism, make correct prediction and analysis of the flow of tourists and take appropriate measures to guide and control it, strengthen the collection, processing and release of tourism quality information, and promote scientific management to ensure tourism safety.

F. Improving the tourist information feedback channel

The purpose of smart tourism is to provide tourists with a better travel experience, so meet the demands of tourists and listen to the feedback of tourists is an important part of smart tourism construction. Therefore, as for complaints from tourists, except complaints through phone channels, online access should also be available. For instance, “Complaints & Suggestion” column should be set on the portal website, or visitors can provide comments, suggestions or complaints through Weibo, WeChat public accounts etc. Wudang Mountain scenic spot should set up a dedicated person to respond in a timely manner, solve the feedback of tourists, and establish a perfect complaints and evaluation feedback system.

V. CONCLUSION

This paper evaluated and analyzed the satisfaction of Wudang Mountain's Smart Tourism construction. Some significant results are shown with statistical analysis and IPA analysis.

- Through deliberation on current status of the construction of Wudang Mountain’s smart tourism, the satisfaction index system consisted of 5 first-level system and 18 second-level indicators.
- According to questionnaire analysis, the satisfaction of tourists in Wudang Mountain smart tourism construction is between “general” and “satisfactory”.
- Based on APA analysis, we concluded that visitors paid more attention to the completeness of intelligent service facilities, the convenience of online accommodation booking, and complaint management, but the satisfaction was relatively low, therefore, construction in this area needs to be improved.

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