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Research on Satisfaction of Fanjing Mountain Smart Tourism based on Probit Model

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Abstract

In order to promote the construction of smart tourism in Fanjing Mountain Scenic Area, improve tourists' satisfaction and promote the development of smart tourism in the whole region, this paper takes Fanjing Mountain Scenic Area in Tongren City, Guizhou Province as the research object, uses the field research method to investigate the specific smart construction of the scenic area, uses the questionnaire survey method to collect data from tourists, and uses the probit model to estimate and calculate. The following conclusions are drawn: the richness of information portal content, intelligent level of meal and room reservation and intelligent after-sales service, the network coverage of scenic spots and electronic payment , and the intelligent degree of tour guides have a significant positive impact on tourist satisfaction. On this basis, propose targeted suggestions to promote the development of smart tourism in Fanjing Mountain and improve tourist satisfaction.

Keywords

Fanjing Mountain; Smart Tourism; Tourist Satisfaction; Probit Model.

1. Introduction

The upgrading of Internet technology has greatly promoted the smart development of the tourism industry. While bringing convenience to tourists, it has opened up space for the reform of China's tourism industry. In 2021, the Ministry of Culture and Tourism proposed to speed up the promotion of smart tourism characterized by digitalization, networking and intelligence in the Summary of the Work Report of the 2021 National Culture and Tourism Director General's Meeting.The concept of smart tourism was first put forward by Phillips[1], a foreign scholar, in 2000. It strengthened the planning of tourism products and services with informatization to make tourism intelligent. Then, many scholars have conducted relevant research on smart tourism. Zhang Lingyun[2] et al. defined smart tourism as a comprehensive tourism platform integrating tourism resources based on mobile communication technologies such as artificial intelligence and cloud computing. Ji Nannan3] analyzed the impact mechanism of smart tourism on tourists in detail, and put forward suggestions on how to effectively promote smart tourism. Wu Yalin[4] believes that applying intelligent applications to tourism can better meet people's needs for tourism, so she expounds the importance of smart tourism and puts forward corresponding countermeasures to solve the corresponding problems.

Tourist satisfaction refers to a subjective judgment of tourists' overall satisfaction with the whole tourism process. Exploring the tourist satisfaction of smart tourism is not only to obtain the tourist satisfaction information, but also to judge the work quality and development level of smart tourism construction. This has aroused many scholars' interest in the related research of the two. Huang[5] et al. found that the application of smart tourism in tourism is very common and growing, so they mainly studied how travelers use these technologies to improve tourism satisfaction. Lee[6] et al. tested the impact of smart tourism and destination value on

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tourist satisfaction through a comprehensive model.Based on the satisfaction of tourists, Tengfei [7] discussed various smart service experiences of tourists in the scenic area, with a view to effectively improving the smart service level of the scenic area.Chen Lingxing [8] et al. constructed the satisfaction evaluation system of smart tourism tourists in Nanjing from the six dimensions of accommodation, catering, shopping tourism, resource environment, public service and order security, and proposed targeted measures to improve satisfaction based on the results.

Guizhou Provincial Party Committee and the provincial government issued the Opinions on Promoting the High Quality Development of Tourism and Accelerating the Industrialization of Tourism to Build a Colorful and Powerful Tourism Province in Guizhou, which continues to promote the construction of smart tourism, promote the development of tourism with digitization, improve the level of tourism science and technology, and improve the intelligence of tourism products. This paper summarizes previous studies, and conducts field research in Fanjing Mountain Scenic Area, Tongren City, Guizhou Province. It constructs a probit model of four major influencing factors of tourists' satisfaction of Fanjing Mountain smart tourism, conducts empirical research to find out the important factors that affect tourists' satisfaction in the construction of Fanjing Mountain smart tourism, and puts forward corresponding measures and suggestions. The research of this paper has certain theoretical and practical significance for the development of smart tourism in Fanjing Mountain Scenic Area and further improving the satisfaction of tourists with smart tourism.

2. Impact Variables and Research Assumptions

2.1. Smart Tourism Information Consultation

(1) H1-1: The content richness of tourist destination information portals has a significant positive impact on tourist satisfaction.

(2) H1-2: The timeliness of information updating of tourism destination information portals has a significant positive impact on tourist satisfaction.

(3) H1-3: The maturity and integrity of mobile client development in tourist destinations have a significant positive impact on tourist satisfaction.

2.2. Smart Tourism Marketing Service

(1) H2-1: The intelligent level of ticket purchase in tourist destinations has a significant positive impact on tourist satisfaction.

(2) H2-2: The intelligent level of food and room reservation in tourist destinations has a significant positive impact on tourist satisfaction.

(3) H2-3: The intelligent level of after-sales service in tourist destinations has a significant positive impact on tourist satisfaction.

2.3. Smart Tourism Infrastructure

(1) H3-1: The network coverage of scenic spots in tourist destinations has a significant positive impact on tourist satisfaction.

(2) H3-2: The intelligence degree of smart transportation in tourist destinations has a significant positive impact on tourist satisfaction.

(3) H3-3: The intelligence degree of electronic payment in tourist destinations has a significant positive impact on tourist satisfaction.

2.4. Smart Tourism Experience Service

(1) H4-1: The intelligent level of smart tourism navigation in tourist destinations has a significant positive impact on tourist satisfaction.

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(2) H4-2: The intelligent level of smart tourism tour guides in tourist destinations has a significant positive impact on tourist satisfaction.

(3) H4-3: The intelligent level of smart tourism guide in tourist destinations has a significant positive impact on tourist satisfaction.

(4) H4-4: The intelligent level of smart tourism shopping guide in tourist destinations has a significant positive impact on tourist satisfaction.

3. Research Model and Data

3.1. Research Model

Probit model is usually used to study the relationship between the probability of a random event and some factors, which is applicable to the research content of this paper. Therefore, this paper uses the probit binary model to study the factors that affect the tourist satisfaction of Fanjing Mountain's smart tourism construction. In order to meet the requirements of the model for binary dependent variables, this study categorizes the tourist satisfaction data, and puts "very satisfied" and "relatively satisfied" into the "satisfied" category, with the value of 1; "not satisfied", "not very satisfied" and "average" are classified as "unsatisfied", and the value is 0. Based on the above assumptions,this study establishes the following relationship function of the influence factors of the construction of smart tourism in Fanjing Mountain Scenic Area on tourists' satisfaction: Y (satisfaction of tourists with smart tourism)=F (smart tourism information consultation,smart tourism marketing service, smart tourism infrastructure and smart tourism experience service)+random interference term.

The specific expression of probit model in this paper is:

$$Y^* = \alpha + \beta X_1 + \beta X_2 + \beta X_3 + \beta X_4 + \mu \quad (1)$$

In Formula (1), Y * represents the unobservable variable or latent variable. When Y *>0, it means that tourists are satisfied with the evaluation of smart tourism, at which time Y=1; When Y *<=0, it means that the tourists are dissatisfied with the evaluation of smart tourism,at which time Y=0. X is the influencing factor variable, namely, the four major aspects of smart tourism information consulting, smart tourism marketing services, smart tourism infrastructure and smart tourism experience services. Here, μ is assumed to be the interference factor, independent of the explanatory variable, and in a standard normal distribution. Thus, the binary discrete probit model of tourists' smart tourism satisfaction in this paper can be expressed as:

$$\begin{aligned} \text{Prob}(Y = 1|X = x) &= \text{prob}(Y^* > 0|x) = \text{prob}\{[\mu > (\alpha + \beta x)]|x\} \\ &= 1 - \Phi[-(\alpha + \beta x)] \\ &= \Phi(\alpha + \beta x) \end{aligned} \quad (2)$$

In Formula (2), Φ is the standard positive-terminus cumulative distribution function. X refers to the same formula (1); x is the actually observed influencing factor, namely the observed variable. It mainly includes the richness of information portal website content, the timeliness of website information update, and the maturity of mobile client development; Intelligent level of ticket purchase service, intelligent level of meal or room reservation service, and intelligent level of smart after-sales service; Network coverage, traffic intelligence and electronic payment intelligence of the scenic area; Smart navigation, tour guide, guide and shopping guide in the scenic area. Therefore, the probit model of influencing factors of tourists' satisfaction with smart tourism can be established as follows:

$$\text{prob}(Y = 1|X_i) = \Phi(\alpha_0 + \beta_{1n} X_1 + \beta_{2n} X_2 + \beta_{3n} X_3 + \beta_{4n} X_4 + \mu)$$

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$$=\Phi(\alpha_0 + \beta_{11}X_{11} + \beta_{12}X_{12} + \beta_{13}X_{13} + \beta_{21}X_{21} + \beta_{22}X_{22} + \beta_{23}X_{23} + \beta_{31}X_{31} + \beta_{32}X_{32} + \beta_{33}X_{33} + \beta_{41}X_{41} + \beta_{42}X_{42} + \beta_{43}X_{43} + \beta_{44}X_{44} + \mu) \quad (3)$$

Table 1. Description and Meaning of Impact Variables

Variable	Number	Variable Description	Priori hypotheses
Smart tourism information consultation	X_{11}	Content richness of the information portal (Not rich=1 not too rich=2 average=3 relatively rich=4 very rich=5)	Forward
	X_{12}	Timeliness of information updates on information portals (not timely=1 not very timely=2 average=3 relatively timely=4 very timely=5)	Forward
	X_{13}	Complete maturity of mobile client development (immature=1 not very mature=2 average=3 relatively mature=4 very mature=5)	Forward
Smart tourism marketing service	X_{21}	Intelligent level of ticket purchase service (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
	X_{22}	Intelligent level of meal or room reservation service (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
	X_{23}	Smart after-sales service (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
Smart tourism infrastructure	X_{31}	Network coverage of scenic spots (Very low coverage=1 not too high=2 average=3 relatively high=4 very high=5)	Forward
	X_{32}	Intelligence degree of smart transportation (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
	X_{33}	Intelligent degree of electronic payment (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
Smart tourism experience service	X_{41}	Intelligence degree of smart tourism navigation (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
	X_{42}	Intelligence degree of smart tourism tour guide (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
	X_{43}	Intelligence degree of smart tourism guide (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
	X_{44}	Intelligence degree of smart tourism shopping guide (unintelligent=1 not very intelligent=2 average=3 relatively intelligent=4 very intelligent=5)	Forward
Tourist satisfaction	Y	Satisfaction of tourists with smart tourism (Not satisfied=1 not very satisfied=2 average=3 relatively satisfied=4 very satisfied=5)	

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In Formula (3), prob (Y=1 | X_i) represents the probability that tourists are satisfied with their tourism satisfaction. X_i is the independent variable vector, which mainly refers to the influence factor variables of the four dimensions mentioned above. α_0 is a constant term. β_{1n} represents the coefficient of probit model regression equation of the nth independent variable under the first independent variable vector. X_{1n} represents the nth independent variable under the first independent variable vector. μ refers to the interference term, that is, the influence of other independent variables that are not reflected. Its mean value is 0, which is independent statistics and conforms to normal distribution.

The specific description of each influence variable in the model is shown in Table 1.

3.2. Data Collection

This questionnaire is mainly designed for the four dimensions of satisfaction with the service system of Fanjing Mountain smart tourism construction, including 13 specific influencing factor variables and the overall satisfaction of tourists. The survey was carried out from July to August 2022 in the Fanjing Mountain Scenic Area of Tongren City, Guizhou Province. The questionnaire was mainly distributed to tourists in the popular tourist areas of Fanjing Mountain. A total of 400 questionnaires were distributed, 390 valid ones were recovered, and the effective rate of the questionnaire was 97.5%.

4. Empirical Analysis

4.1. Descriptive Statistics

The statistics are described from four aspects: gender, age, education and income. Among them, the proportion of men and women in the surveyed population is basically the same, with 199 males accounting for 51% and 191 females accounting for 49%; In terms of age, it is mainly concentrated in the age group from 19 to 40, accounting for 73.9%. From the perspective of education, undergraduate is the most widely distributed, accounting for 39.9%; 69.2% of the population has a monthly income of about 5000. See Table 2 for details.

Table 2. Basic characteristics of survey samples

Personal characteristics	Describe	Number of samples	Percentage
Gender	male	199	51
	female	191	49
Age (Years old)	under 18	26	6.7
	19-25	154	39.5
	26-40	134	34.4
	41-55	53	13.6
	over 55	23	5.9
Education	Junior high school and below	34	8.7
	high school	62	15.9
	junior college	74	19
	undergraduate	148	37.9
	postgraduate and above	72	18.5
Monthly income (yuan)	less than 2000	55	14.1
	2000-5000	137	35.1
	5000-10000	133	34.1
	above 10000	65	16.7

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4.2. Reliability Analysis

In this study, SPSS25.0 was used to analyze the reliability of the variables involved. The Kronbach coefficient method is used to measure the whole scale. The results are shown in Table 3, and the Kronbach coefficient is 0.930. The coefficient value is greater than 0.9, indicating that the reliability of the questionnaire design in this study is good and has good use value.

Table 3. Reliability Analysis Results of Questionnaire

Cronbach's Alpha	Number of items
.930	14

4.3. Validity Analysis

The KMO and Bartlett sphericity tests were conducted on the scale data, and the results are shown in Table 4. The KMO value is 0.922, greater than 0.9, and the Sig significance value of spherical test is 0.000, less than 0.05, indicating that the validity of the questionnaire is good, and the sample data is suitable for further research and analysis.

Table 4. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequary (KMO)	.922	
Bartlett's Test of Sphericity	Approximate chi square	3902.062
	df	91
	Sig.	.000

4.4. Test and Analysis of Probit Model

Table 5. Fitting Results of Model 1 and Model 2

	Model 1		Model 2	
variable	estimated parameters	z-statistic	estimated parameters	z-statistic
X11	0.267*	1.678	0.337**	2.474
X12	-0.104	-0.774		
X13	0.211	1.416		
X21	0.012	0.067		
X22	0.278*	1.792	0.318**	2.327
X23	0.296**	2.070	0.308**	2.505
X31	0.384***	2.621	0.413***	3.262
X32	0.116	0.679		
X33	0.611***	3.396	0.650***	4.447
X41	-0.059	-0.266		
X42	0.751***	3.729	0.746***	5.071
X43	-0.176	-0.959		
X44	0.224	1.552		
C	-9.592***	-10.348	-9.500***	-10.899
R2	0.562		0.574	
log Likelihood	-105.698		-108.636	
maximum likelihood value	-248.241		-248.241	

Note: *means significant at 10% level, ** meas significant at 5% level, *** means significant at 1% level.

In this study, Eviews software was used to run the model on the data, and the specific results are shown in Table 5. The first operation result is as shown in Model 1, passing the test of likelihood ratio significance; Then, according to the results of the first operation, remove the

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variables that have little correlation with the explanatory variable Y and perform the operation again. The results are shown in Model 2 and also pass the likelihood ratio significance test. At the same time, R2 of model 2 reaches 0.574, indicating that the accuracy of the model has been further improved.

5. Conclusion and Suggestions

This research takes the smart tourism of Fanjing Mountain Scenic Area as the object, and discusses the factors that affect tourists' satisfaction in the construction of smart tourism. After estimating the model, it is assumed that H1-1, H2-2, H2-3, H3-1, H3-3, and H4-2 are effectively verified. Based on the above analysis results, this paper proposes the following countermeasures and suggestions in order to provide some inspiration for the construction of Fanjing Mountain smart tourism.

(1) In smart tourism information consulting, the content richness of information portals has a significant positive impact on tourist satisfaction. According to the calculation results of the model, the influence coefficient of the content richness of the information portal website is 0.337. Tourists have a great demand for scenic spots, accommodation, transportation, catering, shopping and other information of the travel destination, and hope that the content is fresh and comprehensive. Therefore, tourism destination information portals need to provide comprehensive, professional and interesting information in a timely manner. The portal pages should be designed as simple and functional as possible to improve tourists' information acquisition experience and improve their impression and trust.

(2) In the smart tourism marketing service, the intelligent level of meal and room reservation and smart after-sales service has a significant positive impact on tourist satisfaction. According to the results of the model, the influence coefficient of intelligent meal and room booking is 0.318, and the influence coefficient of intelligent after-sales service is 0.308. Food, accommodation and transportation are all important links in the tourism chain. Relevant departments should improve relevant booking and purchasing services to enable tourists to experience safer and more diversified services. During travel, tourists will inevitably have doubts or dissatisfaction with the services they receive. Establishing and improving smart after-sales services can provide a convenient and good information feedback platform for tourists to defend their rights and interests, and help operators better obtain tourists' opinions, with a view to improving their own services in the future.

(3) In the construction of smart tourism infrastructure, the network coverage and electronic payment of scenic spots have a significant positive impact on tourist satisfaction. According to the calculation results of the model, the impact coefficient of the scenic area network coverage is 0.413, and the impact coefficient of electronic payment is 0.650. The network coverage in the scenic area enables tourists to enjoy online surfing, information query, positioning navigation, social sharing and other network applications in the scenic area, helping them to get a better sense of experience and satisfaction; At the same time, a good network is also the hardware support for other related smart services. Electronic payment can meet the purchase needs of tourists, and excellent payment environment can ensure the payment security of tourists.

(4) In the smart tourism experience service, the intelligence degree of tour guides has a significant positive impact on tourist satisfaction. According to the calculation results of the model, the influence coefficient of intelligent tour guide is 0.746. Tour guide service runs through the whole process of tourists' travel and is an important part of tourists' tourism perception quality. It is of great significance to pay attention to improving the intelligent tour guide system, such as guide consultation, electronic interpretation, electronic browsing, etc., to enhance tourists' experience and improve satisfaction.

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