Determination of Evaluation Index Weight of Tourist Participation in Leisure Agricultural Tourism in Haikou

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Abstract: The Evaluation Index Weight of Tourist Participation is a very important part for Leisure Agricultural Tourism. This paper analyzes the evaluation index and its weight, and construct the Evaluation factor judgment matrix, finds out the Consistency test results and weight of each evaluation factor. It is hoped that the determination of evaluation index weight will help the analysis and fuzzy comprehensive evaluation of leisure agriculture tourism in Haikou.

1. Overview of research objects

Guilin Yang National Tropical Agricultural Park (hereinafter referred to as the Agricultural Park) is subordinate to Hainan agricultural reclamation group and opened to the outside world in October 2017.Since its opening, more than one million tourists have visited the park. On holidays, it has become one of the tourist choices for Haikou citizens to relax. Here you can see advanced agricultural production equipment, taste the freshest characteristic vegetables and fruits, watch characteristic programs on holidays, and choose to participate in the planting and purchase of agricultural products.The agricultural museum displays various agricultural tools for educational demonstration. In this paper, Guilin Yang National Tropical Agricultural Park is selected as the investigation place for the study of leisure agricultural tourism tourist participation.

2. Questionnaire distribution

In this survey, tourists visiting Guilin Ocean Tropical Agricultural Park in Haikou during the National Day in 2020 were selected as the survey object. 200 questionnaires were distributed in three areas where tourists gathered, including Gaoshan village with folk characteristics, agricultural planting dream factory and tourist service center. 195 questionnaires were recovered through on-site tracking, and 10 invalid questionnaires were excluded, 185 valid questionnaires were collected in this survey, accounting for 92.5%.

3. Data analysis

3.1 Reliability Analysis

According to the collected questionnaire data, spss23.0 statistical software is used to analyze the reliability of the questionnaire data collected by Haikou leisure agricultural tourism tourist participation evaluation questionnaire, and the overall reliability alpha of the questionnaire is 0.927.

The reliability analysis coefficient is 0.8 or above, indicating that the reliability of the test variable is very good; The reliability coefficient is 0.7, which belongs to the acceptable range; If it is above 0.6, it is recognized that the scale needs to be adjusted. The overall reliability of the questionnaire is higher than 0.8. The statistics of alpha coefficient of each factor are shown in table 1.

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Table.1. Reliability analysis of tourist participation in leisure agricultural tourism

index	Number of items	Alpha reliability coefficient
Preparatory participation	6	0.838
Behavioral participation	6	0.798
Responsible participation	6	0.889
Follow up participation	4	0.779

It can be seen from the above table that two alpha reliability coefficient values are greater than 0.8 and two are close to 0.8. Therefore, this questionnaire has high reliability.

3.2 Analysis of demographic characteristics

The first part of the questionnaire is set as the basic information survey of tourists. According to the questionnaire data, the demographic characteristics of leisure agricultural tourism tourists in Haikou are as follows:

Table.2. Basic information of tourists

project	classification	frequency	Percentage
From region	this city	71	38.38%
	Outside the city	34	18.38%
	Outside the province	80	43.24%
Gender	male	60	32.43%
	female	125	67.57%
education	Junior high school and below	18	9.86%
	Senior high school and vocational high school	3	1.14%
	junior college	39	21.13%
	undergraduate	91	49.3%
	Graduate and above	34	18.31%
Age	18Under years old	0	0%
	19-30year	70	38.03%
	30-45year	81	43.66%
	45-60year	16	8.45%
	60Over years old	18	9.86%
occupation	Civil servants or public institutions	47	25.35%
	Private enterprise personnel	26	14.08%
	Self-employed	16	8.45%
	professional	18	9.86%
	retiree	10	5.63%
	student	39	21.13%
	other	29	15.49%
income	3000Below yuan	49	26.76%
	3000-5000element	47	25.35%
	5000-8000element	52	28.17%
	8000More than yuan	37	19.72%

(1) Analysis of tourist source composition: 185 valid data are collected in this questionnaire, and the tourist source is divided into three parts, of which tourists outside the province account for 43.24% of the total sample; Tourists in the city are the second, accounting for 38.38% of the total sample, and tourists outside the city account for 18.38%. From the data, the leisure agricultural tourism tourists in Haikou are mainly customers outside the province.

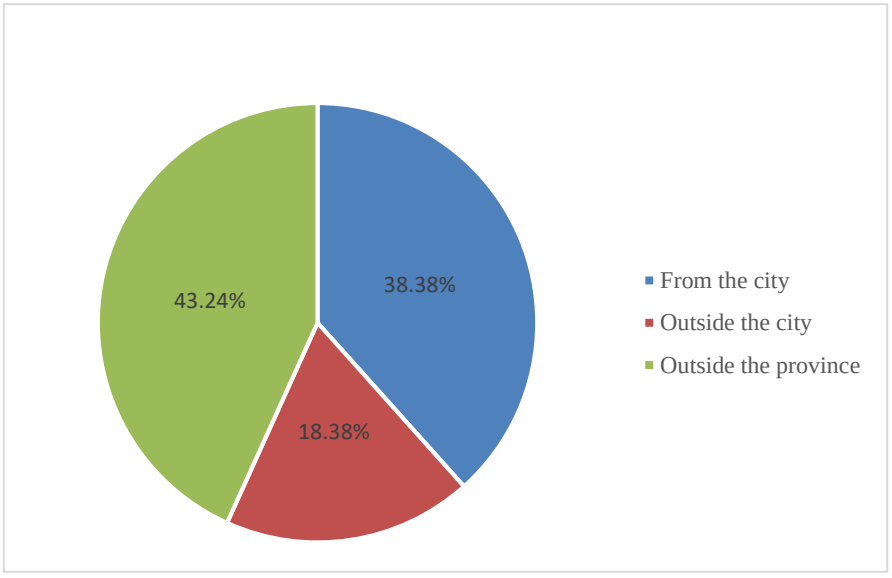

Figure 1. Passenger source

(2) Gender structure: women account for a little more, accounting for 67.57%, and men account for 32.43%.

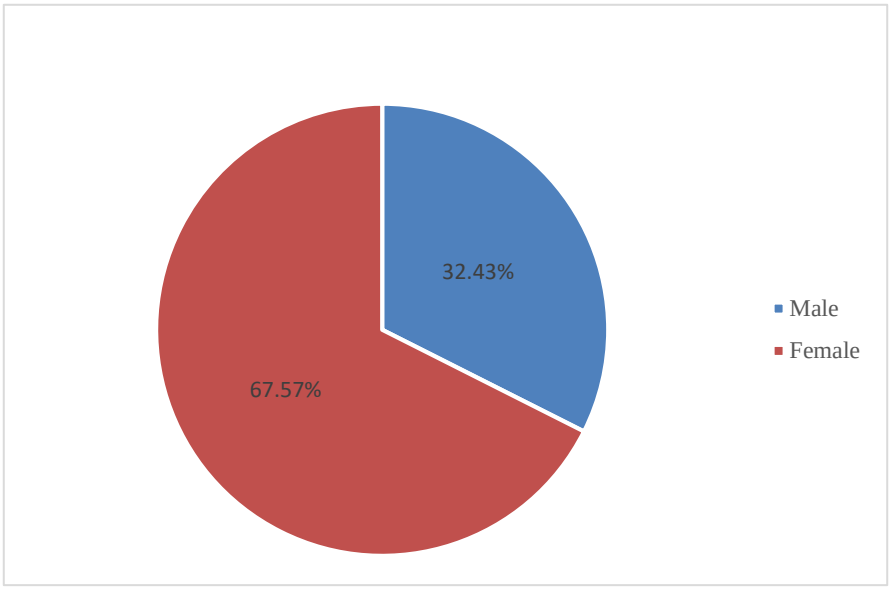

Figure 2. Gender analysis

(3) Education structure: tourists with high school education or below account for about 12%, tourists with college education or above account for more than 70%, and tourists with graduate education or above account for 18.3%; Tourists are highly educated.

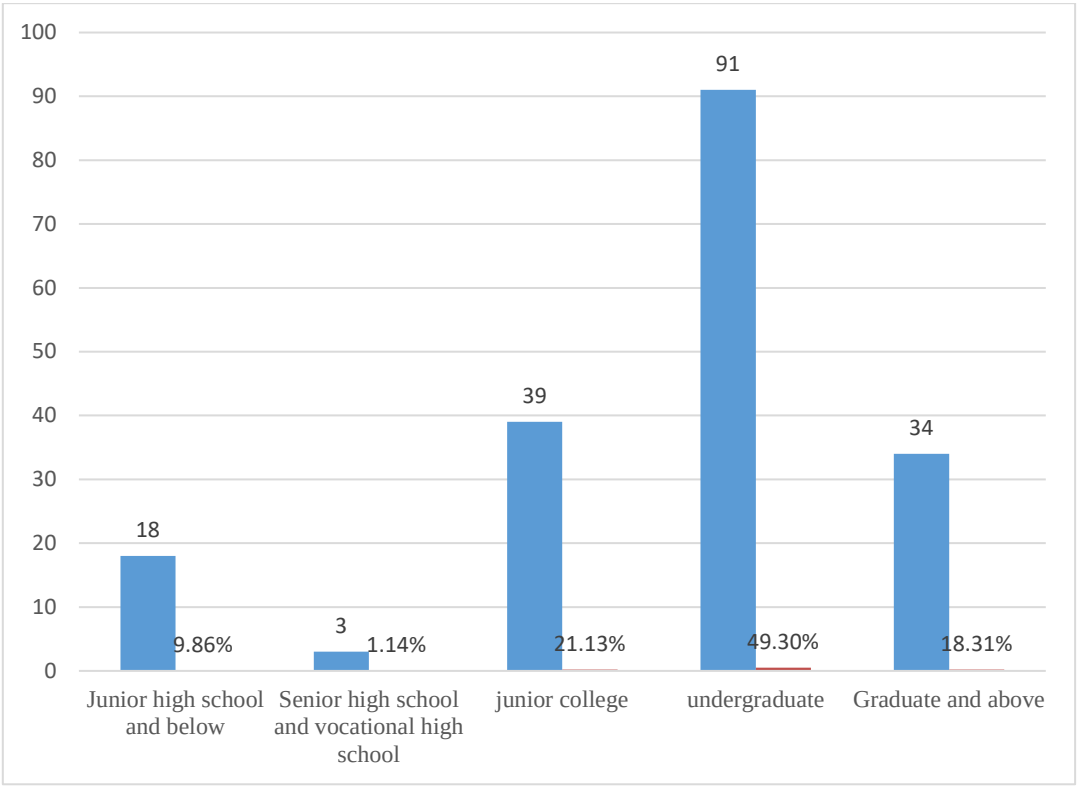

Figure 3. Education analysis

(4) Age structure: tourists are mainly young and middle-aged tourists, of which young tourists aged 19-30 account for 38.03%; Tourists aged 31-45 accounted for 43.66%, and tourists over 45 accounted for about 18%; The younger trend of tourists shows that the scenic spot is welcomed by young and middle-aged tourists

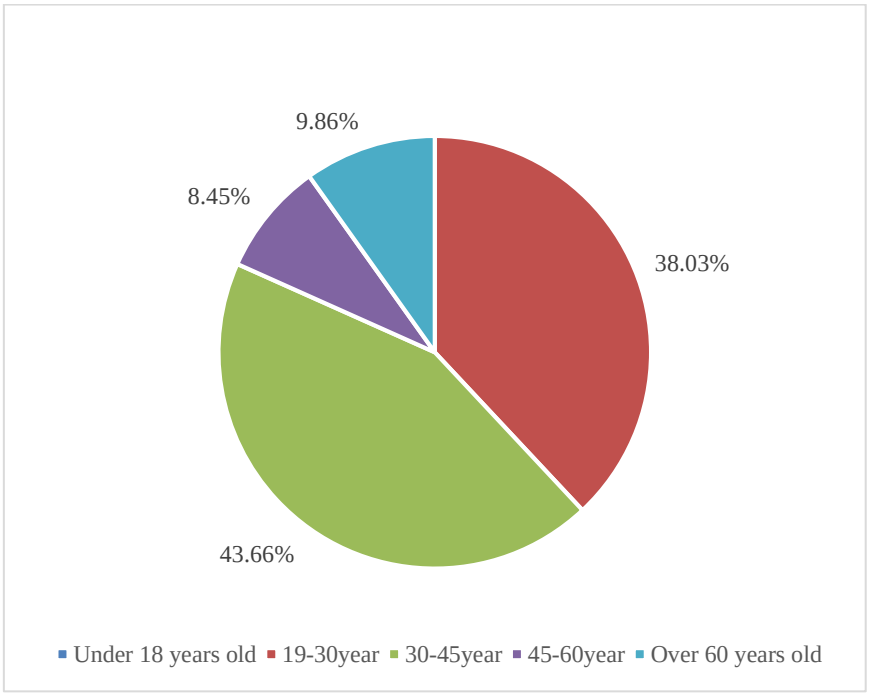

Figure 4. Age analysis

(5) Occupation structure: the proportion of tourists in the occupation category of students and personnel of public institutions is large, about 45%; Followed by private enterprises and other personnel, accounting for about 30%, and freelancers and retirees account for less.

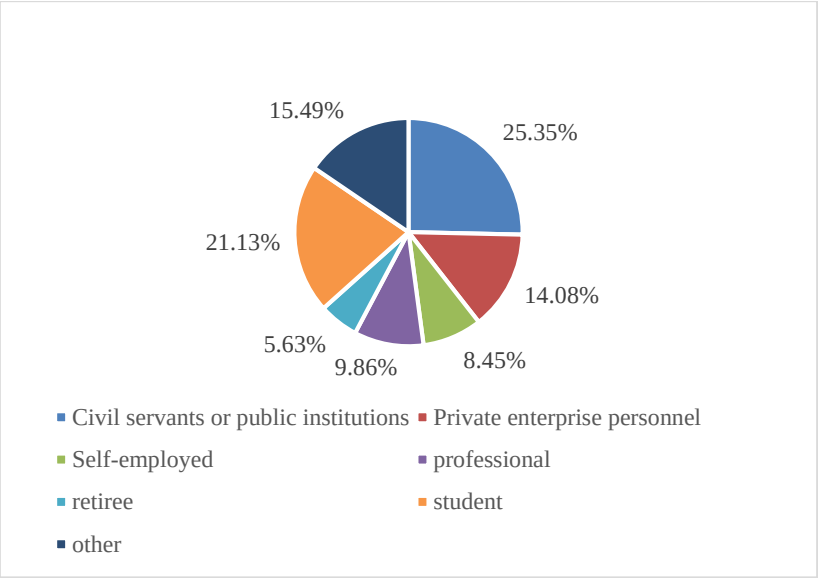

Figure 5. Occupation analysis

(6) Income structure: tourists with a monthly income of less than 5000 yuan account for more than 52%.

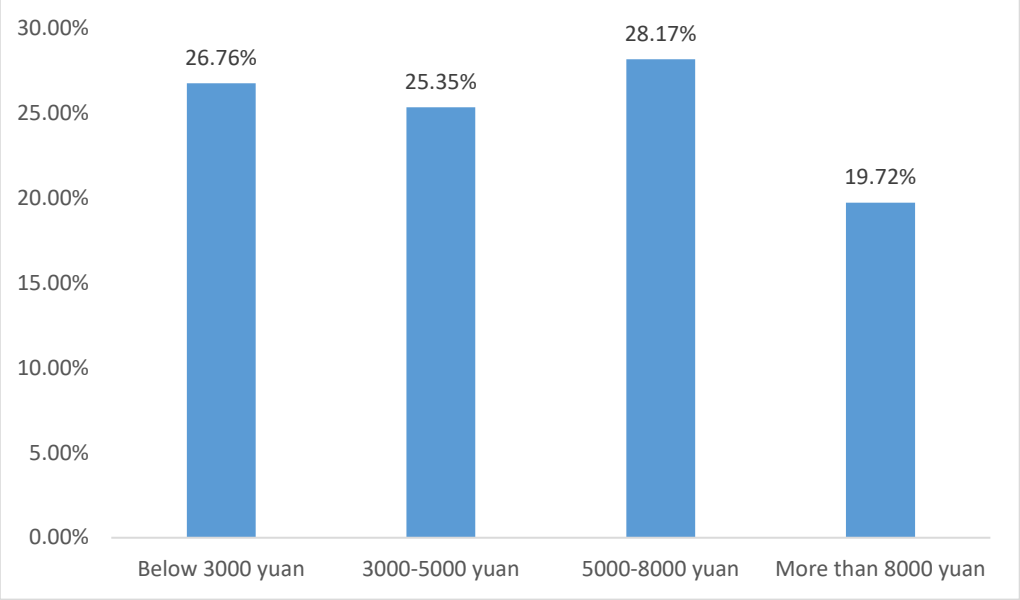

Figure 6. Income analysis

4. Determination of Evaluation Index Weight of Tourist Participation in Leisure Agricultural Tourism in Haikou

4.1 Hierarchical structure

In the evaluation questionnaire of tourist participation in leisure agricultural tourism in Haikou, the target layer is set as a, the project layer is set as Bi, I = {1,4}, and the evaluation factor layer is set as Ci, I = {1,22}. According to the AHP analytic hierarchy process, the elements of Bi and CI are compared to compare the importance of two factors.

4.2 Evaluation factor judgment matrix

In this study, ten tourism teaching experts (all the experts participating in the evaluation have the title of vice senior or above and have been engaged in Tourism Development Research for more than ten years. The ten experts are three professors / associate professors of Hainan economic and Trade

Vocational and technical college, two professors of Hainan Normal University, two professors of Haikou Economic College and two professors of Hainan University) were invited to compare the importance of the judgment factors, the weighted average score of each factor is obtained to construct the judgment matrix, and the statistics are as follows:

Table.3. Factor judgment matrix of a layer

Tourist participation a	Preparatory participation B1	Behavioral participation B2	Responsible participation B3	Follow up participation B4
Preparatory participation B1	1	6/7	1 1/6	2 2/3
Behavioral participation B2	1 1/6	1	2 1/4	2 5/6
Responsible participation B3	6/7	4/9	1	2 1/9
Follow up participation B4	3/8	3/8	1/2	1

Table.4. Factor judgment matrix of B1 layer

Preparatory participation B1	Information collection C1	Information comparison C2	Consult C3 in advance	Develop strategy C4	Purchase necessities C5	Booking accommodation, etc. C6
Information collection C1	1	1 8/9	1 5/8	8/9	2 1/9	2 2/3
Information comparison C2	1/2	1	1 5/8	2 1/4	1 1/9	1
Consult C3 in advance	1 1/6	3/5	1	5/7	1/2	2
Develop strategy C4	1 1/9	4/9	1 2/5	1	4/9	3
Purchase necessities C5	1/2	8/9	2	2 2/7	1	2 1/6
Booking accommodation, etc. C6	3/8	1	1/2	1/3	4/9	1

Table.5. Factor judgment matrix of B2 layer

Behavioral participation B2	Participate in activity C7	Purchase item C8	Sharing information C9	Compliance C10	Difficult help C11	Communication and interaction C12
Participate in activity C7	1	2 1/6	4/5	3 8/9	2 1/9	2 7/8
Purchase item C8	4/9	1	1 2/3	2 1/6	3 5/8	2
Sharing information C9	1 1/4	3/5	1	3	1 1/7	3
Compliance C10	1/4	4/9	1/3	1	2 2/3	2 7/8
Difficult help C11	1/2	2/7	7/8	3/8	1	1 1/9
Communication and interaction C12	1/3	1/2	1/3	1/3	8/9	1

Table.6. Factor judgment matrix of B3 layer

Responsible participation B3	Civilized tourism C13	Resource saving C14	Protect equipment C15	Environmental protection C16	Discouraging uncivilized behavior C17	Comment C18
Civilized tourism C13	1	3	1	1	2	1
Resource saving C14	1/3	1	1	1	2	2
Protect equipment C15	1	1	1	2	2	2
Environmental protection C16	1	1	1/2	1	2	2
Discouraging uncivilized behavior C17	1/2	1/2	1/2	1/2	1	2
Comment C18	1	1/2	1/2	1/2	1/2	1

Table.7. Factor judgment matrix of B4 layer

Follow up participation B4	Organize items C19	Share item C20	Share feelings C21	Lessons learned C22
Organize items C19	1	4/9	1	1 1/9
Share item C20	2 1/8	1	1 6/7	2
Share feelings C21	1	5/9	1	2
Lessons learned C22	8/9	1/2	1/2	1

4.3 Consistency test results and weight of each evaluation factor

In AHP, the acceptable range of consistency ratio of the judgment matrix constructed by the expert scoring table is Cr < 0.1.The consistency inspection process of the element level of the questionnaire is as follows:

(1) Calculate the score of each row element of the matrix:

① Compare the importance of preparatory participation B1 with behavioral participation B2, and the scores of ten experts are as follows:

T1=1 T2=4 T3=3 T4=2 T5=1/2 T6=1/2 T7=1/3 T8=1/3
T9=1/3 T10=1

Q1=T1*T2*T3*T4*T5*T6*T7*T8*T9*T10
=1*4*3*2*1/2*1/2*1/3*1/3*1/3*1

② Similarly, other scores are counted according to the above statistical ① method.Because there are many levels of contrast factors, they will not be listed here.

(2) Calculate the n-th root of the vector:

① The n-th root of the importance comparison score between preparation participation B1 and behavior participation B2, the score is as follows:

$$\overline{Qi} = \sqrt[n]{Qi}$$

$$= \sqrt[10]{1*4*3*2*1/2*1/2*1/3*1/3*1/3*1} = 6/7$$

② Similarly, other scores shall be counted according to the statistical method of ① above. Because there are many levels of contrast factors, the calculation process of each factor score will not be listed here one by one. The statistical results are shown in table 8:

Table.8. Factor judgment matrix of a layer

Tourist participation a	Preparatory participation B1	Behavioral participation B2	Responsible participation B3	Follow up participation B4
Preparatory participation B1	1	6/7	7/6	8/3
Behavioral participation B2	7/6	1	9/4	2 5/6
Responsible participation B3	6/7	4/9	1	2 1/9
Follow up participation B4	3/8	3/8	1/2	1

(3) Normalize the vector:

① Wi=Q1/(Q1+Q2+Q3+Q4) =6/7/(6/7+1+4/9+3/8) =2/7

② Similarly, other scores shall be counted according to the statistical method of ① above. Because there are many levels of contrast factors, the calculation process of each factor score will not be listed here one by one. The statistical results are shown in table 9:

Table.9. Normalization matrix of a layer

Tourist participation a	Preparatory participation B1	Behavioral participation B2	Responsible participation B3	Follow up participation B4
Preparatory participation B1	2/7	2/7	1/4	1/3
Behavioral participation B2	1/3	1/3	4/9	1/3
Responsible participation B3	1/4	1/7	1/5	1/4
Follow up participation B4	1/9	1/8	1/9	1/9

(4) Calculate weight vector: $W = (W1, W2.....Wn)^T$

W1=(2/7+2/7+1/4+1/3)/4=0.283, Similarly, it can be obtained W2=0.3659, W3=0.2122, W4=0.1104.

Table.10. Weight coefficient of a layer

Tourist participation a	Preparatory participation B1	Behavioral participation B2	Responsible participation B3	Follow up participation B4	Weight W
Preparatory participation B1	2/7	2/7	1/4	1/3	0.2830
Behavioral participation B2	1/3	1/3	4/9	1/3	0.3659
Responsible participation B3	1/4	1/7	1/5	1/4	0.2122
Follow up participation B4	1/9	1/8	1/9	1/9	0.1104

(5) Calculate the maximum characteristic root:

$$\lambda \max = \sum_{i=1}^{n} \frac{(AW)i}{nwi}, i = 1,2.....n$$

① λ1 = (1*W1+6/7*W2+7/6*W3+8/3*W4)
= (1*0.2830+6/7*0.3659+7/6*0.2122+8/3*0.1104)
= 1.1420

Similarly, it can be obtained λ2=1.4839, λ3=0.8487, λ4=0.4469. As shown in the following table 11:

Table.11. Maximum eigenvalue of a layer

Tourist participation a	Preparatory participation B1	Behavioral participation B2	Responsible participation B3	Follow up participation B4	Weight W	λi
Preparatory participation B1	1	6/7	7/6	8/3	0.2830	1.1420
Behavioral participation B2	7/6	1	9/4	2 5/6	0.3659	1.4839
Responsible participation B3	6/7	4/9	1	2 1/9	0.2122	0.8487
Follow up participation B4	3/8	3/8	1/2	1	0.1104	0.4469

② λmax= (λ1/W1+λ2/W2+λ3/W3+λ4/W4)/4

= (1.1420/0.2830+104839/0.3659+0.8487/0.2122+0.4469/0.1104)/4

= 4.0339

③ The maximum eigenvalue of the matrix λmax is substituted into formula $CI = \frac{\lambda \max(Q) - n}{n-1}$ and $CR = \frac{CI}{RI}$, getting the result Cr.

CI=λmax-4/(4-1)=(4.0339-4)/3

RI is the specific value 0.89 given by the system, then CR=(4.0339-4)/3/0.89=0.0127, matching the requirements of consistency inspection, Cr < 0.1.The consistency inspection of project layer B passed.

Table.12. Consistency test of a layer

Index	Weight wi	Rmax	CR
B1	0.2830	4.0339	0.0127
B2	0.3659		
B3	0.2122		
B4	0.1104		

(6) The consistency test steps of other factors are calculated according to the requirements of (1) - (5), and the CR value of prepared participation C1 is 0.0969 < 0.1; The CR value of behavioral participation C2 was 0.08859 < 0.1, and that of responsible participation C3 was 0.0606 < 0.1; The CR value of follow-up type participating in C4 was 0.0191 < 0.1. The CR value passed the consistency test. The results are shown in table 13

Table.13. Consistency test

Index	Weight wi	Rmax	CR	index	Weight wi	Rmax	CR
B1	0.2830	4.0339	0.0127	C13	0.2225	6.3819	0.0606
B2	0.3659			C14	0.1685		
B3	0.2122			C15	0.2193		
B4	0.1104			C16	0.173		
C1	0.2441	6.6106	0.0969	C17	0.1124		
C2	0.1774			C18	0.1042		
C3	0.1389			C19	0.1978	4.0510	0.0191
C4	0.1571			C20	0.3938		
C5	0.1953			C21	0.2426		
C6	0.0873			C22	0.1658		
C7	0.2700	6.5581	0.08859				
C8	0.2215						
C9	0.2104						
C10	0.1297						
C11	0.0934						
C12	0.0749						

Determine the final weight of each index

(1) Final indicator weight = each indicator weight 2 * element layer indicator weight 1

(2) Information collection C1 weight = 0.2441 * 0.2380 = 0.0691. Similarly, the final weight of other indicators is shown in table 14:

Table.14. Weight coefficient

Target layer	Feature layer	Weight 1	Indicator layer (c)	Weight 2	Final weight
Tourist participation index system a	Preparatory participation B1	0.2830	Information collection C1	0.2441	0.0691
			Information comparison C2	0.1774	0.0502
			Consult C3 in advance	0.1389	0.0393
			Develop strategy C4	0.1571	0.0445
			Purchase necessities C5	0.1953	0.0553
			Booking accommodation, etc. C6	0.0873	0.0247
	Behavioral participation B2	0.3659	Participate in activity C7	0.2700	0.0988
			Purchase item C8	0.2215	0.0810
			Sharing information C9	0.2104	0.0770
			Compliance C10	0.1297	0.0475
			Difficult help C11	0.0934	0.0342
			Communication and interaction C12	0.0749	0.0274
	Responsible participation B3	0.2122	Civilized tourism C13	0.2225	0.0472
			Resource saving C14	0.1685	0.0358
			Protect equipment C15	0.2193	0.0465
			Environmental protection C16	0.1730	0.0367
			Discouraging uncivilized behavior C17	0.1124	0.0239
			Comment C18	0.1042	0.0221
	Follow up participation B4	0.1104	Organize items C19	0.1978	0.0218
			Share item C20	0.3938	0.0435
			Share feelings C21	0.2426	0.0268
			Lessons learned C22	0.1658	0.0183

5. Conclusions

The evaluation index weight of tourist participation provides a basis for tourist consumption behavior analysis and fuzzy comprehensive evaluation establishment, and construct the Evaluation factor judgment matrix, finds out the Consistency test results and weight of each evaluation factor. At last, we make the Weight coefficient by AHP analytic hierarchy process. In this paper, a determination of evaluation index weight of tourist participation in leisure agricultural tourism has been set up to make the preparation of establishing fuzzy comprehensive evaluation to further analyzing the tourist consumption behavior. The results show that 22 indicator layers suit for the analysis of tourist participation.

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References

[1] Lin Hui, Lin Meizhen. Research on tourist participation level of folk tourism [J]. Journal of Heilongjiang University of Technology, 2014, 14(1): 57-59.

[2] Li Lijuan. Study on the tendency of tourists' participation in value sharing in urban parks -- a case study of Beijing Xiangshan Park [J]. Ecological Economy, 2013, (12): 145-148.

[3] Su Fei, Zhao Lanhua. Factor analysis on the development of leisure agriculture in Jilin -- Taking Fengman District Economic Development Zone as an example [J]. Journal of Agricultural Science Yanbian University, 2015, 37(4): 353-358.

[4] Zhang Lejia. Study on Influencing Factors of leisure agricultural tourism [J].Agricultural engineering, 2017, (01): 116-118.

[5] Zhao Shihong, Chang Xiangyang. Analysis on Influencing Factors of leisure agricultural tourism demand -- An Empirical Study Based on multivariate logistic model [J]. Social Scientist, 2016, (9): 88-93.

[6] Zhang Yujia, Ma Jinyi. Investigation and Analysis on demand tendency of leisure agricultural tourism [J]. Hunan Agricultural Sciences, 2016, (9): 93-96,100.

[7] Han Chen, Imran Rahman. Cultural tourism: An analysis of engagement, cultural contact, memorable tourism experience and destination loyalty [J]. Tourism Management Perspectives, 2018, (26): 153-163.