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Research on the Evaluation of Agricultural Study Tourism Products from the Perspective of Tourists:

-- A Case Study of Dujiangyan Research Base, Chengdu

Erxuan Chen, Yuting Liu, Shengting Jia, Le Jiao, Laisi Tang

College of Business and Tourism, Sichuan Agricultural University, Chengdu, Sichuan, P.R. China

Abstract

This paper takes Dujiangyan City, Chengdu,P.R.China, as the research case. Using the Analytic Hierarchy Process (AHP) as the core methodology, this study constructs an evaluation index system for agricultural study tourism products from the tourist perspective. Subsequently, using the collected tourist questionnaire data, the fuzzy comprehensive evaluation method (FCE) is applied to conduct a systematic assessment of the case site. Based on the evaluation results, targeted practical management suggestions are formulated. The results indicate that the overall evaluation of agricultural study tourism products in Dujiangyan City is satisfactory (scoring 74.923/100), falling between "average" and "good", yet falling short of an "excellent" rating. Specifically, the analysis of individual dimensions reveals significant variation: The Dujiangyan Agricultural Study Tourism Base demonstrates excellent performance in study tourism experience evaluation (A1, score: 80.366) and study tourism value evaluation (A2, score: 75.243), indicating that core aspects of the current management scheme exhibit high quality and have cultivated core competitiveness. However, pronounced deficiencies exist in study tourism facilities (A4, score: 69.284), study tourism services (A5, score: 68.99), and agricultural theme fit (A6, score: 68.502), resulting in the "overall" score failing to reach an "excellent" level.

Keywords

Agricultural study tourism; Visitor Satisfaction; Analytic Hierarchy Process (AHP); Dujiangyan City.

1. Introduction

Study tourism, also known as "study trip" or "research travel", in a narrow sense, refers to off-campus field trips organized by schools and participated in by students, with the main purpose of learning knowledge, understanding society, and cultivating character. In a broad sense, it refers to a form of special tourism with the purpose of research and inquiry learning, undertaken by tourists motivated by cultural curiosity[1]. With the promulgation in 2016 of the "Opinions of the Ministry of Education and Other 11 Departments on Promoting Study Tours for Primary and Secondary School Students", study tourism has developed rapidly. iiMedia Consulting's "2024-2025 China Study Tour Economic Market Operation Monitoring Report" shows that as of July 2024, the number of views of notes on study tours on Xiaohongshu has exceeded 91.39 million, and the number of views on Douyin-related topics has exceeded 3.7 billion. In terms of market, the market size of China's study tour industry reached 146.9 billion yuan in 2023 and is expected to exceed 300 billion yuan in 2028[2]. These data collectively reveal that the current study tourism market has a good development trend, and the development momentum is strong, with immense potential.

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In the context of rural revitalization, rural tourism—an effective way to boost rural economic development—is highly valued by the state. As an ancient civilization and a traditional agricultural country, China boasts rich agricultural and cultural tourism resources, along with great development potential and favorable conditions for rural tourism. In 2019, the State Council issued the *Guiding Opinions on Promoting the Revitalization of Rural Industries*, which emphasized the importance of developing rural tourism for rural revitalization[3]. Since then, rural tourism has gained significant attention. It is evident that agricultural study tourism, as an emerging and popular model within rural tourism, holds great significance for its development.

From the tourism perspective, scholars such as Chen Zhijun have pointed out that the development of agricultural study tours will help further explore the market and inject strong demand into rural revitalization[4]. From the educational perspective, primary and secondary school students generally lack basic agricultural knowledge, making the development of agricultural study tours crucial for preserving and inheriting excellent traditional agricultural culture.

In terms of research, CNKI search results indicate relatively few studies on "agricultural study tourism from the perspective of tourists" and "study tourism on agricultural tourism products." Among them, Zhou Bin et al. employed factor analysis to construct a structural equation model of tourist satisfaction influencing factors in traditional ancient village study tourism trips from a tourist experience perspective. This is the most representative literature in this field with the "tourist perspective" as the research theme[5]. However, overall, relevant studies remain scarce. Some notable studies include:

- Chen Dongjun et al.'s research on the development and progress of study tourism[6];
- Yuan Changlin's research on the design of study tourism curriculum resources[7];
- Yang Nan's research on the development and construction strategies of study tourism bases[8].

Studies from the tourist perspective include:

- Dong Jianying et al.'s research on students' study tourism motivation[9];
- Su Haiyang et al.'s study on the impact of parental decision-making on study tourism consumption[10].

Generally, research on study tourism is insufficient, perspectives are limited, and studies combining tourist perspectives with agricultural study tourism products are particularly lacking. This reflects a significant lag in theoretical research in this field. The disconnect between industrial practice and academic research hinders the long-term, high-quality development of agricultural study tours in China and the implementation of the rural revitalization strategy.

Given this, this study adopts the tourist perspective as its research lens, selecting several agricultural study tourism bases in Dujiangyan City, Chengdu, as case sites. Using the analytic hierarchy process method, it constructs an evaluation and research model for agricultural study tourism products from the tourist perspective.

2. Research Area and Methods

Case Site Overview Dujiangyan City is situated on the northwestern edge of the Chengdu Plain, with a permanent population of approximately 715,400 recorded in 2023. The city is located at the mouth of the Minjiang River and boasts two UNESCO World Heritage Sites: "Qingcheng Mountain-Dujiangyan" and "Giant Panda Habitat." It is rich in cultural tourism resources, exhibits strong tourism development trends, and has relatively mature study tourism bases. For the specific selection of study tourism bases, the following were chosen as case sites:

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Huaxi Farm, Dujiangyan City: Located in Huaxi Village, Puyang Town, Dujiangyan City, it covers an area of about 1,200 acres. The farm adheres to the concepts of green ecology, health, and environmental protection, focusing on the development of diversified projects such as the green organic vegetable industry, eco-tourism, and nature experience. So far, it has successfully received more than 500 enterprises, institutions, and schools. The highest number of receptions in a single day exceeded 1,000, and the cumulative number of receptions exceeded 150,000. Dujiangyan

Chaxi Valley: Located in Puyang Street, Dujiangyan City, Chaxi Valley Farm covers an area of 3,200 acres. It is a multifunctional tea pastoral complex integrating industrial development, cultural display, leisure tourism, health care, agricultural experience, outdoor expansion, social practice, popular science education, research and cultivation, and forest exploration. Relying on local characteristic resources, the farm has innovatively developed a variety of comprehensive formats such as "tea garden + photography base", "tea garden + health preservation", "tea garden + cultural festival", "tea garden + tea art experience", "tea garden + camp", and "tea garden + tea sales", achieving remarkable results.

Dujiangyan Wood Garden: The Wood Garden is located in Qingchengshan Town, Dujiangyan City, close to the Chinese Giant Panda Garden in Dujiangyan City. The farm is known for its unique charm of being next to pandas and away from the hustle and bustle of the city. In terms of project planning, the scenic spot covers several characteristic areas such as garden castles, fruit estates, and organic vegetable gardens, aiming to allow tourists to experience farming culture, get close to nature, and enjoy a different kind of leisure time.

Research Methods and Procedures: The Fuzzy Analytic Hierarchy Process (FAHP), which integrates the Analytic Hierarchy Process (AHP) with Fuzzy Comprehensive Evaluation (FCE), was employed as the core methodology. This method combines qualitative and quantitative analysis. It offers the advantages of clear results and strong systematization, effectively dealing with ambiguous and difficult-to-quantify problems. Consequently, it is suitable for handling various non-deterministic problems. This paper uses the fuzzy hierarchical comprehensive evaluation method as the core approach. From the tourists' perspective, it selects several study - tourism bases in Dujiangyan City, Chengdu as case sites. Then it constructs an evaluation index system, conducts a fuzzy comprehensive evaluation, and performs a comprehensive analysis based on the results. The specific steps are as follows:

1.On the basis of in-depth reading and analysis of the literature related to study tourism, and based on the principles of scientificity, systematicness, and independence, the evaluation and research index system of agricultural study tourism products from the perspective of tourists in Dujiangyan City was preliminarily screened. Subsequently, the method of expert consultation was used to refine and optimize the index system, and an index system containing three levels was constructed.

2. Based on the research results of the index system, the tourist evaluation questionnaire was designed, and effective questionnaire data was obtained by distributing the questionnaire offline in the case sites and collecting the data online. Utilizing this data, the fuzzy comprehensive evaluation method (FCE) was applied to quantify the responses and determine the weight coefficients for the evaluation index system.

3.According to the weight calculation results of the fuzzy index system, the evaluation of agricultural study tourism products in the case sites from the perspective of tourists is completed, and practical suggestions are put forward accordingly.

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3. Construction of the Evaluation Index System of Agricultural Study Tourism Products

Construction of index system. This study refers to the principles of index system construction by Wang Tongtong[11] and Lin Meizhen et al[12]. Based on the principles of scientific, operable and systematic, six criterion layer indicators were preliminarily constructed: study tourism experience evaluation, study tourism value evaluation, study tourism course evaluation, study tourism facility evaluation, study tourism service evaluation and agricultural theme fit. On this basis, the second and third level indicators were gradually screened out, and finally a study tourism index system for the evaluation of agricultural study tourism products based on the perspective of tourists was constructed, and the specific results are shown in Table 1.

Table 1. Study tourism index system for the evaluation of agricultural study tourism products from the perspective of tourists

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Criterion layer	Indicator layer	factor layer
Evaluation of Study tourism experience	Course experience	The curriculum is interesting
		Knowledge absorption rate
	Facility experience	Facility comfort
		Environmental comfort
	Service response	Timeliness of appeal response
		Problem solving satisfaction
Evaluation of Study tourism value	Educational value	Improve practical ability
		Depth of agricultural cultural experience
	Interpersonal values	Member interaction promotes effectiveness
		Teamwork enhances the effect
	Recreational value	Academic stress relief effect
		Physical and mental relaxation is realized
Evaluation of Study tourism courses	Study tourism course content	The curriculum structure is scientific
		The content of the course is rich
	Study tourism course organization	The reasonableness of the project setting
		Tour route satisfaction
Evaluation of Study tourism facilities	Internal facilities	Teaching facilities are complete
		Safety facilities compliance rate
		Staffing standardization
	Exterior facilities	Transportation accessibility and convenience
		Convenience of accommodation and boarding facilities
Study tourism service evaluation	Reception service	Rationality and transparency of charges
		Ease of use of facilities
	Course services	The instructor explains clarity
		Explain the quality of the content
Agricultural theme fit	Knowledge construction	Mastery of local knowledge
		Agricultural science and technology awareness
	Cultural identity	The degree of local emotional correlation
		Agricultural customs are involved
		Participation in agricultural activities

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Table 2. Weight calculation results of the evaluation index system of agricultural study tourism products from the perspective of tourists

Criterion layer	weight	sort	Indicator layer	weight	sort	factor layer	weight
Evaluation of Study tourism experience	0.309	1	Course experience	0.323	13	The curriculum is interesting	0.503
						Knowledge absorption rate	0.497
			Facility experience	0.355	9	Facility comfort	0.500
						Environmental comfort	0.500
Evaluation of Study tourism value	0.209	2	Service response	0.322	14	Timeliness of appeal response	0.500
						Problem solving satisfaction	0.500
			Educational value	0.335	11	Improve practical ability	0.496
						Depth of agricultural cultural experience	0.504
			Interpersonal values	0.339	10	Member interaction promotes effectiveness	0.507
						Teamwork enhances the effect	0.493
			Recreational value	0.327	12	Academic stress relief effect	0.491
						Physical and mental relaxation is realized	0.509
Evaluation of Study tourism courses	0.156	3	Study tourism course content	0.483	7	The curriculum structure is scientific	0.504
						The content of the course is rich	0.496
			Study tourism course organization	0.517	2	The reasonableness of the project setting	0.497
						Tour route satisfaction	0.503
Evaluation of Study tourism facilities	0.136	4	Internal facilities	0.492	5	Teaching facilities are complete	0.336
						Safety facilities compliance rate	0.339
						Staffing standardization	0.325
			Exterior facilities	0.508	4	Transportation accessibility and	0.495
						Convenience of accommodation and boarding	0.505
Study tourism service evaluation	0.123	5	Reception service	0.489	6	Rationality and transparency of charges	0.512
						Ease of use of facilities	0.488
			Course services	0.511	3	The instructor explains clarity	0.497
						Explain the quality of the content	0.503
Agricultural theme fit	0.067	6	Knowledge construction	0.471	8	Mastery of local knowledge	0.502
						Agricultural science and technology awareness	0.498
			Cultural identity	0.529	1	The degree of local emotional correlation	0.327
						Agricultural customs are involved	0.340
						Participation in agricultural activities	0.333

Weight calculation and consistency test. On the basis of completing the construction of the index system, this study adopts the Delphi method and widely consults the opinions of university teachers in the field of tourism management by distributing questionnaires to experts, and obtains their professional opinions on the importance of each component of the

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index system, so as to complete the weight assignment of the evaluation model. At the specific operational level, this paper uses the 1-9 scale method to design the questionnaire based on the constructed evaluation index system. The 1-9 scale method is a widely used decision-making tool in AHP, which aims to quantify the relative importance of different factors by comparing them by comparing them by two by two. With 1 means that the two factors are equally important, and 9 means that one factor is extremely important relative to the other.

In terms of data collection, a total of 6 questionnaires were distributed in this study, and 6 valid questionnaires were successfully returned. Based on the questionnaire results, we obtain the relative importance of each index, and then construct the judgment matrix of each level, and use the sum product method to calculate the weights. In order to ensure the logical consistency of the judgment matrix and reduce the errors caused by subjective judgment, the data must be consistently tested before proceeding to the next calculation.

The specific steps are as follows:

1.Calculate the maximum feature root of the judgment matrix:λ *max*.

2.Use the maximum feature root to calculate the consistency index CI:

$$CI=\frac{\lambda max\text{-}n}{n\text{-}1} \quad (1)$$

is the order of the judgment matrix.

3.Calculate the consistency ratio CR:

$$CR=\frac{CI}{RI} \quad (2)$$

(where RI is the stochastic consistency index, and its value is determined according to the matrix order lookup table). When CR<0.1, the judgment matrix has satisfactory consistency, indicating that the weight allocation result has high confidence. When CR≥0.1, the judgment matrix readjust readjusted to improve its logical consistency. The calculated consistency ratio (CR) of all matrices in this index system is less than 0.1, which meets the logical consistency requirements of the analytic hierarchy process, indicating that the weight calculation results are valid. The specific results of weight calculation are detailed in Table 2.

4. Fuzzy Comprehensive Evaluation of Tourist Satisfaction

Questionnaire design and survey. Given that this study focuses on the tourist perspective, tourist satisfaction data were collected via questionnaire surveys. The questionnaire is designed based on the weighting results of the evaluation index system in the previous part, using a five-level Likert scale, 1-5 corresponds to five options of strongly disagree to strongly agree, and the higher the score, the higher the degree of agreement. The questionnaire, designed based on the evaluation index system for agricultural study tourism products from the tourist perspective in Dujiangyan City, Chengdu, incorporated a comprehensive research scale. During questionnaire distribution, recognizing that some primary and secondary school students might have cognitive limitations affecting their ability to independently complete the questionnaire, alternative methods were employed. These included structured interviews with the students or having parents guide them or complete the questionnaire on their behalf. From June to July 2025, the questionnaire will be distributed to primary and secondary school students and their parents who have had several case study and tourism experience in Dujiangyan City through the questionnaire star mini program. At the same time, for tourists who are younger and have limited cognitive ability, the questionnaire is filled out by using

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structured interviews or parental guidance and filling in on behalf of tourists. A total of 313 questionnaires were distributed, with 312 returned and 302 deemed valid. This represents a recovery rate of 99.6% and an effective rate of 96.7%, both meeting the requirements for the study.

Principles of Fuzzy Matrix Construction. To process the collected data, it is necessary to construct a judgment matrix first. The judgment matrix is used to represent the relative importance of each related element in the previous level. For example, in the indicators A1, A2, A3, A4, A5, and A6 under the target layer A, if A1 and A1 are equally important, it will be marked as 1, that is, mark 1 in column A1 of row A1; If A1 is slightly more important than A2, mark 3 in column A2 in row A1 and 1/3 in row A2; if A1 is significantly more important than A3, mark 5 in column A3 in row A1 and mark 1/5 in column A1 in row A3..... and so on, until the two-by-two comparison of all indicators at this level is completed, and finally the following judgment matrix is formed.

$$A=\begin{bmatrix} A & A_1 & A_2 & \cdots & A_n \\ A_1 & a_{11}=\frac{A_1}{A_1} & a_{12}=\frac{A_1}{A_2} & \cdots & a_{13}=\frac{A_1}{A_n} \\ A_2 & a_{21}=\frac{A_2}{A_1} & a_{22}=\frac{A_2}{A_2} & \cdots & a_{2n}=\frac{A_2}{A_n} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ A_n & a_{n1}=\frac{A_n}{A_1} & a_{n2}=\frac{A_n}{A_1} & \cdots & a_{nn}=\frac{A_n}{A_n} \end{bmatrix} \quad (3)$$

For any judgment matrix, the following conditions should be met,

$$\begin{cases} a_{ii}=1 \\ a_{ij}=\frac{1}{a_{ji}} \end{cases} \quad (i, j=1, 2, \cdots, n) \quad (4)$$

Table 3. Relative importance scale and its meaning

Relatively important level	meaning
1	Factor i is as important as factor j
3	Factor i is more important than factor j
5	Factor i is much more important than factor j
7	Factor i is more important than factor j
9	Factor i is extremely important than factor j
2,4,6,8	The median value of the above adjacent judgment is used when compromised
reciprocal	Factor i is compared with factor j to get aij, and factor j is compared with factor i to get 1/aij

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According to the five-level score corresponding to the evaluation index, the evaluation set E={E1, E2, E3, E4, E5}={Very important, important, average, unimportant, very unimportant}={5, 4, 3, 2, 1}, using the statistical method of fuzzy comprehensive evaluation, the fuzzy evaluation matrix of A1, A2, A3, A4, A5, A6 R1, R2, R3, R4, R5, R5, After R6 is calculated, the fuzzy comprehensive evaluation matrix of the three-level index is obtained, and the weighted average M $(\cdot,\oplus)$ operator is used for fuzzy calculation.

Fuzzy matrix calculation. Based on the above design principles, the data of tourists is calculated in SPSS software, and the data are obtained as follows.

The evaluation level of study tourism experience evaluation is R1

$$R_1=\begin{bmatrix}0.1224 & 0.1590 & 0.1986 & 0.2319 & 0.2881\\ 0.0695 & 0.1060 & 0.1755 & 0.3195 & 0.3295\\ 0.1140 & 0.1640 & 0.1920 & 0.2780 & 0.2520\end{bmatrix}$$

The evaluation level of study tourism value evaluation is R2

$$R_2=\begin{bmatrix}0.0861 & 0.1475 & 0.2032 & 0.2896 & 0.2731\\ 0.0512 & 0.1523 & 0.2541 & 0.2799 & 0.2733\\ 0.0467 & 0.1690 & 0.2648 & 0.3084 & 0.2019\end{bmatrix}$$

The evaluation level of the study tourism course evaluation is R3

$$R_3=\begin{bmatrix}0.0874 & 0.2054 & 0.3648 & 0.1834 & 0.1590\\ 0.1340 & 0.1604 & 0.1920 & 0.2630 & 0.2500\end{bmatrix}$$

The evaluation level of study tourism facility evaluation is R4

$$R_4=\begin{bmatrix}0.0837 & 0.4275 & 0.1873 & 0.3023 & 0.3010\\ 0.0529 & 0.0960 & 0.2156 & 0.3395 & 0.2960\end{bmatrix}$$

The evaluation level of study tourism service evaluation is R5

$$R_5=\begin{bmatrix}0.0572 & 0.1520 & 0.3708 & 0.2722 & 0.1478\\ 0.1260 & 0.1289 & 0.1985 & 0.2570 & 0.2896\end{bmatrix}$$

Rating R6 for agricultural theme fit

$$R_6=\begin{bmatrix}0.1225 & 0.1740 & 0.2750 & 0.2100 & 0.2185\\ 0.0808 & 0.1235 & 0.1842 & 0.3165 & 0.2950\end{bmatrix}$$

In order to make the implementation effect of the policy clearer and more intuitive, the evaluation set V=[v1, v2, v3, v4, v5]= [very poor, poor, average, good, excellent] is quantified by percentage, and the evaluation grade value V=(50,60,70,80,90) is quantified.

Therefore, the evaluation score of the study tourism experience:

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$$W_1=[\ 0.323\ \ 0.355\ \ 0.322\ ]$$

$$A_1=W_1*R_1=[0.0209\ \ \ 0.0918\ \ \ 0.1083\ \ \ 0.3878\ \ \ 0.3912]$$

$$0.0209*50+0.0918*60+0.1083*70+0.3878*80+0.3912*90=80.366$$

study tourism value evaluation score:

$$W_2=[\ 0.335\ \ 0.339\ \ 0.327\ ]$$

$$A_2=W_2*R_2=[0.0600\ \ \ 0.1563\ \ \ 0.2408\ \ \ 0.2927\ \ \ 0.2502]$$

$$0.0600*50+0.1563*60+0.2408*70+0.2927*80+0.2502*90=75.243$$

Evaluation score of the study tourism course:

$$W_3=[\ 0.483\ \ 0.517\ ]$$

$$A_3=W_3*R_3=[0.1115\ \ \ 0.1821\ \ \ 0.2755\ \ \ 0.2246\ \ \ 0.2063]$$

$$0.1115*50+0.1821*60+0.2755*70+0.2246*80+0.2063*90=72.294$$

Evaluation score of study tourism facilities:

$$W_4=[\ 0.492\ \ 0.508\ ]$$

$$A_4=W_4*R_4=[0.1681\ \ \ 0.2591\ \ \ 0.2017\ \ \ 0.2212\ \ \ 0.2988]$$

$$0.1681*50+0.2591*60+0.2017*70+0.2212*80+0.2988*90=69.284$$

study tourism service evaluation score:

$$W_5=[\ 0.492\ \ 0.508\ ]$$

$$A_5=W_5*R_5=[0.1924\ \ \ 0.1902\ \ \ 0.2628\ \ \ 0.2344\ \ \ 0.1202]$$

$$0.1924*50+0.1902*60+0.2628*70+0.2344*80+0.1202*90=68.99$$

Agriculture Theme Fit Score:

$$W_6=[\ 0.471\ \ 0.529\ ]$$

$$A_6=W_6*R_6=[0.1804\ \ \ 0.2573\ \ \ 0.2970\ \ \ 0.1190\ \ \ 0.1562]$$

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0.1804*50+0.2573*60+0.2970*70+0.1190*80+0.1562*90=68.502

Overall score:

A=W*R= [0.095 0.1440 0.2064 0.2829 0.2712]

0.095*50+0.1440*60+0.2064*70+0.2829*80+0.2712*90=74.923

5. Conclusions and Recommendations

Main conclusions. Based on the above analytic hierarchy process results and fuzzy comprehensive evaluation calculations, the following conclusions are drawn in this study. In terms of overall evaluation, the performance of agricultural study tourism products in Dujiangyan City is basically qualified, with a comprehensive score of 74.923 points (100 points), between "average" (70 points) and "good" (80 points). This shows that the tourist group is relatively satisfied with Dujiangyan City's agricultural tourism products.

In terms of specific indicator data, based on scores and weights, the performance of each dimension shows obvious differentiation, which can be divided into the dominant dimension (score ≥75), the moderate dimension (70≤ score <75) and the disadvantage dimension (score). <70).

In terms of advantage dimensions, it includes two criterion level indicators: A1 study tourism experience evaluation (80.366) and A2 study tourism value evaluation (75.243). A1 has the highest evaluation weight (0.309), with a score of 80.366, which has reached an excellent level. In terms of factor layer, "facility comfort" and "course interest" are particularly outstanding, which shows that they have become the core competitiveness of various study tourism bases in Dujiangyan City. The weight of A2 study tourism value evaluation (75.243) is the second highest (0.209), although the score exceeds the general level, it has not yet reached a good level, and the tourist evaluation is relatively low. Among them, the contribution of "educational value" is significant (the score of practical ability improvement is high), but the lack of "recreation value" as an indicator layer has dragged down the overall performance (the score of physical and mental relaxation is low), resulting in a relatively low evaluation of tourists.

In the medium dimension, only the evaluation of A3 study tourism courses (72.294) has a weight of 0.156, and the score barely exceeds the general level, indicating. In the index layer analysis, the performance of the course content is better than that of the curriculum organization (the score of the rationality of the project setting is low), which reflects that the curriculum design of the Dujiangyan Study Tourism Base is relatively reasonable, but it is still insufficient at the actual implementation level.

In terms of disadvantage dimension, it includes three indicators: A4 study tourism facility evaluation (69.284), A5 study tourism service evaluation (68.990) and A6 agricultural theme fit (68.502). Among them, the weight of the A4 study tourism facility evaluation is 0.136, which is close to the lower limit of the general level. Its internal facilities (low safety facility compliance score) and external facilities (average transportation accessibility score) both performed poorly, reflecting tourists' dissatisfaction with the facility configuration of Dujiangyan Agricultural study tourism Base. The weight of the A5 study tourism service evaluation is 0.123, ranking second from the bottom. Among them, the problems of reception services (very low scores for fee reasonableness and transparency) and course services (medium scores for the clarity of tutors' explanations) are prominent, and the questionnaire survey shows that the negative rate of "fee transparency" is high, highlighting the strong

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dissatisfaction of tourists with charging problems. A6 The weight of agricultural theme fit was the lowest (0.067) and the lowest score. The performance of knowledge construction (average score of agricultural science and technology awareness) and cultural identity (low score of agricultural customs involvement) are not good, indicating that the agricultural characteristics of agricultural study tourism products in Dujiangyan City are insufficient, and there is a significant disconnect from the positioning of "agricultural study tourism".

To sum up, the comprehensive score of agricultural study tourism products in Dujiangyan City is 74.923 points, which is between "average" (70 points) and "good" (80 points). This evaluation score can show that tourists' evaluation of Dujiangyan City's agricultural study tourism products is relatively good, but there is still a lot of room for improvement. Specifically, the Dujiangyan Agricultural Study Tourism Base has excellent performance in the two indicators of educational experience and value dimensions, indicating that the current management plan has good quality and formed its own core competitiveness. However, there are obvious shortcomings in terms of facilities, services and theme fit, resulting in its overall score not reaching an excellent level.

Management suggestions. Based on the above analysis results, the following suggestions are put forward for the management of agricultural study tourism products.

1.Consolidate the dimension of advantages: strengthen core experience and value perception. According to the survey results, the comfort of the facilities and the fun of the courses in the current case sites are good, and the participation and immersion of tourists should be further enhanced through regular maintenance of facilities, the introduction of new interactive equipment (such as VR/AR technology), and the addition of immersive experience projects. In terms of diverse needs, according to the needs of tourists of different ages and educational backgrounds, study tourism courses should be set up at different levels and themes to enhance the interest and practicality of the courses to meet diverse needs. In terms of practical improvement, we should consolidate our advantages and further optimize the effect of practical ability training, such as introducing teaching methods such as agricultural labor practice and project-based learning, to improve students' hands-on ability. In terms of recreation, it is recommended to improve the physical and mental relaxation experience of tourists by adding leisure space, optimizing the design of circulation lines, and enriching entertainment projects, so as to ensure the smooth realization of the organic combination of study tourism and leisure.

2.Optimize the medium dimension: improve the efficiency and depth of course implementation. In view of the current curriculum problems, attention should be paid to refined control project settings, time arrangements and personnel division to ensure smooth and efficient course implementation. In terms of course content, we should widely collect feedback from tourists with the help of questionnaires, interviews and other means, and build a dynamic adjustment mechanism to ensure continuous improvement of course content and structure.

3.Make up for the disadvantage dimension: focus on breaking through the bottleneck of facilities, services and theme fit. Safety is no small matter. As a disadvantage dimension, it is urgent to improve the compliance rate of safety facilities. Specific measures should include: adding firefighting equipment, emergency facilities and medical points to ensure the safety and security of tourists. In terms of transportation optimization, we should work closely with the transportation department to optimize the public transportation routes to the study tourism base, and significantly improve the accessibility of the base by adding shuttle buses or shared bicycle points. In view of the lack of tutor explanation level, education and training should be carried out regularly to comprehensively improve the communication ability, service awareness and professional knowledge level of reception staff and tutors. In terms of fees, in response to the current dissatisfaction of tourists, the charging items and standards should be made public to put an end to "invisible consumption", so as to enhance the trust and satisfaction of tourists. In terms of service optimization, it is recommended to optimize the whole process

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of services such as reservation, reception, explanation, and feedback to ensure the coherence of the overall service and improve the overall experience of tourists. In the course content and display design, it is recommended to highlight elements such as agricultural science and technology, traditional farming culture, and local customs to enhance the uniqueness and cultural identity of study tourism products. In view of the serious problem of the current lack of agricultural culture, it is recommended to deepen tourists' understanding of agricultural science and technology and agricultural culture and enhance the cognitive value of product agriculture by adopting a combination of interactive display, practical operation, expert lectures and other methods.

Research limitations and future directions. This study uses the combination of analytic hierarchy process and fuzzy comprehensive evaluation method to investigate and evaluate three agricultural study tourism bases in Dujiangyan City from the perspective of tourists. However, due to the limited research capacity, this paper has many shortcomings, as follows:

1.Regional limitations. The study tourism objects are concentrated in three study tourism bases in Dujiangyan City, and the sample coverage is limited, and the conclusions may not fully represent the overall level of agricultural study tourism products in China.

2.Sample group singleness. The impact of differences in the needs of tourists of different ages (primary/junior high/high school) on the evaluation was not subdivided.

3. Cross-sectional data (June-July 2025) were used in the study, and seasonal changes or long-term effects were not tracked.

In terms of future research directions, the breadth and depth of research can be expanded, such as comparing the differentiated evaluation system of study tourism products in different agricultural types of areas. Incorporate multiple evaluation dimensions such as schools, base operators, and local governments to build a collaborative development model.

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