FAHP on the Development of Exhibition Ecological Education

Lin Yang

Jinhua Polytechnic, Jinhua, ZheJiang,321000, China
Email:860814235@qq.com

Abstract. Based on the research findings of some experts, this article tries to construct the index system of the sustainable development of exhibition ecological education and the assessment model with the utilization of FAHP. In the meantime, it conducts the fuzzy Comprehensive assessment with the case study of Jinhua Polytechnic.

1. Preface

Fuzzy analytic hierarchy process (FAHP) is the method of the union of the analytic hierarchy process and fuzzy comprehensive assessment. Its main idea can be used to guide the quatity assessment of exhibition ecological education.

The theory and practice of exhibition ecological education are still in the exploratory stage in China.Theoretically, in the VIP using "exhibition ecological education" as the keyword search can only find 9 relevant literature, and research, focused on ecological rather than education; in practice, the author can only collect 20 items of related exhibition projects of ecological education, including some still in the enactment of laws and regulations related to the implementation stage yet, or still in the pilot phase.

The status of ecological education constitutes two difficulties in practice, but also two major difficulties in the completion of this paper: (1) how to establish the assessment indicators of the exhibition ecological education projects of sustainable development; (2) how to evaluate construction completed indicators by quantitative and qualitative analysis.

2. Construct Sustainable Development Index System Of exhibition Ecological Education

China's exhibition ecological education mechanism is reflected in the subject of education, education objects, methods and means, in order to filter out the most closely, the most representative indicator of the three areas. In the research process, the article chose the current being implemented or planned 10 exhibition projects as ecological education study sample, first of all, collected relevant data online, found out the problem, then conducted a telephone survey to separated interests body in the implementation of various projects to collect the figures, to grasp the main factors affecting project implementation, determine the relevant assessment system.

2.1. Sample Analysis

As ecological education of exhibition pilot project is still in the exploratory stage, data accuracy is so difficult to be assured that the relevant assessment index system is not established. Therefore, this paper adopts the combination of qualitative and quantitative survey methods, the establishment of ecological education of exhibition sustainable development assessment system.

Table 1. Overview Analysis of Samples of Exhibition Ecological Education

number	Project name	Education Performance
1	Jinhua Polytechnic	Drawing lessons from the concept of "ecological" education and taking "ecological integration" and "ecological sustainable development" as the guiding principles of education, a comprehensive training plan for convention and exhibition education is formulated
2	Tourism College of Zhejiang	Reasonably construct the framework of in-class education, form a three-dimensional intersecting spatial relationship, and form a healthy ecosystem
3	Fujian Institute of Economics and Trade	Through the intergrowth and complementarity of theory, practice and students, school teaching and Exhibition industry, and through the combination of ecological education among various disciplines, elements and professionals.
4	Shenzhen polytechnic	Guided by the "ecological education concept" and following the professional rules, the teaching structure system should be constructed.

2.2. Indicators Establishment
First of all, based on the related research, determing exhibition ecological education level indicators: the education subject, education object, education standard, education style and education financial security. On this basis, using the Delphi method, invite experts to filter the primary evalution indicators and keep the balance with the changeof its real impact on the community.
Secondly, the use of survey questionnaires, using Likert five scale implementation of the project of tourist ecological education to measure the impact of assessment indicators. Statistical analysis of survey results follows the table.

Table 2. The Main Factors of Exhibition Ecological Education Effect (Note: R values refer to Table 3)

factor number	R1-1	R1-2	R1-3	R2-1	R2-2	R2-3	R2-4	R3-1	R3-2	R3-3	R4-1	R4-2	R4-3	R5-1	R5-2	R5-3
1			4			4.2	3	5	5	4			5		4	2
2		4	4.8	4.4	4		4	5	5		4		5	4.2		4.5
3			3.6		4	4.5	5	5	4			4	5		4.5	4.7
4			4		4.8			5	5	4.6			5		4	
5		4.8	4	4.2	3.8	4.3		5	5				5		4	
6			4.2		4			5	5	4		4.1	5		4	
7	4.2	4	3.8	3	4	3.8		5	5	4.5	4.5		5	4.5	4	
8	4.5	4	4.6	4.5			4.5	5	5	3.9	4		5	4	4	4
9		5	4	3.8		3.7		5	5	4	3.7	4	5	4.2	4.2	4.2
10	3.6		4.2					5	5				5	2.8	4.2	

2.3. The Establishment of Index System
In the above survey and assessment framework, under the basic idea of FAHP and the practical needs of sustainable development of exhibition, this article will divide ecological education assessment index system of sustainable development into three levels, the target layer (highest level), criteria layer (middle layer) and the index layer (bottom).

Table 3. Exhibition Indicators of Sustainable Development of Ecological Education System

Target layer G	Criteria layer C	Index layer P	
The indicators system of sustainable development of ecological education	education Subject R_1	education audience	R_{11}
		education Implementer	R_{12}
		education controller	R_{13}
	education object R_2	Regional ecological function	R_{21}
		exhibition resource	R_{22}
		Ecological Environment	R_{23}
		education resources	R_{24}
	education Standard R_3	Equity of education Standard	R_{31}
		Education amount	R_{32}
		Affordability of education	R_{33}
	education Style R_4	Policy education	R_{41}
		Project education	R_{42}
		ecostype education	R_{43}
	education Financial securityR_5	Government education	R_{51}
		Market education	R_{52}
		Legal penalty	R_{53}

3. The Implementation Steps of the Sustainable Development Assessment on exhibition Ecological Education Project

3.1. Solve the Index Weight Of Assessment With FAHP

In this paper, based on preliminary investigation, issued 60 questionnaires, 50 valid questionnaires. According to survey statistics order to obtain the average value of each index, and establish into the following six comparison matrix.

Matrix of G-R:
$$\begin{pmatrix} 2 & 1 & 1/4 & 1/2 & 1/3 \\ 1/3 & 1 & 1/2 & 1/2 & 1/3 \\ 3 & 2 & 2 & 1/3 & 1/2 \\ 3 & 2 & 1 & 2 & 3 \\ 2 & 3 & 1/3 & 1/2 & 1 \end{pmatrix}$$

Matrix of R1: judgement matrix
$$\begin{Bmatrix} 1 & 2 & 1/4 \\ 2 & 1/3 & 1/2 \\ 1 & 2 & 1/3 \end{Bmatrix}$$

Matrix of R2:
$$\begin{Bmatrix} 1 & 2 & 1/3 & 1/4 \\ 1/2 & 1/3 & 1/3 & 2 \\ 2 & 2 & 1/3 & 1/2 \\ 2 & 1 & 1 & 1 \end{Bmatrix}$$

Matrix of R3: -P
$$\begin{Bmatrix} 1 & 2 & 2 \\ 1 & 1 & 2 \\ 1/2 & 1/3 & 1/4 \end{Bmatrix}$$

Matrix of R4-P:
$\left\{\begin{array}{ccc} 1 & 2 & 1 \\ 1/3 & 1/4 & 1/3 \\ 1 & 2 & 2 \end{array}\right\}$

Matrix of R5:
$\left\{\begin{array}{ccc} 1 & 2 & 1 \\ 2 & 1/2 & 1/2 \\ 1/2 & 1/2 & 1/3 \end{array}\right\}$

Make use of FAHP, according to statistics data, expert opinions and analysis personnel recognition, and with reference to pairs of qualitative analysis of various factors, various indicators compare the relative importance of two, tectonic model of fuzzy consistent matrix, and then to single-level sorting, solving the weight of each index (accordiing to Table 5).

Table 5. Weights of Exhibition Ecological Education Projects

Criteria layer	R_1		R_2		R_3		R_4		R_5	
weight	0.0977		0.0763		0.3458		0.3879		0.1924	
index layer& weight	R_{11}	0.310	R_{21}	0.1182	R_{31}	0.4922	R_{41}	0.3404	R_{51}	0.4558
	R_{12}	0.3402	R_{22}	0.2885	R_{32}	0.3533	R_{42}	0.2254	R_{52}	0.3886
	R_{13}	0.3498	R_{23}	0.2412	R_{33}	0.1545	R_{43}	0.4342	R_{53}	0.1556
			R_{24}	0.3521						

The Judgement matrit of the largest eigenvalue, respectively 5.1765,3.0845,4.2541,3.0340,3.0701,3.0464, CR values were 0.0394,0.0728,0.0941,0.0371,0.0604,0.040, are less than 0.10, so all through the consistency test, the above weight of each index level are valid.

3.2. Comprehensive Assessment of Exhibition Ecological Education Projects with Fuzzy Comprehensive Assessment

Using FAHP to calculate ecological education of exhibition relative importance of each indicator quantitatively, you can use fuzzy comprehensive assessment method to calculate for sustainable development level of a exhibition ecological education projects. For example, Jinhua Polytechnic scenic ecological education programs, fuzzy comprehensive assessment are as follows:

3.2.1. Single-level Assessment of Ecological Education of the Jinhua Polytechnic

The establishment of a scenic area staff, Jinhua Polytechnic residents and experts as panel of judges, according to the index contains specific assessment requirements, the assessment team reviews the given set V = (very good, good, ordinary, poor, very bad). And the establishment of this assessment based on fuzzy assessment matrix (Accoring to Table 6).

Table 6. Fuzzy Assessment Matrix of Sustainable Development of Ecological Education on Jinhua Polytechnic

assessment Factors		assessment grade				
		Well	good	normal	bad	worse
education Subject R_1	education audience R_{11}	0.3	0.2	0.2	0.2	0.1
	education Implementer R_{12}	0.2	0.3	0.2	0.2	0.1
	education controller R_{13}	0.1	0.4	0.1	0.2	0.2
education object R_2	Regional ecological function R_{21}	0.2	0.2	0.3	0.2	0.1
	exhibition resource R_{22}	0.3	0.1	0.3	0.2	0.1
	Ecological Environment R_{23}	0.1	0.2	0.3	0.2	0.2
	education resources R_{24}	0.1	0.2	0.3	0.2	0.2
education Standard R_3	Equity of education Standard R_{31}	0.1	0.2	0.2	0.3	0.2
	education amount R_{32}	0.1	0.2	0.2	0.2	0.3
	Afford ability of education R_{33}	0.1	0.3	0.2	0.2	0.2
education Style R_4	Policy education R_{41}	0.2	0.1	0.2	0.4	0.1
	Project education R_{42}	0.2	0.3	0.3	0.1	0.1
	ecostypes education R_{43}	0.1	0.2	0.2	0.3	0.2
education Financial security R_5	Government education R_{51}	0.2	0.1	0.2	0.2	0.3
	Market education R_{52}	0.2	0.2	0.2	0.3	0.1
	Legal penalty R_{53}	0.2	0.2	0.2	0.2	0.2

Specific method is to invite 10 experts to assess every indicator, finally, take the probability in judgment set. For example, the education audience indicator in education subject is 0.3; means in 10 experts 3 have said that indicator is better. Among them, the education subject indicators layer is the fuzzy matrix B_{1j}, the weight coefficient is A_1, calculate the index level of comprehensive assessment matrix.

$$R_1 = A_1 \times B_{1j} = （0.340\ 0.3017\ 0.3493）\times$$

$$= （0.1371\ 0.3274\ 0.3681\ 0.1342\ 0.1342$$

$$\begin{Bmatrix} 0.3 & 0.3 & 0.3 & 0.1 & 0.1 \\ 0.1 & 0.3 & 0.3 & 0.3 & 0.3 \\ 0.1 & 0.1 & 0.3 & 0.3 & 0.3 \end{Bmatrix}$$

The above results were normalized as

$$R_1 = (0.1386 \quad 0.3295 \quad 0.3705 \quad 0.1357 \quad 0.1357)$$

Using the same method to get other indicators' comprehensive assessment matrix.

$$R_2 = (0.1187 \quad 0.3000 \quad 0.3220 \quad 0.3000 \quad 0.1593)$$

$$R_3 = (0.1000 \quad 0.3495 \quad 0.3505 \quad 0.3000 \quad 0.3000)$$

$$R_4 = (0.1572 \quad 0.3360 \quad 0.3000 \quad 0.1534 \quad 0.1534)$$

$$R_5 = (0.1844 \quad 0.3000 \quad 0.3000 \quad 0.3000 \quad 0.1156)$$

3.2.2. Ecological Education Project of the Jinhua Polytechnic Scenic Multi-level Assessment

The assessment results will be integrated, form index layer fuzzy assessment matrix B_i. According to AHP to determine the combination factor A, get the final result, and for normalization.

$$R = A \times B_i = (0.1428 \quad 0.3928 \quad 0.3116 \quad 0.1774 \quad 0.1335)$$

3.2.3. Assessment Results and Analysis

According to the principle: maximum degree of membership to determine the assessment rating, which in the final membership matrix, in composite indicator which indicator assessed higher levels of membership, will have to determine the assessment target as the assessment grade. The comprehensive assessment index for the maximum degree is 0.3908, the corresponding assessment rating of "good". This shows that current Jinhua Polytechnic' ecological education is in a healthy state of sustainable development. Through the establishment of score ratings vector, specific score can be calculated, setting the corresponding score assessment for each grade vector.

$$E = (93 \ 85 \ 75 \ 60 \ 42)^T$$

Calculated the final assessment score

$$Z = R \times E = 71.35474$$

4. Conclusion

According to the calculation results, through analysis of sustainable development level of exhibition ecological education projects in China. Find gaps and shortcomings and propose improvement measures. Jinhua Polytechnic's ecological education programs generally are in the forefront of similar projects in our country, but the final score was low, indicating the project of exhibition ecological education overall level in China is low. And the Jinhua Polytechnic has significant gaps in the education subject, education object recognition; need to take appropriate measures for improvement. In addition, the randomness of the assessment process, evaluator's subjective uncertainty and ambiguity in understanding cause a certain degree of subjective assumptions, so there are some errors in assessment results.

4.1. Constructing Ecotype Teaching System Based on Exhibition Specialty Characteristics

Exhibition is a multi-disciplinary comprehensive cross-disciplinary specialty. It is an information dissemination activity aiming at information exchange and visual communication. It is also a highly integrated platform for information dissemination and exchange in art space, involving a wide range of knowledge and strong technical operability. Due to the different scale and themes of "convention and exhibition activities", there are different conferences and exhibition forms with different sizes and themes, such as politics, economy, culture, sports and religion. They involve economics, management, informatics, tourism, architecture, linguistics, transportation, port science, art, environmental science, statistics and beauty. Learning, body etiquette, etc.

4.2. Subdividing the Direction of Specialty and Cultivating it in Accordance with Each Other to Embody the "Specialty and Precision"

In the training of exhibition planning, management and design, undergraduate education in Colleges and universities can draw lessons from the concept of "ecological" education, take "ecological integration" and "ecological sustainable development" as the guiding principles of education, formulate the training plan of exhibition education in an all-round way, reasonably construct the

framework of in-class education, and form a three-dimensional education. Cross spatial relationships form a healthy ecosystem. Eco-education concept aims at improving students' comprehensive quality and creativity. It aims at establishing teachers and students through the multi-level and mutually reinforcing relationship among exhibition theory, professional practice and students, school teaching and exhibition industry, and through the combination of multi-disciplines, multi-elements and multi-professionals in eco-education. Students learn and practice together in a learning environment to cultivate high-quality professionals for exhibition majors.

4.3. Setting up "Wide and Deep" Degree of Basic Teaching of Exhibition
The undergraduate education of exhibition is one of the important ways to cultivate core and auxiliary talents of exhibition. Good teaching environment, basic teaching system and sound educational system provide students with opportunities to learn basic knowledge of exhibition specialty. Especially in comprehensive universities, the advantages of multi-disciplines are embodied in the blending of knowledge and professional exchanges, which provide students with a wide range of knowledge sources, can meet the requirements of exhibition talents for "wide" knowledge and "deep" professional knowledge and theory, and lay a good foundation for professional learning. "Subdividing professional orientation and counterpart training" has created conditions for students' professional training. For Convention and exhibition majors with strong creativity, the superior hardware teaching conditions and abundant educational technology of undergraduate education provide guarantee for students to open up their thinking and cultivate their creative consciousness, which is conducive to the cultivation of students' creative ability.

5. References

[1] ZHANG Jijun. Fuzzy Analytical Hierarchy Process. Fuzzy Systems and Mathematics [J].2012 (2): 80-82
[2] LAI QIfu, CHEN Guisong, HUANG Xiujuan. Benefit assessment of Forest exhibition Lodging Facilities Based on AHP [J]. Journal of Xiangfan University, 2019 (1): 84-88
[3] Chang Dayong, Zhang Dayong, Zhang Lili. Economic management in fuzzy mathematics [M].Beijing: Beijing Economic College Press, 2015.