Brand Innovation Performance Evaluation of China's Art Education Enterprises Based on AHP and Fuzzy Comprehensive Evaluation

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Abstract
This study investigated the evaluation system of brand innovation effectiveness in art education enterprises. This study combines the Analytic Hierarchy Process (AHP) with the fuzzy comprehensive evaluation method to propose a new framework for evaluating brand innovation performance. Applying this framework can make the evaluation results more scientific, accurate, and objective. Specifically, an evaluation index set was created around the key content of brand innovation implementation, and the weights of factors and sub-factors were estimated using the AHP. On this basis, the fuzzy comprehensive evaluation method is adopted to evaluate the brand innovation performance. A case study was used to illustrate the framework, using a self-management questionnaire and a fuzzy comprehensive evaluation method to analyze 537 samples empirically. This study found that the case has shortcomings in potential customer attraction, brand culture penetration, community marketing ability, service process refinement, digital teaching form application ability, and internal control ability under executive centralized management, and proposed optimization suggestions. The conclusion drawn from this study is that: Firstly, managers of art education enterprises have insufficient understanding of brand innovation, and the overall process is in the exploratory stage. Secondly, the effectiveness of brand innovation requires reasonable planning, effective organization and coordination, continuous adjustment based on external and internal changes, and accumulation and sedimentation to achieve innovative results. Thirdly, brand innovation is a comprehensive work from multiple perspectives, and good brand building cannot be achieved without an effective management model. To be effective in brand innovation, businesses must recognize that their management systems must constantly adapt to new regulations, demographics, and phases.
Keywords: Brand Innovation, Brand Innovation Performance Evaluation, Chinese Art Education Enterprise, AHP, Fuzzy

Introduction
Over the past forty years, China has made rapid progress in its development during the reform and opening up, and has achieved fruitful results in political, cultural, economic, and other

fields of construction. The continuous development of the economy and the continuous improvement of infrastructure have continuously improved the living standards of the people, providing a solid consumption foundation for the art education industry. According to the National Bureau of Statistics (2024), in 2023, the per capita disposable income of Chinese residents was 39218 yuan, a nominal increase of 6.3% compared to the previous year. The per capita consumption expenditure of Chinese residents was 26796 yuan, a nominal increase of 9.2% compared to the previous year. After deducting the influence of price factors, the actual growth was 9.0%. The per capita expenditure on education, culture, and entertainment was 2904 yuan, an increase of 17.6%, accounting for 10.8% of the per capita consumption expenditure. The level is higher compared to previous years. Education expenditure has become one of the major sources of household consumption.

In 2021, the proposal of the Double Reduction Policy (2023), accelerated the penetration rate of quality education and rapidly expanded the industry scale. With the shrinkage of the subject education and training market, the demand for user training is shifting towards quality education, and its penetration rate is expected to increase rapidly, reaching a level of 31% by 2025. The art education and training market in China is showing a continuous heating up. In the past few years, the Chinese art training market has shown a trend of rapid growth and diversification (Zhiyan Consulting, 2023).

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Table 1
Scale of China's Art Education Market (2023-2025)

Year	Market size (100 million yuan)
2019	795
2020	860
2021	912
2022	983
2023	1028
2024	1106
2025	1177

Source: Zhiyan Consulting (2023)

A brand is the symbol that distinguishes a company and its products (or services) from its competitors. Brand innovation is the individual or combined innovation of the constituent elements of a brand by a company based on the needs of market competition and changes in consumer demand, to establish a new brand image (Lin et al., 2022; Blagojce, 2023). In a highly complex and uncertain market environment, brand innovation is not only an important

measure for enterprises to overcome brand aging and improve market value, but also a fundamental way to cultivate and enhance their core competitiveness (Gonzalez et al., 2016).

There are not many successful cases of brand innovation in Chinese enterprises. Apart from the lack of brand innovation awareness and experience, an important issue is the key content and evaluation mechanism of enterprise brand innovation, the fuzziness around the key content of enterprise brand innovation and its evaluation mechanism has become a key issue hindering successful brand innovation. The theoretical community has not formed a consistent conclusion (Qin, 2023; Peredy et al., 2022). Identifying the key content of brand innovation and establishing an evaluation mechanism is of great practical significance for guiding enterprises to effectively carry out brand innovation and enhance brand market competitiveness (Abdirahmonovich et al., 2021).

Given the important role of brand innovation in enhancing the market competitiveness of enterprises, more and more enterprises are beginning to think about how to effectively carry out brand innovation (Li et al., 2022). However, most enterprises still have a vague understanding of brand innovation. Although existing literature can provide some useful theoretical foundations and insights, the academic community has not provided sufficient explanatory answers to the evaluation system of brand innovation, or research has focused on various financial indicators of traditional performance evaluation systems (O'Sullivan & O'Connell, 2016; Bezerra, 2013). This study examines the key aspects of brand innovation in art education enterprises and constructs non-financial evaluation indicators for these aspects, to provide possible solutions for brand building and innovation enhancement in art education enterprises.

Literature Review
With the advent of the era of brand competition, more and more scholars are paying attention to the content and methods of brand innovation. Brand innovation is essentially the updating and restructuring of factors such as products, technology, culture, and image (Xiang, 2023; Hariandja & Sartika, 2022; Yang et al., 2021; Phakdiburut, 2017). Product innovation can better meet consumer needs and is the foundation of brand innovation (Baik et al., 2011), technological innovation is the support of brand innovation, and cultural and image innovation are the means of brand innovation (Gonzalez et al., 2016).

Scholars have explored the key content of brand innovation from multiple perspectives, with both differences and overlaps in its composition. Consumer Value Theory holds that brand innovation should be centered around consumer needs, meeting constantly changing consumer demands by providing innovative products and services, improving consumer satisfaction, and enhancing brand market value (Atashfaraz & Abadi, 2016). The theory of innovation elements holds that brand innovation enhances the market influence of a company's brand and narrows the gap between brands through systematic innovation of elements such as products, services, technology, image, and management (Gonzalez et al., 2016). From the perspective of brand structure, Studinska (2023), believes that brand structure includes four levels: product, organization, personality, and symbol. George and Anandkumar (2018), further propose dimensions including product, identification, organization, personality, and culture. From the perspective of brand innovation capability.

Guo et al (2023), and Blagojce (2023), argue that products, funding, talent, technology, image, management, and other key elements that influence brand innovation.

Brand innovation performance evaluation is important to improve the quality of brand innovation and plays an important role in strengthen brand management. Grigoriou et al. (2016), used a polynomial regression model in recursive modelling to evaluate brand innovation performance by integrating signal theory and resource-based theory, focusing on internal quality signals, dynamic capabilities and competitive advantages. Wei and Yu (2015), evaluated brand innovation performance by building an evaluation index system, using the entropy weight coefficient and grey-system evaluation method, and analyzing the local correlation coefficient. Hsu (2012), used DEMATEL and DAMP methods to evaluate brand innovation performance, and determined that factors such as the frequency of new products and management skills were crucial to success. Yang et al (2021), partial least squares structural equation modelling (PLS-SEM) studied the definition and core concepts of Internet brand innovation and its impact on performance.

Unfortunately, the research enthusiasm for brand innovation continues to rise. However, research mainly focuses on large enterprises or specific industries (Kankam Kwarteng et al., 2022; Maura et al., 2022; Yao et al., 2019; Xiang, 2023; Hariandja & Sartika, 2022; Hetet et al., 2019). Although the art education industry is booming, it is filled with a large number of training institutions within the industry, and the scale of enterprises is generally small. The concentration of enterprises is extremely low, and the market share of industry leaders is less than 1% (Zhiyan Consulting, 2023). Core managers are limited in systematic knowledge in management, and functional talents are scarce (Tatarnikova, 2022). Because the service depends on the real economy, its time cost and site cost are high, the enterprise management mode is traditional, and the degree of education informatization is weak, and it is difficult to form a large-scale and standardized system (De Ávila & Davel, 2023; Prykhod'ko et al., 2022). They are lack of a dedicated brand management team. Faced with fierce market competition, the overall level of brand operation in the industry is relatively low (Kraehe & Crabbe, 2019).

Most of these methods typically require precise values and lead to precise approaches to each alternative. It is difficult to quantify the intangible benefits of brand innovation using traditional economic analysis techniques (Narkunienė & Ulbinaitė, 2018). This study proposes an analytical method for evaluating the intangible aspects of brand innovation. A new brand innovation performance evaluation framework is proposed by combining the fuzzy analytic hierarchy process with the fuzzy comprehensive evaluation method. Applying this framework can make the evaluation results more scientific, accurate, and objective. The framework was demonstrated through a case study, demonstrating the feasibility of the proposed method.

Analytic Hierarchy Process (AHP) and Fuzzy Comprehensive Evaluation Method
This section provides a detailed introduction to AHP and Fuzzy methods. In addition, the framework for evaluating brand innovation performance was justified. This study adopts quantitative methods, specifically, an evaluation index set was created around the key content of brand innovation implementation, and the weights of factors and sub-factors were

estimated using the AHP. On this basis, the fuzzy comprehensive evaluation method is adopted to evaluate the brand innovation performance. The method combines evaluation factors into one framework. Discussed methods for constructing comparison matrices, measuring consistency in pairwise comparisons, and aggregating eigenvectors of matrices to produce final results. Two kinds of data analysis software are applied in this study, one is IBM social science statistics package (SPSS) for data input and another one is MATLAB programming for matrix construction. The proposed research framework is shown in Figure 1:
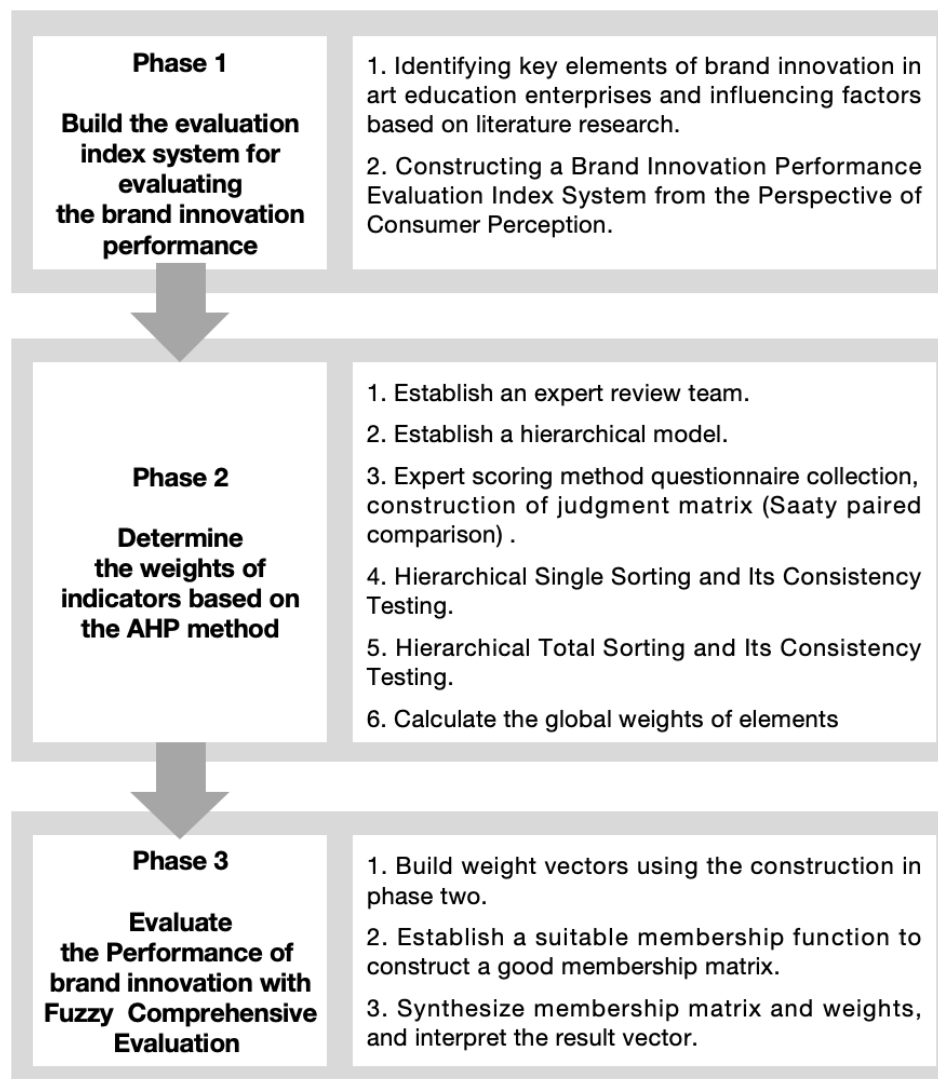

Figure 1. The framework of the proposed model for evaluating the performance of brand innovation

Method of Analytic Hierarchy Process (AHP)
Analytic hierarchy process (AHP) is a decision analysis method, which was proposed by Saaty and Vargas (1979), which decomposes the decision-making problem into multiple levels, and makes decisions by comparing and synthesizing the importance of different factors. This

method combines qualitative and quantitative analysis, so that complex decision-making problems can be mathematically and systematically handled (Sabia & Faccenda, 2022).

The core idea of AHP is to determine the relative importance of each factor through pairwise comparison, and then use the mathematical operation to calculate the final weight and comprehensive performance score (Sabia & Faccenda, 2022). AHP can transform people's subjective judgment into quantitative data, and can deal with problems that are difficult to be fully quantified. It combines system analysis and mathematical methods, can effectively deal with various hierarchical decision-making problems, and provides scientific decision support for decision-makers, especially in the case of multi-objective and multi-criteria (Saaty, 2008). Firstly, identify the target level, criterion level and procedure level related to decision-making: comprehensively consider various evaluation standards, and construct the evaluation hierarchy of brand innovation performance evaluation of art education enterprises.

Secondly, construct a discriminant matrix. Starting from the second layer of the hierarchical model, Saaty's pairwise comparison is used to compare various elements for the same layer of each factor belonging to (or affecting) the upper layer. Experts are requested to evaluate each element in the corresponding chapter and adopt relative scale at this time, so as to minimize the difficulty of comparing various factors with different properties and improve accuracy. Table 2 lists the 9 importance levels and their assigned values given by Saaty, and the judgment matrix is the comparison result of the importance of element a_{ij} and element a_{ji}, which has the following formula:

$$a_{ij} = \frac{1}{a_{ji}}$$

Table 2
Proportional Scale Table

Scale(a_{ij})	Meaning
1	x_i is the same importance as x_j
3	x_i is slightly more important than x_j
5	x_i is strongly more important thanas x_j
7	x_i is very strongly more important thanas x_j
9	x_i is extremely more important thanas x_j
2, 4, 6, 8	Middle value of the above
Reciprocal	$x_i/x_j = a_{ij}$, then $x_j/x_i = a_{ji} = 1/a_{ij}$

Thirdly, hierarchical single sorting and its consistency testing. Corresponding to the maximum eigenvalue of the judgment matrix λ the eigenvector of max is normalized (such that the sum of the elements in the vector equals 1) and is denoted as W. The element W represents the ranking weight of the relative importance of a factor at the same level compared to a factor at the previous level. To confirm the hierarchical single ranking, consistency testing is required.

The consistency index is calculated using CI, and the smaller the CI, the greater the consistency. Using the n-eigenvector corresponding to the maximum eigenvalue as the weight vector of the influence of the compared factor on a certain factor in the upper layer, the greater the degree of inconsistency, the greater the judgment error caused. The unique non-zero eigenvalues of an n-order uniform matrix are n, using λ- n The magnitude of n values is used to measure the degree of inconsistency in A. The consistency indicator is defined as:

CI = 0, with complete consistency; CI is close to 0, with satisfactory consistency; The larger the CI, the more severe the inconsistency. To measure the size of CI, the random consistency index RI is introduced, the random consistency index RI is related to the order of the judgment matrix. Generally, the higher the order of the matrix, the greater the possibility of random deviation from consistency (as shown in Table 3):

Table 3
Standard values of average random consistency index RI

n	1	2	3	4	5	6	7	8	9	10	11	12
RI	0	0	0.58	0.89	1.12	1.36	1.41	1.46	1.49	1.52	1.54	1.56

Considering that the deviation of consistency may be caused by random reasons, when checking whether the judgment matrix has satisfactory consistency, it is also necessary to compare CI with the random consistency index RI to obtain the tested coefficient Cr, and the formula is as follows:

$$CR = \frac{CI}{RI}$$

If CR < 0.1, it is considered that the judgment matrix has passed the consistency test, otherwise it does not have satisfactory consistency.

Finally, the overall ranking of the levels and its consistency test are carried out, which is to calculate the weight of the relative importance of all factors at a certain level to the highest level (the overall goal). This process is carried out from the highest level to the lowest level.

Method of Fuzzy Comprehensive
The fuzzy comprehensive evaluation method is a comprehensive evaluation method based on fuzzy mathematics. The comprehensive evaluation method is based on the membership theory of fuzzy mathematics, which transforms the qualitative evaluation into quantitative evaluation, that is, using fuzzy mathematics to comprehensively evaluate the things or objects affected by various factors (Zhao & Zhou, 2023).

Table 4

Steps of Fuzzy Comprehensive Evaluation Method

(1)	According to the established index system, the object set, factor set (sub factor set) and alternative set (evaluation set and comment set) are established.
(2)	The weight vector is established by appropriate methods.
(3)	Construct fuzzy matrix: establish appropriate membership function and construct a good evaluation matrix.
(4)	Evaluate the synthesis of matrix and weight, use the synthesis factor to synthesize it, and explain the result vector.

Empirical Study

Index System Construction

This study refers to a large number of literatures, combines the data provided by business incubators, takes into account the factors affecting the performance of incubator projects, and constructs the performance evaluation index system of art education enterprise brand innovation as shown in Figure 2 from both qualitative and quantitative aspects.
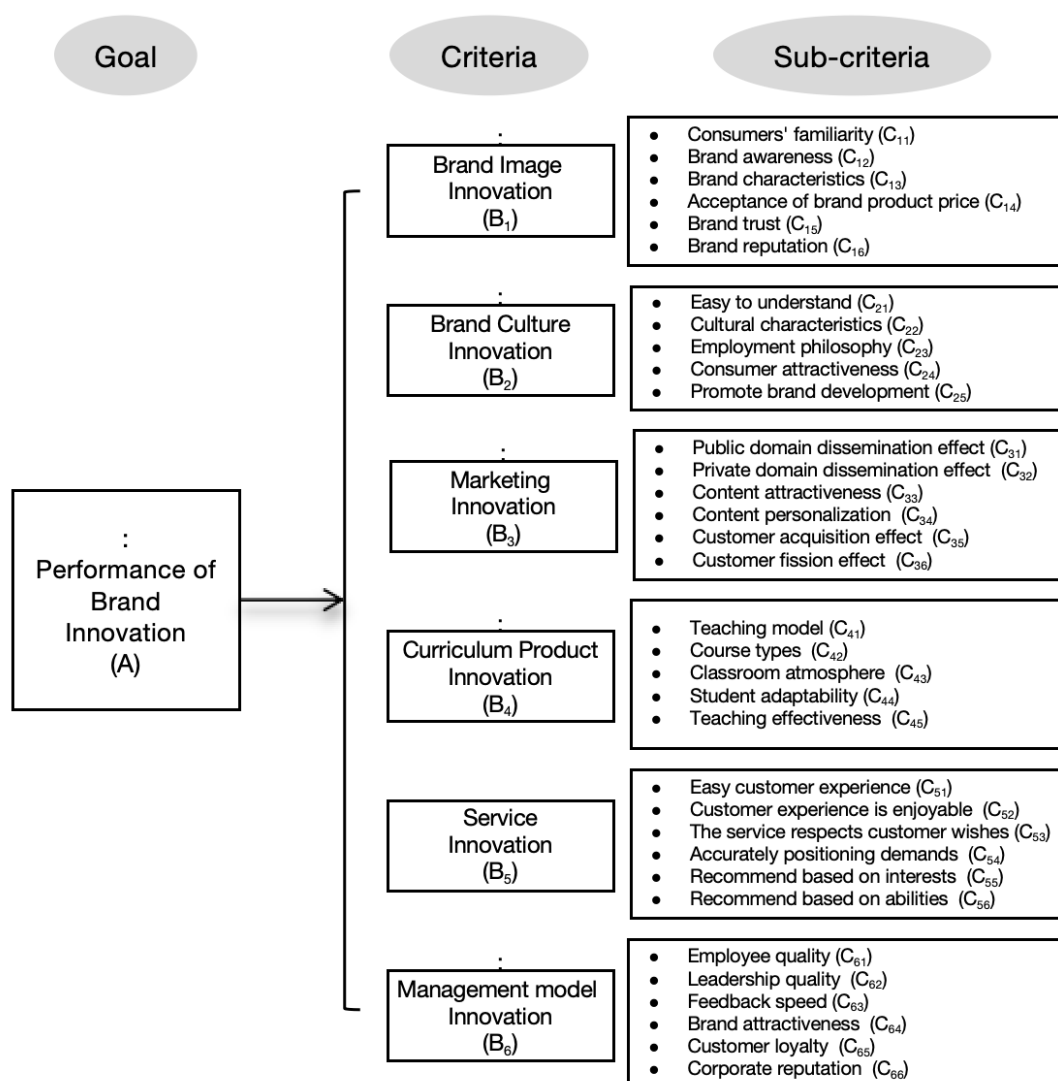
Figure 2. Evaluation index system for brand innovation performance evaluation from the sustainability perspective

Determination of Weight by AHP

Establish a Judgment Matrix

Based on the established indicator system, we can divide it into goal layer (A), criterion layer (B), and sub-criterion layer (C). This study invited 7 experts to form an evaluation team, including 1 professor, 1 associate professor, 3 educational enterprise leaders, and 1 product manager. According to the quantitative scale (as shown in Table 2), compare the relative importance of different indicators at the same level pairwise. Based on the scoring results of 7 experts, take the arithmetic mean of the scores for each option and obtain the judgment matrix as shown in Table 5:

Table 5

AHP judgment matrix

B =	1.0000 2.6429 1.8214 1.7500 1.6190 3.4762 0.3784 1.0000 0.8384 1.2714 1.5405 2.6000 0.5490 1.1927 1.0000 3.0238 2.1190 3.3571 0.5714 0.7865 0.3307 1.0000 2.3929 2.7857 0.6176 0.6491 0.4719 0.4179 1.0000 3.0714 0.2877 0.3846 0.2979 0.3590 0.3256 1.0000
C1 =	1.0000 3.3810 4.3143 3.7619 2.8929 2.5714 0.2958 1.0000 2.1429 2.6429 1.8810 1.1786 0.2318 0.4667 1.0000 1.2500 1.9609 1.6190 0.2658 0.3784 0.8000 1.0000 2.1357 1.3905 0.3457 0.5316 0.5100 0.4682 1.0000 2.1667 0.3889 0.8485 0.6176 0.7192 0.4615 1.0000
C2 =	1.0000 3.0000 3.2143 2.6071 3.4762 0.3333 1.0000 1.7143 1.3857 2.6190 0.3111 0.5833 1.0000 1.5000 2.5357 0.3836 0.7216 0.6667 1.0000 3.4571 0.2877 0.818 0.3944 0.2893 1.0000
C3 =	1.0000 2.0120 3.1905 2.6429 2.9286 3.0714 0.4970 1.0000 3.8571 3.3143 3.1429 3.4762 0.3134 0.2593 1.0000 1.1190 2.4571 1.3857 0.3784 0.3017 0.8936 1.0000 2.7500 2.1714 0.3415 0.3182 0.4070 0.3636 1.0000 1.3929 0.3256 0.2877 0.7216 0.4605 0.7179 1.0000
C4 =	1.000 3.5714 2.1429 3.5000 2.7143 0.2800 1.0000 1.7738 2.2857 1.1071 0.4667 0.5638 1.0000 2.6190 2.4286 0.2857 0.4375 0.3818 1.0000 0.8095 0.3684 0.9032 0.4118 1.2353 1.0000
C5 =	1.0000 2.1429 2.2143 2.0476 1.7714 2.0000 0.4667 1.0000 2.2619 3.0159 0.9571 1.6071 0.4516 0.4421 1.0000 2.3095 0.9048 1.4762 0.4884 0.3316 0.4330 1.0000 1.3095 2.2143 0.5645 1.0448 1.1053 0.7636 1.0000 1.7143
C6 =	1.0000 3.2857 1.7429 3.7143 3.2857 3.7143 0.3043 1.0000 0.9452 2.3571 1.8214 2.9286 0.5738 1.0579 1.0000 3.4571 3.0714 3.4048 0.2692 0.4242 0.2893 1.0000 1.0238 2.0000 0.3043 0.5490 0.3256 0.9767 1.0000 2.1429

Calculate the Weight of Evaluation Indicators

This study uses eigenvalues to obtain weight vectors. Calculate the maximum eigenvalue of the discrimination matrix and its corresponding eigenvector, and use the normalized eigenvector of the maximum eigenvalue as the weight vector. Using MATLAB for hierarchical analysis calculation, the weight W_k of each level indicator is obtained as follows:

W_B = (0.2822 0.1561 0.2345 0.1517 0.1181 0.0574)
W_{C1} = (0.3877 0.1806 0.1229 0.1137 0.1013 0.0938)
W_{C2} = (0.4183 0.1949 0.1580 0.1566 0.0722)
W_{C3} = (0.3251 0.2860 0.1141 0.1276 0.0749 0.0724)
W_{C4} = (0.4087 0.1882 0.1944 0.0879 0.1207)
W_{C5} = (0.2759 0.2104 0.1454 0.1251 0.1480 0.0950)
W_{C6} = (0.3548 0.1714 0.2303 0.0879 0.0955 0.0602)

Hierarchical Single Sorting and Its Consistency Testing

Compared with the random consistency index RI, the consistency index CR is obtained. Consistency testing of various indicators: Using MATLAB for consistency check, if the CR of each matrix indicator is less than 0.1, the consistency check is passed, and the calculation results of Table 6 show that the consistency test of indicators at all levels has passed.

Table 6
Calculation results of each indicator

k	B	C_2	C_3	C_4	C_5	C_6
W_{k1}	0.2822	0.4183	0.3251	0.4087	0.2759	0.3548
W_{k2}	0.1561	0.1949	0.2860	0.1882	0.2104	0.1714
W_{k3}	0.2345	0.1580	0.1141	0.1944	0.1454	0.2303
W_{k4}	0.1517	0.1566	0.1276	0.0879	0.1251	0.0879
W_{k5}	0.1181	0.0722	0.0749	0.1207	0.1480	0.0955
W_{k6}	0.0574	——	0.0724	——	0.0950	0.0602
T_k	6.2997	5.1892	6.2860	5.2189	6.3688	6.1529
CI_k	0.0599	0.0473	0.0572	0.0547	0.0738	0.0306
RI_k	1.36	1.12	1.36	1.12	1.36	1.36
CR_K	0.0441	0.0422	0.0421	0.0489	0.0542	0.0225

Overall Sorting Consistency Test

The target indicator system is hierarchical from top to bottom, using the overall ranking consistency ratio to calculate the weight of all factors in the same level for the overall goal, and completing the overall ranking and consistency test of the hierarchy.

$$CR = \frac{a_1 CI_1 + a_2 CI_2 + \cdots + a_n CI_n}{a_1 RI_1 + a_2 RI_2 + \cdots + a_n RI_n} \ (CR < 0.1)$$

According to the data in Table 5, the weights of the total targets C1, C2, C3, C4, C5, and C6 are calculated as 0.2021, 0.2178, 0.1955, 0.2179, 0.1867 and 0.2090.

$$W_B = (0.2822\ 0.1561\ 0.2345\ 0.1517\ 0.1181\ 0.0574)$$

The calculation shows that CR=0.0706<0.1. Therefore, the overall ranking of the hierarchy has passed the consistency test.

Confirm the Weights of Various Levels of Factor Indicators

The final confirmation of the weight distribution of various factor indicators is shown in Table 7:

Table 7

Weights of Factors and Indicators at All Levels

Goal layer (A)	Criterion layer (B)		Sub-criterion layer (C)	
Brand Innovation Performance	Brand Image Innovation	0.2822	Consumers' familiarity	0.3877
			Brand awareness	0.1806
			Brand characteristics	0.1229
			Acceptance of brand product price	0.1137
			Brand trust	0.1013
			Brand reputation	0.0938
	Brand Culture Innovation	0.1561	Easy to be understand	0.4183
			Cultural characteristics	0.1949
			Employment philosophy	0.1580
			Consumer attractiveness	0.1566
			Promote brand development	0.0722
	Marketing Innovation	0.2345	Public domain dissemination effect	0.3251
			Private domain dissemination effect	0.2860
			Content attractiveness	0.1141
			Content personalization	0.1276
			Customer acquisition effect	0.0749
			Customer fission effect	0.0724
	Curriculum Product Innovation	0.1517	Teaching model	0.4087
			Course types	0.1882
			Classroom atmosphere	0.1944
			Student adaptability	0.0879
			Teaching effectiveness	0.1207
	Service Innovation	0.1181	Easy customer experience	0.2759
			Customer experience is enjoyable	0.2104
			The service respects customer wishes	0.1454
			Accurately positioning demands	0.1251
			Recommend based on interests	0.1480
			Recommend based on abilities	0.0950

			Employee quality	0.3548
	Management model Innovation	0.0574	Leadership quality	0.1714
			Feedback speed	0.2303
			Brand attractiveness	0.0879
			Customer loyalty	0.0955
			Corporate reputation	0.0602

Fuzzy Comprehensive Evaluation

Questionnaire Survey and Data Analysis

This study distributed a brand innovation effectiveness evaluation questionnaire to customers of the case company named ACD. The questionnaire uses the Richter 5-point scale. A total of 600 questionnaires were distributed and 537 valid questionnaires were collected.

Reliability analysis was conducted on 537 collected questionnaire data using SPSS, and the results are shown in Table 8. The reliability coefficient of 537 questionnaires collected from customers is 0.945, which is greater than 0.9, indicating that the reliability quality of the research data is very high.

Table 8
Cronbach reliability analysis results

Customer data	**Items number**	**Sample size**	**Cronbach α**
	60	537	0.945

The validity analysis results of the questionnaire collected data using SPSS are shown in Table 8. Using KMO and Bartlett's test for validity verification, it can be seen from the above table that the KMO value of 537 brand customer data is 0.953, which is greater than 0.6, indicating that the data has validity.

Table 9
Test results for KMO and Bartlett

KMO		**Customer data**
		0.953
Bartlett sphericity test	**Approximate chi square**	24944.449
	df	1431
	p	0.000

Determine the Single Factor Evaluation Vector for Evaluation Indicators

According to the effective questionnaire for evaluating the implementation effect of brand innovation in Company A, the data was organized, and the proportion of each indicator option was expressed as R_{ij} (as shown in Table 10):

Table 10
Results of the proportion of options in the effectiveness evaluation

		J=	1	2	3	4	5
R_{1j} Brand Image Innovation	Consumers' familiarity Brand awareness Brand characteristics Acceptance of brand product price Brand trust Brand reputation		R_{11} = (0.0503	0.0596	0.4041	0.2998	0.1862)
			R_{12} = (0.0279	0.0391	0.2291	0.4097	0.2942)
			R_{13} = (0.0279	0.0317	0.2346	0.5395	0.2663)
			R_{14} = (0.0279	0.0726	0.3895	0.2849	0.2160)
			R_{15} = (0.0279	0.0372	0.1955	0.4254	0.3128)
			R_{16} = (0.0298	0.0242	0.2868	0.3911	0.2682)
R_{2j} Brand Culture Innovation	Easy to be understand Cultural characteristics Employment philosophy Consumer attractiveness Promote brand development		R_{21} = (0.0317	0.0503	0.2998	0.3855	0.2328)
			R_{22} = (0.0261	0.0410	0.2588	0.3892	0.2849)
			R_{23} = (0.0279	0.0466	0.2775	0.3985	0.2495)
			R_{24} = (0.0279	0.0317	0.2682	0.4004	0.2719)
			R_{25} = (0.0279	0.0317	0.2458	0.4209	0.2737)
R_{3j} Marketing Innovation	Public domain dissemination effect Private domain dissemination effect Content attractiveness Content personalization Customer acquisition effect Customer fission effect		R_{31} = (0.0186	0.0428	0.3426	0.2924	0.3035)
			R_{32} = (0.0205	0.0410	0.3091	0.3687	0.2607)
			R_{33} = (0.0130	0.0242	0.2309	0.4302	0.3017)
			R_{34} = (0.0242	0.0335	0.2849	0.4078	0.2495)
			R_{35} = (0.0242	0.0317	0.2644	0.3878	0.2924)
			R_{36} = (0.0410	0.0428	0.2719	0.4730	0.1806)
R_{4j} Curriculum Product Innovation	Teaching model Course types Classroom atmosphere Student adaptability Teaching effectiveness		R_{41} = (0.0205	0.0503	0.2346	0.4022	0.2924)
			R_{42} = (0.0298	0.0372	0.2328	0.4246	0.2756)
			R_{43} = (0.0242	0.0410	0.2142	0.4488	0.2719)

		R_{44} = (0.0279 0.0223 0.2402 0.4339 0.2756)
		R_{45} = (0.0223 0.0372 0.2030 0.4637 0.2737)
R_{5j} Service Innovation	Easy customer experience Customer experience is enjoyable Service respects customer wishes Accurately positioning demands Recommend based on interests Recommend based on abilities	R_{51} = (0.0186 0.0354 0.2328 0.4209 0.2924) R_{52} = (0.0223 0.0372 0.2682 0.3966 0.2756) R_{53} = (0.0205 0.0354 0.2570 0.4115 0.2756) R_{54} = (0.0223 0.0242 0.2402 0.4339 0.2793) R_{55} = (0.0261 0.0372 0.2402 0.4004 0.2961) R_{56} = (0.0205 0.0354 0.2495 0.4004 0.2942)
R_{6j} Management Model Innovation	Employee quality Leadership quality Feedback speed Brand attractiveness Customer loyalty Corporate reputation	R_{61} = (0.0242 0.0335 0.2291 0.3948 0.3184) R_{62} = (0.0242 0.0335 0.2663 0.3985 0.2775) R_{63} = (0.0223 0.0410 0.2477 0.4060 0.2831) R_{64} = (0.0279 0.0335 0.2328 0.4209 0.2849) R_{65} = (0.0279 0.0261 0.2495 0.4041 0.2924) R_{66} = (0.0261 0.0168 0.2328 0.4134 0.3110)

Multi Factor Fuzzy Comprehensive Evaluation

Construct an evaluation vector matrix Ri based on a single factor evaluation vector as shown in Table 11:

Table 11

Single factor evaluation vector matrix

R1 =	0.0317 0.0503 0.2998 0.3855 0.2328 0.0261 0.0410 0.2588 0.3892 0.2849 0.0279 0.0466 0.2775 0.3985 0.2495 0.0279 0.0317 0.2682 0.4004 0.2719 0.0279 0.0317 0.2458 0.4209 0.2737
R2 =	1.0000 3.0000 3.2143 2.6071 3.4762 0.3333 1.0000 1.7143 1.3857 2.6190 0.3111 0.5833 1.0000 1.5000 2.5357 0.3836 0.7216 0.6667 1.0000 3.4571

	0.2877 0.3818 0.3944 0.2893 1.0000
R3 =	0.0186 0.0428 0.3426 0.2924 0.3035 0.0205 0.0410 0.3091 0.3687 0.2607 0.0130 0.0242 0.2309 0.4302 0.3017 0.0242 0.0335 0.2849 0.4078 0.2495 0.0242 0.0317 0.2644 0.3878 0.2924 0.0410 0.0428 0.2719 0.4730 0.1806
R4 =	0.0205 0.0503 0.2346 0.4022 0.2924 0.0298 0.0372 0.2328 0.4246 0.2756 0.0242 0.0410 0.2142 0.4488 0.2719 0.0279 0.0223 0.2402 0.4339 0.2756 0.0223 0.0372 0.2030 0.4637 0.2737
R5 =	0.0186 0.0354 0.2328 0.4209 0.2924 0.0223 0.0372 0.2682 0.3966 0.2756 0.0205 0.0354 0.2570 0.4115 0.2756 0.0223 0.0242 0.2402 0.4339 0.2793 0.0261 0.0372 0.2402 0.4004 0.2961 0.0205 0.0354 0.2495 0.4004 0.2942
R6 =	0.0242 0.0335 0.2291 0.3948 0.3184 0.0242 0.0335 0.2663 0.3985 0.2775 0.0223 0.0410 0.2477 0.4060 0.2831 0.0279 0.0335 0.2328 0.4209 0.2849 0.0279 0.0261 0.2495 0.4041 0.2924 0.0261 0.0168 0.2328 0.4134 0.3110

Based on the obtained indicator weights and membership matrix Ri, the fuzzy evaluation result Qi of the membership matrix is calculated as follows:

$$Q_1 = W_{B1} o R_1 = (0.0503\ 0.0726\ 0.3877\ 0.2998\ 0.1862)$$
$$Q_2 = W_{B2} o R_2 = (0.0317\ 0.0503\ 0.2998\ 0.3855\ 0.2328)$$
$$Q_3 = W_{B3} o R_3 = (0.0410\ 0.0428\ 0.3251\ 0.2924\ 0.3035)$$
$$Q_4 = W_{B4} o R_4 = (0.0298\ 0.0503\ 0.2346\ 0.4022\ 0.2924)$$
$$Q_5 = W_{B5} o R_5 = (0.0261\ 0.0372\ 0.2328\ 0.2759\ 0.2759)$$
$$Q_6 = W_{B6} o R_6 = (0.0279\ 0.0410\ 0.2303\ 0.3548\ 0.3184)$$

Integrate to obtain the fuzzy comprehensive evaluation matrix Q:

$$Q = \begin{matrix} 0.0503\ 0.0726\ 0.3877\ 0.2998\ 0.1862 \\ 0.0317\ 0.0503\ 0.2998\ 0.3855\ 0.2328 \\ 0.0410\ 0.0428\ 0.3251\ 0.2924\ 0.3035 \\ 0.0298\ 0.0503\ 0.2346\ 0.4022\ 0.2924 \\ 0.0261\ 0.0372\ 0.2328\ 0.2759\ 0.2759 \\ 0.0279\ 0.0410\ 0.2303\ 0.3548\ 0.3184 \end{matrix}$$

Based on the overall indicator weight WA, the final evaluation result is:

$$D_A = W_A oQ = (0.0503 \ 0.0726 \ 0.2822 \ 0.2822 \ 0.2345)$$

It can be seen that for brand innovation effectiveness, "very poor" = 0.0503, "poor" = 0.0726, "average" = 0.2822, "good" = 0.2822, and "very good" = 0.2345.

According to the principle of maximum evaluation value, the evaluation value of this model is 0.2822, indicating that the implementation effect of A company's brand innovation is between "average" and "good". The evaluation values of each criterion layer are shown in Table 12:

Table 12
Evaluation Values of Criteria Layer Effect

Q	Items	Maximum value	Evaluation
1	Brand Image Innovation	0.3877	Average
2	Brand Culture Innovation	0.3855	Good
3	Marketing Innovation	0.3251	Average
4	Curriculum Product Innovation	0.4022	Good
5	Service Innovation	0.2759	Very good
6	Management Model Innovation	0.3548	Good

Results

Based on the indicator weights calculated using the AHP method, this study understands that brand image innovation and marketing innovation have a significant impact on the performance of corporate brand innovation. At the same time, due to the inherent attributes of the art education industry, the development of curriculum products and cultural concepts also occupies a significant proportion. The success of brand image innovation is closely related to its popularity, and brand culture innovation must pay attention to its culture being easy to understand. In the context of the new consumption mode and the Internet era, the marketing innovation of art education enterprises should focus on the effect of public communication and the operation level of customer communities. Therefore, a high-level teaching model that balances a good classroom atmosphere is the key to breakthrough innovation in teaching products for art education institutions. Accurately grasping customer needs and creating a relaxed and enjoyable service experience can greatly help with service innovation. In addition, innovation in management models relies more on the overall competence level of the team. As clients in the education industry have more daily contact with employees (teachers, learning consultants, etc.), from the client's perspective, the importance of overall employee competence is higher than that of leadership competence.

From the evaluation results with fuzzy, it can be seen that the overall implementation effect of brand innovation in the ACD is between "average" and "good". From the perspective of each criterion layer, the performance of "consumer cognition" and "marketing innovation" is "average", while the performance of other criterion layers is "good". Among them, the service effect is highly praised compared to other indicators.

i.   The ACD has achieved the following results in brand innovation practice.
ii.   The ACD has a high level of popularity and affordable prices;
iii. The brand culture built of the ACD has its unique characteristics;
iv.   The displayed brand promotional content has a high appeal to consumers in this enterprise;
v.   The enterprise has established customer brand trust and loyalty;
vi.   A harmonious teaching atmosphere has been formed in this enterprise, and the teaching effect is significant. After adjustment, it is easy to adapt and the satisfaction is high.

These achievements have enabled the ACD to have high customer stickiness and a certain level of word-of-mouth conversion ability among existing customers. Played a driving role in the development of the brand.

Discussion

The comprehensive evaluation results show that although the ACD has achieved certain results in brand innovation and promoted enterprise development, there is still room for improvement. Suggest improving brand innovation practices from the following aspects:

Establishing Brand Awareness and Enhancing Attractiveness to Potential Customers

Consumer familiarity with the brand is crucial for purchasing decisions. Lack of brand understanding among new customers can affect their customer acquisition ability, while the perception of existing customers can affect customer loyalty. Building a brand requires continuous absorption, integration, and innovation. Strengthen consumer awareness, and enhance brand trust and attractiveness by enhancing resonance between the brand and consumers. To address the above issues, enterprises should establish brand awareness in the organization. By building a brand ecosystem, enterprises should create an urban brand ecosystem, and derive differentiated products (Ellitan, 2022), and aim to enhance the brand's influence and attractiveness, and meet the needs of consumers for brand identity. On the other hand, enterprises need to seize the opportunity and move forward, keep up with the pace of the times, constantly innovate brand image, adapt to the trend of consumer upgrading, and continuously enhance the competitive advantage of the enterprise (Sugiarto & Suryanadi, 2019). In addition, strengthening brand awareness training is important for middle-level management to ensure the implementation of brand concepts at all levels of management and promote the effectiveness of brand strategy implementation (Sugiarto & Suryanadi, 2019).

Deepen the Penetration of Brand Culture through Reasonable Guidance

A deep brand is a comprehensive combination of attributes, benefits, values, culture, personality, and consumer evaluations. The ACD has a high cultural personality, but it is not popular enough and its acceptance is not good enough. The transmission of brand culture requires the brand to combine its characteristics, participate in the social discourse system corresponding to the target, and trigger emotional identification and resonance in the process of interacting with the public, creating another sense of popular culture (Hetet et al., 2019). Enterprises should fully implement brand culture internally, establish a promotion mechanism, and deepen the awareness of brand values among employees, so that customers

can feel the brand spirit, thereby increasing recognition. At the same time, integrating corporate social responsibility, winning public recognition, and guiding customers to make positive associations, enhance the added value of product culture, make the brand unique, and enhance consumer loyalty (Kataria et al., 2021). By deeply building brand culture, cultivating consumer emotions, and improving brand recognition and purchase rates.

Emphasize Content Marketing to Enhance Consumer Resonance
The marketing model of the ACD is limited to advertising style public domain communication, which is a "utilitarian" communication method that ignores the needs of consumers, does not form resonance, is not easy to obtain recognition, relies on low-priced content and simple recording methods, and lacks innovation as a whole. It is easy to erode user patience with the brand, leading to bias and loss of new and old users. At the same time, the conversion ability of public and private traffic is not fully utilized, and poor community operation results will lower the conversion rate and hinder customer acquisition. Designing communication content according to customer characteristics, guiding consumers to generate positive associations and promote purchase behavior, achieving user participation, establishing social interaction with Internet genes, precipitating core data, helping enterprises improve private domain transformation ability, establishing user closed-loop, accurately guiding customer maintenance (Sammour et al., 2020), so that realize sales transformation, and expand influence.

Refined Service Process
When consumer needs become more fragmented, it requires companies to refine their service design, and refined services require more detailed service process preparation. To optimize the service process, an enterprise should take the following measures: deeply explore customer needs, closely integrate employees, products, and customers, provide value-added services in the surrounding areas, and create maximum value; Emphasize customer satisfaction, customize personalized services, promote customer retention, and achieve precise operations, extend the industrial chain, strengthen cooperation with innovation centers, government education commissions, enterprises, and schools, and obtain more resources (Ellitan, 2022).

Introducing Information Technology to Promote the Standardization of Curriculum Products
To improve the quality of teaching, enterprises should enhance the core competencies of educational products in various aspects, including teacher teaching, professionalism, research and development, and student management. Enterprises can set up curriculum research and development teams, optimize existing projects and standardize teaching management, make full use of the Internet, establish an information-supported management system, increase teachers' support for lesson preparation, and build a communication platform to provide a preview, after-school exercises, and timely feedback (Darama et al., 2018). It is also important to actively prepare talent reserves, and art education enterprises should promote deep cooperation with universities to obtain more resources.

Establish a Learning Organization and Enterprise Standard Processes to Enhance Internal Control Capabilities

Corporate decisions are concentrated in the hands of headquarters and a single shareholder, resulting in time-consuming and laborious individual stores. If the headquarters fails to plan and respond flexibly, it will increase management costs. In addition, the planning ability of individual store personnel is insufficient, and unified consideration cannot balance different business districts and consumption patterns. With the expansion of scale and the increase in resource consumption, internal control is insufficient to meet the needs of modern management, which limits the performance of grassroots personnel. Enterprises need to establish a learning organization and fully utilize the integration of centralization and decentralization (Haile & Tüzüner, 2022). Firstly, enhancing the innovation ability of managers, their personalities, and abilities have a direct impact on brand value. Otherwise, strengthen the internal control capabilities of enterprises, accurately control costs, and expand revenue through internal management, and achieve sustainable development. Establishing enterprise standardization is another important step to establish unified standards for each campus, enhance brand image and product quality, and promoting development.

Conclusion

This study produced positive results. During the research process, this study established an analytical framework for brand innovation in art education and training institutions, as well as a set of performance evaluation indicators. Based on theoretical and literature research, combined with research and analysis, the content, environment, influencing factors, and applicability methods of brand innovation in the art education and training industry have been supplemented, enriching the theoretical content and analytical framework that art education and training practitioners and startups can refer to. Meanwhile, this study found that among the elements of brand innovation, brand image innovation, and marketing innovation account for the largest proportion. Chinese art education industry enterprises implementing brand image building and sedimentation, fully utilizing the new marketing model of the digital age, are expected to achieve brand innovation performance results. In addition, brand innovation theory can serve as a solid structure to support the theoretical framework of this study. Therefore, this study achieved its objectives and answered the research questions and objectives based on the discussion of the research results. On the other hand, this study conducted empirical research on case enterprises, which combined AHP and Fuzzy evaluation methods to enrich the application of brand innovation performance evaluation methods.

However, current research is limited by methods, time, and conditions, such as the AHP which imposes subjective arbitrariness on evaluators; and a non-listed enterprises case which lacks of good statistics on its financial and user data during background checks, and there were some missing data in the process of data acquisition. Future research may focus on or focus on enterprises of different regions or scales in China, or conduct more in-depth research on brand innovation evaluation factors.

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