Research Article

Index Construction and Application of School-Enterprise Collaborative Education Platform Based on AHP Fuzzy Method in Double Creation Education Practice

Zhenzhen He and Xiuhong Sun

Baoding University, Hebei, Baoding 071000, China

Correspondence should be addressed to Zhenzhen He; hezhenzhen@bdu.edu.cn

Received 15 May 2022; Revised 8 July 2022; Accepted 18 July 2022; Published 30 August 2022

Academic Editor: Yuan Li

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At present, China’s education reform is developing rapidly, and many schools begin to study and implement school-enterprise cooperative education. There are also some conceptual deviations. In addition, the government’s weak implementation of the guarantee policy for the implementation of combination of school and enterprise education, coupled with the lack of relevant laws and regulations, rarely leads to the success and enthusiasm of combination of school and enterprise education. With the development of collaborative training companies, the participation rate needs to be improved, and the influence of school-enterprise colearning is not significant enough. Therefore, we should do more theoretical research on combination of school and enterprise education, so as to further improve the present situation of combination of school and enterprise education in China and promote the in-depth development of combination of school and enterprise education. At the same time, we should constantly improve relevant practices and systems, improve relevant laws and regulations, learn from the successful experience of cooperation between schools and enterprises training at home and abroad, and design a unique path of cooperation between schools and enterprises in combination with China’s reality. First of all, this paper deeply analyzes the synergy degree of combination of school and enterprise education. By defining the concepts of the combination of industry and teaching and the combination of colleges and enterprises, synergy degree, and cooperative development level, this paper makes an in-depth interpretation of the education and teaching of schools and enterprises. From the perspective of synergetic theory and interactive mechanism, school-enterprise cooperation needs to be strengthened. Secondly, the model is created through the analytic hierarchy process, in which the hierarchical model uses the 10/10-18/2 scaling method to form the classification matrix. Finally, this paper analyzes on the factors affecting the combination of school and enterprise education and puts forward some perfect countermeasures from three angles of government, school, and enterprise.

1. Introduction

We introduce a method to deal with fuzzy analytic hierarchy process, which uses degree analysis method to determine the comprehensive degree value of pairwise comparison method. Applying the comparison principle of fuzzy numbers, under certain criteria, this decision-making process is illustrated by an example [1]. We propose a degree analysis method of fuzzy analytic hierarchy process and get a clear priority vector from the triangular fuzzy matrix of the equation. Experiments show that the hierarchical analysis method cannot estimate the true weight of fuzzy reference matrix, which leads to a large number of abuses. This paper illustrates with examples that the priority vector determined by degree analysis does not represent the relative importance of decision criteria or procedures [2]. An evaluation system based on analytic hierarchy process and fuzzy comprehensive evaluation is proposed to select the best supplier for garment enterprises. This paper mainly introduces a social manufacturing framework, which can be used to perceive and influence customers and meet the needs of mass customization. Both qualitative and quantitative factors are considered in this method. Its efficiency and feasibility have been verified in Dongguan garment enterprises [3]. The fuzzy overall evaluation method of AHP, through the study of
highway widening trend, will provide a framework for the formulation of highway widening scheme and provide quantitative objective basis for subjective decision-making of highway widening [4]. Based on the performance, aesthetics and ecology of golf courses, the landscape index system is constructed as the target of the landscape evaluation of the lake-view golf course in Kunming. The method, index, and model of the landscape evaluation of the city golf course are discussed by using the semantic differential method, the analytic hierarchy process, and the fuzzy comprehensive evaluation of the landscape evaluation of the lake-view golf course in Dianchi Lake [5]. Aiming at the limitation of AHP fuzzy comprehensive evaluation method, an improved AHP fuzzy comprehensive evaluation method is proposed, which has isomorphism and test evaluation set, and will continue to be applied to the evaluation of higher education quality and comprehensive evaluation of colleges and universities. The results show that the improved method can better test and evaluate the expected consistency of each evaluation factor [6]. The combination of schools and enterprises is a form of talent training that adapts to the development of the times. Make full use of resources from all aspects to enhance practical ability. Therefore, it is of great significance to put forward improvement measures and accelerate the formation of an effective cooperation model for national education and social development [7]. It is of great practical value to form a cooperative education community between schools and enterprises for cultivating students’ professional skills. By changing the traditional classroom teaching methods, the connection between professional skills and professional skills is realized, which increases students’ professional knowledge and enriches students’ professional skills. It provides a new way for students’ emotional attitude and character [8]. This paper analyzes the necessity of implementing entrepreneurship education in cooperation between schools and enterprises from the perspective of educational institutions and entrepreneurship education in colleges and universities and puts forward that the curriculum system of entrepreneurship education in colleges and universities should be carried out by both parties. Work together to create a campus entrepreneurial culture atmosphere and improve the effectiveness of entrepreneurship education [9]. This paper analyzes the importance of cooperation between schools and enterprises, suggests setting key courses according to the skills required by specific tasks, and studies the construction methods of modular curriculum design, curriculum improvement, and grading system design [10]. College students’ innovation and entrepreneurship education has been paid more and more attention by the society. This is not only the requirement of the times, but also the charm of innovation and entrepreneurship education itself. In view of the present situation of applied entrepreneurship and the difficulties in applied finance, this paper summarizes the reasons that affect students’ entrepreneurial ability and discusses the ways to improve financial students’ entrepreneurial ability and self-realization [11]. It is the requirement of the progress and development of market economy and the inevitable choice of innovation and entrepreneurship in China to strengthen the innovation and entrepreneurship education of college students to help them consolidate the concept of innovation and entrepreneurship and improve their awareness of innovation and entrepreneurship. The traditional college model lacks innovation and entrepreneurship awareness and innovation and entrepreneurship theory. According to the requirements of innovation construction, colleges and universities should renew their concepts, establish a correct understanding of their abilities, and carry out fundamental reforms and innovations in the concepts, mechanisms, contents, methods, management, and innovative entrepreneurial skills of entrepreneurship education [12]. Many colleges and universities do not mention increasing innovation and entrepreneurship in their personnel training objectives. Moreover, institutional innovation and entrepreneurship education are only forms. Therefore, innovation and entrepreneurship education has not yet penetrated into the whole process of talent development. Some school-enterprise cooperation lacks deep integration into the whole education system and vocational training [13]. It is very important for the development and prosperity of the country to improve students’ innovation and entrepreneurship ability and employment development competitiveness in the financial crisis. Combined with the present situation of colleges and universities in China, this paper puts forward some countermeasures to promote students’ innovation and entrepreneurship from two main angles: colleges and students themselves [14]. Based on the innovation and entrepreneurship needs of students majoring in tourism management in tourism development, this paper combs the problems existing in the tourism management ability system from three angles of innovation consciousness, innovation ability, and innovation ability and puts forward targeted countermeasures and suggestions [15]. By improving the school’s participation in collaborative education and deepening the degree of collaboration between schools and enterprises, it is conducive for the school to set up majors, formulate courses, compile teaching materials, build internal and external training and practice bases, and employ frontline technical skill masters of enterprises to provide practical skill guidance, so as to effectively improve the quality of talent training, ensure that students can meet the requirements of industry enterprises for technical talents through systematic learning of theoretical knowledge and practical skills, effectively shorten the time of students’ post adaptation, and truly cultivate skilled talents required by industry enterprises and society.

2. The Current Situation of Students’ Dual-Innovation Ability under the Mode of Cooperation between Schools and Enterprises

2.1. Failure to Fully Understand the Importance of Cultivating Innovation and Entrepreneurship. Under the background of education reform, the Ministry of Education has launched various corresponding policies. Under the effect of these policies, colleges and universities have begun to attach importance to the cultivation of entrepreneurial talents and focus on building a talent training platform to provide talents for the society. However, the research shows that some universities do not fully understand the importance of improving entrepreneurial skills, and higher vocational colleges are less invested in this
area than undergraduate colleges, and there are still obvious problems. At present, some universities pay attention to improving students' professional teaching and learning ability according to the cooperation between schools and enterprises model but do not recognize the value of innovative and entrepreneurial courses and activities. Although most VET institutions have established similar training bases in the synergy between enterprises, they often focus on skills training, which runs counter to the VET concept in the new era of schools and is not conducive to the all-round development of students.

2.2. The Existing Cooperation Mechanism Still Needs to Be Improved. Under the existence of many drawbacks, there are obvious defects in the relevant mechanism of cooperation between schools and enterprises at present, especially in cultivating students' innovative and entrepreneurial ability, which only focuses on the improvement of students' professional skills and seriously lacks practical characteristics, which makes it difficult for students to invest in innovative and entrepreneurial activities under such a mechanism and cannot improve their practical ability. Under the new situation, colleges and universities should establish a stable cooperation mechanism with modern enterprises, carry out targeted education, and provide students with an environment and platform for innovation and entrepreneurship.

2.3. Lack of Innovative Practice Platform. At present, the resources of campus bases such as innovation studios and workshops are scarce, and the utilization rate is low. Cooperation between schools and enterprises mode is still under study, and comprehensive operation modes such as negotiation, contact, docking, and monitoring have not yet been formed. It is not well combined with college students' mass entrepreneurship and innovation. Therefore, students' practice of participating in innovation and entrepreneurship is less, and their achievements have not gone out of school and gone to the society in a large scale, so they cannot be tested by the market.

3. Improvement of Analytic Hierarchy Process

By analyzing the specific implementation steps of analytic hierarchy process, the hierarchical model after construction is evaluated. After extensive analysis, an improved algorithm is proposed, and the efficiency of the algorithm is ensured by the practical application of the system. The improved algorithm of the system can efficiently reduce the amount of computation, and the algorithm has wide adaptability. The algorithm is not only suitable for the case that all the estimated relative weights $a_{ij} = \mu_{ij} \mu_{j}$ of $I$, $j(I, j = 1, 2, \cdots, n)$ are completely valid, but also suitable for the following cases: there is no complete confirmation.

3.1. Optimal Selection of Scale. The values of each element of the evaluation matrix reflect the subjective cognition and evaluation of decision makers. In the practical application of analytic hierarchy process, the general scaling methods are three scaling methods, 0.5-0.9 scaling methods, 9/9-9/1 scaling methods, and 10/10-18/2 scaling methods.

Three-scale method: only three values can be selected in the judgment of matrix, which are -1, 0, and 1 as shown in the formula

$$a_{ij} \begin{cases} -1, \text{Means I is less important than J,} \\ 0, \text{It means that I and J are equally important,} \\ 1, \text{Indicates that I is more important than J.} \end{cases}$$

$a_{ij}$ denotes the relative weight of element $I$ compared to element $J$, and $A = (a_{ij})_{mn}$ is the pairwise judgment matrix, where $a_{ij}$ has the following properties: $a_{ij} > 0, a_{ij} = 1/a_{ji}, a_{ii} = 1$.

The pairwise comparison classification matrix formed according to this definition is shown in the formula

$$A = \begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{pmatrix}. \quad (2)$$

Then, the optimal transfer matrix $B$ of the judgment matrix $A$ is shown in the formula

$$B = \begin{pmatrix} b_{11} & \cdots & b_{1n} \\ \vdots & \ddots & \vdots \\ b_{n1} & \cdots & b_{nn} \end{pmatrix}, \text{where, } b_{ij} = \frac{1}{n} \sum_{k=1}^{n} (a_{ik} + a_{jk}).$$

The transition matrix $B$ is further transformed into the consistency matrix $C$.

For matrix $A = (a_{ij})_{mn}$, it is a positive and inverse $n$-multiplicity matrix. If every $I, j, k = 1, 2, \cdots, n$ has $a_{ij} \cdot a_{ji} = 1$, it is a consistent matrix, as shown in the formula

$$C = \begin{pmatrix} c_{11} & \cdots & c_{1n} \\ \vdots & \ddots & \vdots \\ c_{n1} & \cdots & c_{nn} \end{pmatrix}, \text{where, } c_{ij} = \exp \left( b_{ij} \right). \quad (4)$$

Consistency matrix $C$ is the evaluation matrix needed by AHP.

9/9-9/1 scaling method: the specific values are investigated by Delphi method.

0.5-0.9 scaling method: if $A_{i}$ is considered as important as $A_{j}$, then $a_{ij} = 0.5$; if $A_{i}$ is more important than $A_{j}$, then $a_{ij} = 0.9$; in other cases, it is between 0.5 and 0.9. The even reference matrix $A = (a_{ij})_{mn}$ generated by 0.5-0.9 scaling method has the following properties: $a_{ij} > 0, a_{ij} = 1/a_{ji}, a_{ii} = 0.5$, and the matrix generated by 0.5-0.9 scaling method are complementary matrices.

10/10-18/2 scaling method: in order to improve the paired estimation matrix scaling method, there is also a 10/10-18/2 scaling method. In the 1/9 scaling method, the corresponding ratio to the 9/9-9/1 scaling method is shown in Table 1.
3.2. Improvement of Algorithm for Calculating Ranking Weight. Suppose there is a criterion C, then the relative weights of specific layers \( u_1, u_2, u_3, \ldots, u_n \) of the classification matrix \( A \) are carried out, and then the consistency test is carried out. Once the weight vector of a specific element relative to the previous layer element is calculated under the criterion, the combined weight of each element relative to the total amount of the target layer is finally obtained.

The sequence weight vectors of the \( k-1 \) elements of the \( k-1 \) layer are sorted according to the elements of \( k-1 \) layer as

\[
\omega^{(k-1)} = \left( \omega^{(k-1)}_1, \omega^{(k-1)}_2, \ldots, \omega^{(k-1)}_n \right).
\]

The ordering vector of \( k-1 \) elements of the \( k \) layer is shown in the formula

\[
P^{(k)}_j = \left( p^{(k)}_{1j}, p^{(k)}_{2j}, p^{(k)}_{3j}, \ldots, p^{(k)}_{kj} \right).
\]

The elements of \( k \) layer are sorted according to the elements of \( k-1 \) layer as

\[
P^{(k)} = \left( p^{(k)}_{1j}, p^{(k)}_{2j}, p^{(k)}_{3j}, \ldots, p^{(k)}_{kj} \right).
\]

Elements that calculate the weight of the \( k \) layer relative to the target are shown in the formula

\[
\omega^{(k)} = \left( \omega^{(k)}_1, \omega^{(k)}_2, \ldots, \omega^{(k)}_n \right) = \left( p^{(k)} \right) * \omega^{(k-1)}.
\]

Or use the summation method as shown in the formula

\[
\omega^{(k)}_i = \sum_{j=1}^{k-1} p^{(k)}_{ij} * \omega^{(k-1)}_j, \quad i = 1, 2, \ldots, n.
\]

Because calculating the relative weight of each layer element is familiar with calculating the relative weight of the total object, this paper does not propose them one by one.

3.2.1. Eigenvalue Method. If the elements obtained from the hierarchical model satisfy \( a_{ij} > 0 \) and \( a_{ij} = \frac{1}{a_{ji}} \), \( a_{11} = 1 \) and \( a_{ik} * a_{kj} = a_{ij} \) at the same time, \( \omega \) can be normalized to obtain the relative weight vector. The following methods are as follows:

3.2.2. Power Method. In the actual situation of this study, it is found that the amount of calculation is very large. Therefore, when dealing with complex situations, the calculation of square root method becomes more and more limited.

A judgment matrix constructed under a single criterion between levels: \( A = (a_{ij})_{n \times n} \), where \( a_{ij} = \mu_i / \mu_j \) then has formula (10) according to linear algebraic knowledge

\[
\begin{pmatrix}
\begin{array}{cccc}
a_{11} & \cdots & a_{1n} \\
\vdots & \ddots & \vdots \\
a_{n1} & \cdots & a_{nn}
\end{array}
\end{pmatrix}
= \frac{1}{n} \begin{pmatrix}
\begin{array}{cccc}
\mu_1 & \cdots & \mu_n \\
\vdots & \ddots & \vdots \\
\mu_n & \cdots & \mu_n
\end{array}
\end{pmatrix}
= \frac{1}{n} \begin{pmatrix}
\begin{array}{cccc}
1 & \cdots & 1 \\
\vdots & \ddots & \vdots \\
1 & \cdots & 1
\end{array}
\end{pmatrix}
\]

Then \( n \) is the eigenvalue of Eigen equation \( A \mu = \lambda \mu \), and the corresponding eigenvector is

\[
\mu = \begin{pmatrix}
\mu_1 \\
\vdots \\
\mu_n
\end{pmatrix}.
\]

Then normalize, that is, \( i = 1, 2, \ldots, n \), get \( \omega_i = \mu_i / \sum_{j=1}^{n} \mu_j \), and get \( \omega = (\omega_1, \omega_2, \cdots, \omega_n)^T \). The above is the ideal case where the ranking of the scoring matrix \( A \) is 1; that is, the paired scoring matrix only meets the requirements of positive and negative attributes and consistency. However, if \( a_{ik} = a_{ij} \) is invalid, the largest right root is not equal to \( N \). It is necessary to check and adjust the consistency of matrix in order to achieve satisfactory consistency of matrix.

Table 1: Importance of three scale methods.

| 1-9 scale method | 9/9-9/1 scale method | 10/10-18/2 scale method | The importance of the representation |
|------------------|----------------------|-------------------------|-----------------------------------|
| 1                | 9/9                  | 10/10                   | The same important                |
| 3                | 9/7                  | 12/8                    | A little important                |
| 5                | 9/5                  | 14/6                    | Important                         |
| 7                | 9/3                  | 16/4                    | Strong important                  |
| 9                | 9/1                  | 18/2                    | Very important                    |
| K1, 2, ...; 9    | 9/(10−K)1, 2, ...; 9 | (9 + k)/(11 − K)1, 2, ...; 9 | Range of structural formula K     |

Table 1: Importance of three scale methods.

- The 1-9 scale method represents the importance of the representation.
- The 9/9-9/1 scale method represents the importance of the representation.
- The 10/10-18/2 scale method represents the importance of the representation.

The importance of the representation is as follows:

- The same important: 1, 2, ..., 9
- A little important: 9/9, 9/10
- Important: 9/11, 10/11
- Strong important: 9/9, 10/10
- Very important: 9/9, 10/10

The 9/9-9/1 scale method is the same as the 1-9 scale method.

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- A little important: 9/9, 9/10
- Important: 9/11, 10/11
- Strong important: 9/9, 10/10
- Very important: 9/9, 10/10

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The importance of the representation is as follows:

- The same important: 1, 2, ..., 9
- A little important: 9/9, 9/10
- Important: 9/11, 10/11
- Strong important: 9/9, 10/10
- Very important: 9/9, 10/10

The 9/9-9/1 scale method is the same as the 1-9 scale method.
every nonzero $x^{(0)}$, there must be an $a_1, a_2, \cdots, a_n$ such that $a_1 = \sum_{j=1}^{n} a_j \mu_j$. Use the iterative formula $x^{(k+1)} = A x^{(k)}$, $k = 0, 1, \cdots$ to find the point sequence and get $\{x^{(0)}, x^{(1)}, \cdots\}$. Then according to what we can get, $x^{(k+1)} = A x^{(k)} = A^{k+1} x^{(0)} = A^k \sum_{j=1}^{n} a_j A^k \mu_j = \sum_{j=1}^{n} a_j \lambda_j^k \mu_j = \lambda_j^k \sum_{j=1}^{n} a_j (\lambda_j / \lambda_k)^k \mu_j$, where $|\lambda_1| > |\lambda_2| > |\lambda_3| > \cdots > |\lambda_n|$, so if $\sum_{j=1}^{n} a_j (\lambda_j / \lambda_k)^k \mu_j$ is large enough and $K$ is small enough, we can get $x^{(k+1)} / x^{(k)} = (A^k x^{(0)}) / (A^{k-1} x^{(0)}) \approx \lambda_1$, so $x^{(k+1)} / x^{(k)}$ is an approximate estimate of $\lambda_1$. The actual calculation ensures that if $|\lambda_1| < 1$ or $|\lambda_1| > 1$, $|\lambda_1|$ tends to infinity or infinity. Namely $a = \max \{x^{(k)}_i | i = 1, 2, \cdots, n\}$, and then $x^{(k+1)} = A * (1/a) x^{(k)}$, $k = 1, 2, \cdots$.

3.2.3. Square Root Method. The square root method is to carry out geometric average on each row vector of judgment matrix $A$ first, and then normalize it. First, a product operation is performed on the elements of the estimated value $A$ of each row that is shown in the formula

$$M_i = \left( \prod_{j=1}^{n} a_{ij} \right)^{1/n},$$

(13)

where $i = 1, 2, \cdots, n$. Normalization is then performed, as shown in the formula

$$\omega_i = \frac{M_i}{\sum_{i=1}^{n} M_i}, \quad i = 1, 2, \cdots, n.$$  (14)

Then the maximum eigenvalue of judgment matrix $A$ is shown in the formula.

$$\lambda_{\max} = \frac{1}{n} \left( \sum_{i=1}^{n} \frac{(Aw)_i}{\omega_i} \right).$$  (15)

In the formula, $(Aw)_i$ is the $i$ components of $Aw$, and $\omega = (\omega_1, \omega_2, \cdots, \omega_n)^T$.

3.2.4. Least Square Method. The judgment matrix

$$A = \begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{pmatrix} = \begin{pmatrix} \mu_1 / \mu_2 & \cdots & \mu_1 / \mu_n \\ \vdots & \ddots & \vdots \\ \mu_n / \mu_2 & \cdots & \mu_n / \mu_n \end{pmatrix}$$  (16)

is not valid. In other words, the estimated relative weight $a_{ij} = \mu_i / \mu_j$ is not fully applicable to all $I, j (j = 1, 2, \cdots, n)$. In this case, the value of $a_{ij} \mu_j - \mu_i$ is not all zero, and the weight set $\{u_1, u_2, u_3, \cdots, u_n\}$ is selected to minimize the sum of squares, as shown in the formula

$$\min Z = \sum_{i=1}^{n} \sum_{j=1}^{n} (a_{ij} - \mu_i)^2,$$

(17)

S.t. $\sum_{i=1}^{n} \mu_i = 1$.

The generated program is a typical nonlinear program. We use Lagrange coefficients to make nonlinear programming a purely quantitative programming problem and construct Lagrange functions as shown in the formula

$$L = \sum_{i=1}^{n} \sum_{j=1}^{n} (a_{ij} \mu_j - \mu_i)^2 + 2 \lambda \left( \sum_{i=1}^{n} \mu_i - 1 \right).$$  (18)

In analytical mechanics, the Lagrange function of a dynamic system is a function that describes the dynamic state of the whole physical system. For general classical physical systems, it is usually defined as kinetic energy minus potential energy, which is expressed by the equation, where $L$ is the Lagrange quantity, $\lambda$ is the kinetic energy, and $\mu$ is the potential energy.

In analytical mechanics, assuming that the Lagrange function of a system is known, the Lagrange quantity can be directly substituted into the Lagrange equation, and the motion equation of the system can be obtained with a little operation. Perform the first partial derivative operation on the above formula as shown in the formula

$$\frac{\partial L}{\partial \mu_i} = 2 \sum_{i=1}^{n} (a_{i1} \mu_1 - \mu_i) a_{i1} - 2 \sum_{j=1}^{n} (a_{ij} \mu_1 - \mu_i) + 2 \lambda = 0,$$  (19)

where $l = 1, 2, \cdots, n$. $\partial L / \partial \lambda_i = 2 \left( \sum_{i=1}^{n} \mu_i - 1 \right) = 0$.

First, list the steps of the algorithm in theory:

(1) Construct judgment matrix $A$

(2) Using the least square method to get the maximum eigenvalue $\lambda_{\max}$ and get the corresponding eigenvector

(3) Normalized eigenvector

(4) Calculate the conformance index CI(0), and get the CR(0) of any conformance index RL. If CR(0) < 0.1, no iteration is required. The relative weight vector obtained is

$$\omega^{(0)} = \left( \omega_1^{(0)}, \omega_2^{(0)}, \cdots, \omega_n^{(0)} \right)^T.$$  (20)

Otherwise, you need to build a complete consistency matrix as shown in the equation
Adopting iterative equation: $A^{(1)} = tA^{(0)} + (1 - t)B^{(0)}$, carrying out iterative operation.

After iteration, the maximum eigenvalue of the judgment matrix is checked for consistency. If the consistency requirement is not met, the iteration must continue until the consistency requirement is met.

Use the talent evaluation system example in this article to demonstrate the algorithm:

This paper only introduces the “comprehensive quality” evaluation system, and the demonstration methods of other evaluation systems in the system are known, so this paper will not list them separately.

First, build the hierarchical model as follows in Figure 1:

Hierarchical model uses 10/10-18/2 scaling method to create classification matrix, it is shown in Table 2.

Then, the maximum eigenvalue of the scoring matrix is obtained by using the least square method: $\lambda_{\text{max}} = 6.6357$; the corresponding eigenvector and the normalized eigenvector are shown as

$$\omega^{(0)} = \begin{pmatrix} \omega_1^{(0)} \\ \vdots \\ \omega_n^{(0)} \end{pmatrix} = \begin{pmatrix} 0.1377 \\ 0.1998 \\ 0.2348 \\ 0.2138 \\ 0.2138 \end{pmatrix},$$

$$\text{CI} = \frac{\lambda_{\text{max}} - n}{n - 1} = \frac{6.6357 - 5}{5 - 1} = 0.4089,$$

$$\text{RI} = 1.12,$$

$$\text{CR} = \frac{\text{CI}}{\text{RI}} = \frac{0.4089}{1.12} = 0.3650 > 0.1.$$  

Obviously, the requirement of consistency is not met. Achieve consistency through iterative method.

Construct a complete consistency matrix as shown in the formula

$$B^{(0)} = \begin{pmatrix} \omega_1^{(0)} & \omega_2^{(0)} & \cdots & \omega_n^{(0)} \\ \omega_1^{(0)} & \vdots & \ddots & \vdots \\ \vdots & \ddots & \ddots & \vdots \\ \omega_1^{(0)} & \omega_2^{(0)} & \cdots & \omega_n^{(0)} \end{pmatrix} = \begin{pmatrix} 1 & 0.6892 & 0.5694 & 0.624 & 0.624 \\ 1.4621 & 1 & 0.8418 & 0.9541 & 0.9541 \\ 1.7265 & 1.7265 & 1 & 1.1018 & 1.1018 \\ 1.5521 & 1.0971 & 0.9823 & 1 & 1 \\ 1.6567 & 1.0989 & 0.9811 & 1 & 1 \end{pmatrix}.$$  

Iterative equation: $A^{(1)} = tA^{(0)} + (1 - t)B^{(0)}$; take $t = 0.9$ and iterate, as shown in the formula

$$A^{(1)} = 0.9A^{(0)} + 0.1B^{(0)} = \begin{pmatrix} 1 & 1.323 & 1.3581 & 1.6224 & 1.5618 \\ 0.8934 & 1 & 3.9821 & 3.9321 & 0.8721 \\ 4.5622 & 0.3299 & 1 & 5.2217 & 3.9809 \\ 3.0098 & 2.9832 & 0.9721 & 1 & 0.3750 \\ 0.9023 & 2.3255 & 3.9227 & 3.0445 & 1 \end{pmatrix}.$$  

The maximum eigenvalue of $A^{(1)}$ is calculated, and the corresponding eigenvectors are shown as

$$\omega^{(0)} = \begin{pmatrix} \omega_1^{(0)} \\ \omega_2^{(0)} \\ \vdots \\ \omega_n^{(0)} \end{pmatrix} = \begin{pmatrix} 0.3987 \\ 0.5171 \\ 0.7689 \\ 0.8093 \\ 0.5609 \end{pmatrix},$$

$$\text{CI} = \frac{\lambda_{\text{max}} - n}{n - 1} = \frac{6.672 - 5}{5 - 1} = 0.418,$$

$$\text{RI} = 1.12,$$

$$\text{CR} = \frac{\text{CI}}{\text{RI}} = \frac{0.418}{1.12} = 0.3732 > 0.1.$$  

Need to continue iteration.

After 4 iterations, the maximum eigenvalues are shown as

$$\lambda_{\text{max}}^{(1)} = 5.579,$$

$$\lambda_{\text{max}}^{(2)} = 5.498,$$

$$\lambda_{\text{max}}^{(3)} = 5.4623,$$

$$\lambda_{\text{max}}^{(4)} = 5.41,$$

$$\text{CI} = \frac{\lambda_{\text{max}} - n}{n - 1} = \frac{5.41 - 5}{5 - 1} = 0.1025,$$

$$\text{RI} = 1.12,$$

$$\text{CR} = \frac{\text{CI}}{\text{RI}} = \frac{0.1025}{1.12} = 0.0915 < 0.1.$$  

That is to say, satisfactory consistency requirements are achieved. Then the corresponding eigenvectors are normalized to get the final weight value.

4. Experimental Research and Results

4.1. Data Acquisition and Index Weighting

4.1.1. Data Collection and Processing. This study is distributed to schools in two ways: electronic questionnaire and paper proofreading enterprise training site from 2013 to 2018. There are 341 valid questionnaires, excluding invalid questionnaires. The interest rate is 96.6%, which meets the requirements. And based on this information, explore the cooperation between schools and enterprises in educating people.

4.1.2. Weighting Method of Evaluation Index. In this paper, subjective and objective weighting methods are mainly used to determine and jointly determine the index weight. Entropy
method and coefficient of variation method are used to determine the index weight, and finally combined weighting method is used to determine the final weight to weigh the advantages and disadvantages of different methods. This index makes up for the deficiency of single weight model and makes the effectiveness of the index more reasonable.

4.2. Determining the Weight of the Cooperative Education System between Schools and Enterprises

4.2.1. Determine the Weight of Each Index of School-Enterprise Education System. Entropy method. According to the calculation formula, the weight of each index is obtained. See Table 3 for specific data.

Variation coefficient method. According to the weighting formula of variation coefficient method, the characteristic value of each index is substituted into the formula, and the index weight of school general education system is obtained. See Table 4 for details.

Combination weight. According to the calculation formula of combination weight, \( \beta = 0.5 \), and the comprehensive weight of each item in the index system of coeducational system is obtained according to Table 5.

4.2.2. Determine the Weight of Each Index of Enterprise Cooperative Training System. Entropy method. According to the weighting principle of entropy method, the relevant indexes of cooperative training system are weighted, and the weights of each index are obtained according to Table 6.

Variation coefficient method. According to the weighting formula of variation coefficient method, the characteristic value of each index is substituted into the corresponding formula, and the index weight of business cooperation training system is obtained, as shown in Table 7.

Combination weight formula. According to the combination weight calculation formula \( \beta = 0.5 \), the total weight of the cooperative training system index system can be obtained, as shown in Table 8.

To sum up, the weight of the corresponding indicators of school collaborative education and enterprise collaborative education can be obtained. See Table 9 for more detailed information.

4.3. Empirical Analysis of the Synergy Degree of School-Enterprise Collaborative Education
4.3.1. Analysis of Comprehensive Development Level of School-Enterprise Collaborative Education System. Multiplying the respective index weights in the index system of school-enterprise collaborative education system with the original data after entropy method, the comprehensive development level of school-enterprise collaborative education system from 2013 to 2018 can be obtained, respectively, as shown in Table 10 for details.

Analysis Table 10 knows:

(1) From the time point of view, the overall development level of combination of school and enterprise education system is on the rise. Among them, the upward trend of enterprises is clear and develops rapidly, while schools are stable and grow steadily. The overall development level of coeducation in schools has steadily increased from 0.1804 in 2013 to 0.8826 in 2018, with a steady growth rate and almost no growth in recent six years. The overall development speed is slow, showing a gradual upward trend; the overall development level of joint venture training system increased from 0.1257 in 2013 to 0.4561 in 2016 and from 0.1257 in 2013 to 0.4561 in 2016. The development speed was rapid in 2017, and in 2013: 0.2051671. In the past two years, the overall development level has been significantly improved. To sum up, from 2013 to 2018, the overall development level of cooperation between schools and enterprises in running schools has changed, but the development speed is slightly faster than that of schools, and the overall development level is generally higher.

(2) The overall development level of the cooperative school-running system is different from that of the cooperative school-running system, which leads to obvious differences between the two systems in the development process. Overall, the overall development level of coeducation in enterprises increased slightly faster than that in schools from 2013 to 2018. The gap between the overall development level of cooperative education and the overall development level of cooperative education can be divided into two stages: the first stage, the positive distribution stage after 2013. Until 2016, it was the collaborative education system of the school. The overall development level of human system is faster than that of cooperative education system. At present, the overall development level of the general education system in schools has increased from 0.1804 in 2013 to 0.5412 in 2016, while the development level of companies has increased from 0.1257 in 2013 to 0.4561 in 2016. Company leading to the overall development level of the school collaborative training system is better than the overall development level of the company collaborative training system.

The second stage, the negative gap stage from 2017

### Table 3: Index weight.

| Metric | Entropy value | 1-E | Entropy right |
|--------|---------------|-----|---------------|
| D1     | 0.8713        | 0.1287 | 0.0289 |
| D2     | 0.7875        | 0.2125 | 0.0478 |
| D3     | 0.8101        | 0.1899 | 0.0427 |
| D4     | 0.8473        | 0.1527 | 0.0343 |
| D5     | 0.8577        | 0.1423 | 0.032  |
| D6     | 0.8298        | 0.1702 | 0.0383 |
| D7     | 0.8454        | 0.1546 | 0.0348 |
| D8     | 0.7895        | 0.2105 | 0.0473 |
| D9     | 0.8196        | 0.1804 | 0.0406 |
| D10    | 0.775         | 0.2225 | 0.0506 |
| D11    | 0.8242        | 0.1758 | 0.0395 |
| D12    | 0.8535        | 0.1465 | 0.0329 |
| D13    | 0.824         | 0.176  | 0.0396 |
| D14    | 0.8055        | 0.1945 | 0.0437 |
| D15    | 0.778         | 0.222  | 0.0499 |
| D16    | 0.8039        | 0.1961 | 0.0441 |
| D17    | 0.8055        | 0.1945 | 0.0437 |
| D18    | 0.8583        | 0.1417 | 0.0319 |
| D19    | 0.5512        | 0.4488 | 0.1009 |
| D20    | 0.7968        | 0.2032 | 0.0457 |
| D21    | 0.6225        | 0.3775 | 0.0849 |
| D22    | 0.7968        | 0.2032 | 0.0457 |

### Table 4: Index weight of school collaborative education system under coefficient of variation method.

| Metric | Coefficient of variation | Weight |
|--------|--------------------------|--------|
| D1     | 0.0568                   | 0.0784 |
| D2     | 0.0573                   | 0.0791 |
| D3     | 0.004                    | 0.0055 |
| D4     | 0.032                    | 0.0441 |
| D5     | 0.044                    | 0.0607 |
| D6     | 0.0302                   | 0.0417 |
| D7     | 0.0582                   | 0.0803 |
| D8     | 0.0579                   | 0.08   |
| D9     | 0.0658                   | 0.0908 |
| D10    | 0.0284                   | 0.0392 |
| D11    | 0.0552                   | 0.0762 |
| D12    | 0.0281                   | 0.0388 |
| D13    | 0.0216                   | 0.0298 |
| D14    | 0.0223                   | 0.0308 |
| D15    | 0.0354                   | 0.0489 |
| D16    | 0.0522                   | 0.072  |
| D17    | 0.0129                   | 0.0177 |
| D18    | 0.0138                   | 0.019  |
| D19    | 0.0277                   | 0.0382 |
| D20    | 0.0022                   | 0.003  |
| D21    | 0.0129                   | 0.0177 |
| D22    | 0.0058                   | 0.008  |
to 2018, means that the overall development level of the education system based on enterprise cooperation is faster than that of the school cooperative education system. After the overall development level improved steadily from 2013 to 2016, the overall development level of the joint venture training system improved rapidly in 2017, from 0.4561 in 2016 to 0.7462 in 2017 and then to 0.8485 in 2018, which is a great increase. From 2017 to 2018, the overall development level of coeducation is higher than that of coeducation in schools. The main reasons are as follows: First, from the perspective of industrial transformation and renewal, China’s economy has been declining in recent years. Traditional industries are in urgent need of reform and modernization, and enterprises also urgently need to change traditional product production processes, improve product quality, and cooperate with schools to develop new products, which not only contributes to the reform and renewal of enterprise products, but also disappears China’s human capital dividend from the perspective of human resource demand. At present, enterprises are in urgent need of high-quality technology and professional skills that can work at zero distance. Some universities are the main supply sources of technical capabilities, and enterprises can cooperate with them to meet their own needs. School-enterprise cooperation requires a certain degree of high-quality technology and technical ability; Finally, from the perspective of improving the competitiveness of enterprises, innovation is the motive force of enterprise development. In the past, many enterprises invested a lot of money in displaying innovative talents, developing new product patents and innovating products. In order to save the cost of innovation, more and more enterprises are setting up new product development centers in colleges and universities and implementing industrial education integration schools. Enterprises cooperate in educating people and jointly research and develop new processes, technologies, projects, and products with teachers and students, which significantly reduces the research and development costs of enterprises and improves the competitiveness of enterprises. Since 2017, the overall development level of enterprise collaborative education system has gradually exceeded the school level, and there is a negative gap in the development trend.

4.3.2. Analysis on the Development Level of Collaborative Education Subsystem between Schools and Enterprises

(1) Analysis on the Development Level of Collaborative Education in Schools. From the analysis of Figure 2, it can be seen that the comprehensive development level of school

Table 5: Comprehensive weight.

| Metric | Entropy weight method | Variability coefficient method | Comprehensive weight |
|--------|-----------------------|-------------------------------|----------------------|
| D1     | 0.0289                | 0.0784                        | 0.0537              |
| D2     | 0.0478                | 0.0791                        | 0.0634              |
| D3     | 0.0427                | 0.0055                        | 0.0241              |
| D4     | 0.0343                | 0.0441                        | 0.0392              |
| D5     | 0.032                | 0.0607                        | 0.0464              |
| D6     | 0.0383                | 0.0417                        | 0.04               |
| D7     | 0.0348                | 0.0803                        | 0.0575              |
| D8     | 0.0473                | 0.08                        | 0.0637              |
| D9     | 0.0406                | 0.0908                        | 0.0657              |
| D10    | 0.0506                | 0.0392                        | 0.0449              |
| D11    | 0.0395                | 0.0762                        | 0.0579              |
| D12    | 0.0329                | 0.0388                        | 0.0359              |
| D13    | 0.0396                | 0.0298                        | 0.0347              |
| D14    | 0.0437                | 0.0308                        | 0.0373              |
| D15    | 0.0499                | 0.0489                        | 0.0494              |
| D16    | 0.0441                | 0.072                        | 0.0581              |
| D17    | 0.0437                | 0.0177                        | 0.0307              |
| D18    | 0.0319                | 0.019                        | 0.0254              |
| D19    | 0.1009                | 0.0382                        | 0.0696              |
| D20    | 0.0457                | 0.003                        | 0.0244              |
| D21    | 0.0849                | 0.0177                        | 0.0513              |
| D22    | 0.0457                | 0.008                        | 0.0268              |

Table 6: Weight of enterprise education system under entropy method.

| Metric | Entropy value | 1-E | Entropy right |
|--------|--------------|-----|--------------|
| D23    | 0.8057       | 0.1943 | 0.0387       |
| D24    | 0.7804       | 0.2196 | 0.0437       |
| D25    | 0.8054       | 0.1946 | 0.0388       |
| D26    | 0.857        | 0.143  | 0.0285       |
| D27    | 0.795        | 0.205  | 0.0408       |
| D28    | 0.8018       | 0.1982 | 0.0395       |
| D29    | 0.867        | 0.133  | 0.0265       |
| D30    | 0.8775       | 0.1225 | 0.0244       |
| D31    | 0.6854       | 0.3146 | 0.0627       |
| D32    | 0.7492       | 0.2508 | 0.05        |
| D33    | 0.7528       | 0.2472 | 0.0492       |
| D34    | 0.8023       | 0.1977 | 0.0394       |
| D35    | 0.6523       | 0.3477 | 0.0693       |
| D36    | 0.8115       | 0.1885 | 0.0375       |
| D37    | 0.7517       | 0.2483 | 0.0495       |
| D38    | 0.8605       | 0.1395 | 0.0278       |
| D39    | 0.8237       | 0.1763 | 0.0351       |
| D40    | 0.7808       | 0.2192 | 0.0437       |
| D41    | 0.6459       | 0.3541 | 0.0705       |
| D42    | 0.7923       | 0.2077 | 0.0414       |
| D43    | 0.7132       | 0.2868 | 0.0571       |
| D44    | 0.8722       | 0.1278 | 0.0255       |
| D45    | 0.8451       | 0.1549 | 0.0309       |
| D46    | 0.852        | 0.148  | 0.0295       |
collaborative education system has steadily improved from 2013 to 2018. From 0.1804 in 2013 to 0.8826 in 2018, the subsystems that constitute the coeducation system in schools show a mixed development trend, but the overall development level has improved. Among them, in 2015, the mechanism construction, teaching staff construction, curriculum construction, and teaching materials construction all exceeded the overall level of school collaborative education system development, and the talent curriculum construction exceeded the overall level of school development. In 2016, schools will jointly run schools. In 2013, the infrastructure construction also exceeded the overall development level of running schools together. This shows that compared with other subsystems, the first five subsystems contribute more to the overall development level of school collaborative education system. And the other five subsystems are education and apprenticeship system, education evaluation, work quality, social welfare and social satisfaction with schools, and the comprehensive development level of school-based education system. The contribution degree is slightly lower than the first five subsystems, and the influence of the system on the overall development level of the school can be ignored. On this basis, generally speaking, although the development level of each subsystem is different, it contributes to the overall development level of the school cooperative training system to varying degrees.

Table 7: Index weight of enterprise collaborative education system under coefficient of variation method.

| Metric | Coefficient of variation | Weight |
|--------|--------------------------|--------|
| D23    | 0.0466                   | 0.0591 |
| D24    | 0.0434                   | 0.055  |
| D25    | 0.0093                   | 0.0117 |
| D26    | 0.0525                   | 0.0666 |
| D27    | 0.0436                   | 0.0553 |
| D28    | 0.0471                   | 0.0597 |
| D29    | 0.033                    | 0.0419 |
| D30    | 0.0347                   | 0.044  |
| D31    | 0.0234                   | 0.0297 |
| D32    | 0.0334                   | 0.0424 |
| D33    | 0.0434                   | 0.0551 |
| D34    | 0.001                    | 0.0013 |
| D35    | 0.0358                   | 0.0454 |
| D36    | 0.0424                   | 0.0538 |
| D37    | 0.0348                   | 0.0442 |
| D38    | 0.0316                   | 0.0401 |
| D39    | 0.0199                   | 0.0253 |
| D40    | 0.0382                   | 0.0484 |
| D41    | 0.0345                   | 0.0438 |
| D42    | 0.0465                   | 0.059  |
| D43    | 0.0251                   | 0.0319 |
| D44    | 0.0233                   | 0.0295 |
| D45    | 0.0205                   | 0.026  |
| D46    | 0.0244                   | 0.031  |

Table 8: Comprehensive weight of enterprise education system indicators.

| Metric | Entropy weight method | Variability coefficient method | Comprehensive weight |
|--------|-----------------------|-------------------------------|----------------------|
| D23    | 0.0387                | 0.0591                        | 0.0489               |
| D24    | 0.0437                | 0.055                         | 0.0494               |
| D25    | 0.0388                | 0.0117                        | 0.0252               |
| D26    | 0.0285                | 0.0666                        | 0.0475               |
| D27    | 0.0408                | 0.0553                        | 0.0481               |
| D28    | 0.0395                | 0.0597                        | 0.0496               |
| D29    | 0.0265                | 0.0419                        | 0.0342               |
| D30    | 0.0244                | 0.044                         | 0.0342               |
| D31    | 0.0627                | 0.0297                        | 0.0462               |
| D32    | 0.05                  | 0.0424                        | 0.0462               |
| D33    | 0.0492                | 0.0551                        | 0.0522               |
| D34    | 0.0394                | 0.0013                        | 0.0203               |
| D35    | 0.0693                | 0.0454                        | 0.0573               |
| D36    | 0.0375                | 0.0538                        | 0.0457               |
| D37    | 0.0495                | 0.0442                        | 0.0468               |
| D38    | 0.0278                | 0.0401                        | 0.0339               |
| D39    | 0.0351                | 0.0253                        | 0.0302               |
| D40    | 0.0437                | 0.0484                        | 0.046                |
| D41    | 0.0705                | 0.0438                        | 0.0572               |
| D42    | 0.0414                | 0.059                         | 0.0502               |
| D43    | 0.0571                | 0.0319                        | 0.0445               |
| D44    | 0.0255                | 0.0295                        | 0.0275               |
| D45    | 0.0309                | 0.026                         | 0.0284               |
| D46    | 0.0295                | 0.031                         | 0.0302               |

(2) Analysis on the Development Level of Enterprise Collaborative Education Subsystem. From the analysis of Figure 3, it can be seen that from 2013 to 2018, the overall development level of enterprise cooperative training system has been rapidly improved. From 0.1257 in 2013 to 0.8485 in 2018, the overall development level has been improved to varying degrees in different periods. In its subsystems, the participation of enterprises in the construction of curriculum materials and the development of personnel training projects exceeds the overall level of collaborative business training system development in 2014, while the mechanism construction does not exceed the overall development level. In 2015, the overall development level of the collaborative training system is basically at the same level, which indicates that compared with other subsystems and schools, the contribution of enterprises participating in the construction of teacher training bases to the overall development level of the joint training system is slightly lower than the share of the overall development level of the joint training system of schools. Therefore, by increasing the participation of enterprises in the construction of school teachers and training centers, the overall development level of enterprise collaborative training system can be effectively improved. The development level of the other six subsystems is as follows: participation in education and training programs,
Table 9: Weight table of index system of collaborative education system between schools and enterprises.

| System level                          | Functional layer                | Index layer                                                                 | Index layer weight | Function layer weight |
|---------------------------------------|---------------------------------|-----------------------------------------------------------------------------|--------------------|-----------------------|
| School collaborative education system  | Mechanism construction          | The government supervises the number of cooperative education mechanisms in schools | 0.0537             | 0.1171                |
|                                       |                                 | Number of school assessment and management collaborative education system     | 0.0634             |                       |
|                                       |                                 | The proportion of double-qualified teachers are full-time teachers           | 0.0241             |                       |
|                                       | Teacher construction            | The proportion of part-time teachers are full-time teachers                  | 0.0392             | 0.1097                |
|                                       |                                 | The proportion of temporary teachers in enterprises are full-time teachers   | 0.0464             |                       |
|                                       |                                 | Introduce enterprises or jointly develop the number of courses               | 0.04                |                       |
|                                       | Curriculum and teaching material construction | Introduce enterprises or jointly develop the number of textbooks             | 0.0575             | 0.1612                |
|                                       |                                 | The proportion of part-time teachers teaching in the total professional class hours | 0.0637             |                       |
|                                       | Talent training plan formulation | Organize the number of revisions of the talent training plan                  | 0.0657             | 0.1156                |
|                                       |                                 | Organize the demonstration times of talent training program                 | 0.0449             |                       |
|                                       | Construction of training base   | The number of on-campus practical training bases jointly built by schools and enterprises | 0.0579             | 0.0938                |
|                                       |                                 | Number of off-campus training bases jointly built by schools and enterprises | 0.0359             |                       |
|                                       | Training internship arrangement | Number of cooperative enterprises per specialty                               | 0.0347             | 0.072                 |
|                                       |                                 | Arrange the number of practical training instructors                        | 0.0373             |                       |
|                                       |                                 | Number of courses inviting companies to participate in the evaluation       | 0.0494             |                       |
|                                       | Teaching evaluation             | The number of courses unilaterally evaluated by the entrusted enterprises    | 0.0581             | 0.1075                |
|                                       | Quality of employment           | First-time employment ratio of graduates                                     | 0.0307             | 0.0561                |
|                                       |                                 | Corresponding employment ratio of graduates                                  | 0.0254             |                       |
|                                       | Social effect results benefit   | Get the enterprise collaborative research and development project funds      | 0.0696             | 0.094                 |
|                                       | Social satisfaction with schools| Train the number of employees for enterprises                                | 0.0244             |                       |
|                                       |                                 | Student satisfaction with the school                                         | 0.0513             | 0.0781                |
|                                       |                                 | Enterprise satisfaction with students                                        | 0.0268             |                       |
| Enterprise collaborative education system | Participate in mechanism construction | The government supervises the number of cooperative education mechanism conducted by enterprises | 0.0489             | 0.983                 |
|                                       |                                 | Number of enterprise assessment and management collaborative education system | 0.0494             |                       |
|                                       | Participate in the construction of teachers | The proportion of employees participating in teaching employees in the enterprise | 0.0252             | 0.0727                |
|                                       |                                 | The total number of teachers temporarily employed in the school              | 0.0475             |                       |
|                                       | Participate in the construction of courses and teaching materials | Number of participation in professional course development                   | 0.0481             |                       |
|                                       |                                 | Number of participants in the development of professional textbooks          | 0.0496             | 0.1319                |
|                                       | Participate in the formulation of talent training plan | Number of courses taught by part-time teachers                              | 0.0342             |                       |
|                                       |                                 | Participated in the formulation and revision of the talent training program for times | 0.0342             |                       |
|                                       |                                 | Participate in the demonstration times of the talent training program        | 0.0462             |                       |
|                                       |                                 | The number of on-campus practical training bases donated                    | 0.0462             | 0.0984                |
participation in education evaluation, student retention, R&D innovation, enterprise financial investment, and school satisfaction with enterprises that do not exceed the overall level of school development. Training system based on business cooperation shows that the contribution of cooperative education system to the overall development level is relatively low. Companies can improve the efficiency of the common education system by increasing students' participation in education and practical arrangements and teaching evaluation and by increasing investment in coeducation in schools. The overall development level has improved the participation and synergy of enterprises in coeducation. Generally speaking, although each subsystem has different contributions to the overall development level of collaborative training system, the situation of enterprises participating in collaborative training shows an increasing trend year by year, and the synergy between them is constantly enhanced. The combination of production and training will also be realized by improving synergy.

(3) Analysis of the Collaborative Development Level of Cooperation between Schools and Enterprises and Collaborative Education. According to the above evaluation model, we can calculate the overall development level of the cooperative training system between schools and enterprises from 2013 to 2018, the degree of coordination between the two systems, and the development level of cooperation, as shown in Table 11.

As shown in Figure 4, the development level of cooperation between schools and enterprises has steadily improved and has experienced an upgrading process from subversion to subversion-difficult coordination-priority coordination.

The in-depth analysis of the synergy and development level of schools and enterprises that cooperate to educate
Figure 2: Development level of school collaborative education subsystem.

Figure 3: Development level of enterprise collaborative education subsystem.

Table 11: Collaborative development level of collaborative education between schools and enterprises from 2013 to 2018.

| A particular year | Comprehensive development level of school collaborative education | Comprehensive development level of enterprise cooperative education | Collaborative degree | Coordinated development level |
|-------------------|-----------------------------------------------------------------|------------------------------------------------------------------|----------------------|------------------------------|
| 2013              | 0.1804                                                          | 0.1257                                                           | 0.484                | 0.2722                       |
| 2014              | 0.2913                                                          | 0.2271                                                           | 0.4923               | 0.3572                       |
| 2015              | 0.3667                                                          | 0.3294                                                           | 0.4986               | 0.4166                       |
| 2016              | 0.5412                                                          | 0.4561                                                           | 0.4964               | 0.4975                       |
| 2017              | 0.6033                                                          | 0.7462                                                           | 0.4944               | 0.5776                       |
| 2018              | 0.8286                                                          | 0.8485                                                           | 0.4999               | 0.6475                       |
students shows that the synergy of school-enterprise collaborative education fluctuates slightly, but the overall level has been improved. The level of coordinated development has been generally improved, showing a steady growth trend. The functional coordinated development of collaborative education between schools and enterprises is insufficient. The synergy between schools and enterprises in educating people is not well coordinated in time dimension. The coordinated state of collaborative education between schools and enterprises is not sustainable.

5. Concluding Remarks

As a part of the national policy of combining production with education and coconstruction between schools and enterprises, this paper investigates the degree and countermeasures of cooperation between schools and enterprises in tourism professional management. To clear the research ideas as a starting point, review the existing comprehensive evaluation of the integration of production and education and cooperation between schools and enterprises training, demonstrate the feasibility of this study, and seek the breakthrough of this research. Taking the interactive mechanism of S Tourism Vocational School as an example, this paper analyzes the current situation of cooperation between schools and enterprises training. The comprehensive evaluation index system and evaluation model of school-enterprise cooperation need to be tested in tourism secondary vocational education. Finally, this paper analyzes the factors that affect the cooperative training level between tourism colleges and tourism enterprises, puts forward effective countermeasures for the influencing factors, and finally forms a clear research idea and detailed analysis and research route.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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