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Research on Quality Evaluation of Entrepreneurship Education in Colleges and Universities based on Triple Helix Theory and CIPP Model

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Abstract

This paper combines the triple helix theory with the CIPP model, and establishes a quality evaluation index system for entrepreneurship education in colleges and universities based on the triple helix theory and the CIPP model.so this paper constructs a Matter-element evaluation model by combining COWA Empowerment and G1 Empowerment, which could be able to evaluate the actual quality of entrepreneurship education in a university. The results show that the evaluation results of the model are consistent with the actual quality evaluation results of entrepreneurship education. Provide ideas for the quality evaluation of entrepreneurship education in colleges and universities. It also could provide ideas for the quality evaluation of entrepreneurship education in colleges and universities.

Keywords

Entrepreneurship Education in Colleges and Universities; Quality Evaluation; Triple Helix Theory; CIPP Model; Matter-element Model.

1. Introduction

The international competition in the 21st century will be the competition of talents. Vigorously developing entrepreneurship education has great practical significance and far-reaching historical significance for our country to further accomplish the strategic goals of "rejuvenating the country through science and education" and "building an innovative country". Promoting mass entrepreneurship and mass innovation is an important support for the in-depth implementation of the innovation-driven development strategy, and an important way to further promote the supply-side structural reform. Therefore, the research on the quality evaluation of entrepreneurship education has also become one of the research hotspots of many experts and scholars.

My country's research on entrepreneurship education lags behind foreign countries. In terms of evaluation research, Li Jing (2013) used a combination of formative evaluation and summative evaluation to evaluate entrepreneurship education[1]. Zhou Yindong (2015) constructed a quality evaluation model of entrepreneurship education by combining the AHP method and the fuzzy comprehensive evaluation method, and made an overall and individual evaluation analysis for teachers and undergraduates[2]. Lv Yang (2017) constructed a TOPSIS university entrepreneurship education quality evaluation model based on entropy weights, and proposed the establishment of a quality evaluation mechanism, setting up scientific entrepreneurship education courses, establishing a strong backing of teachers, and improving the quality service and management of entrepreneurship education. Research on the path of promoting entrepreneurship education in colleges and universities from four aspects[3]. Zhang Wei (2019) built an evaluation model combining AHP method and fuzzy comprehensive evaluation method based on CIPP theory, and proposed four quality improvement strategies

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for entrepreneurship education based on entrepreneurship education environment foundation, resource allocation, process action ability, and achievement performance[4].

As the government, enterprises and colleges gradually pay more attention to entrepreneurship education, the quality of entrepreneurship education in my country has also developed, but the evaluation method of entrepreneurship education is still relatively simple. In terms of constructing the indicators for the quality evaluation of entrepreneurship education in colleges and universities, we often only pay attention to the teachers of colleges and universities, the number of entrepreneurship courses, and the funding for entrepreneurship, while the government and enterprise support for stakeholders are often ignored. Therefore, this paper will focus on Combined with the CIPP theory and the triple helix theory, establish the evaluation index of entrepreneurship education in colleges and universities with the participation of the government, enterprises, universities and other stakeholders. Abandoning the singularity of traditional weighting, combining objective weighting COWA operator with subjective weighting G1 method for combined weighting, constructing a Matter-element evaluation model based on COWA-G1 combined weighting, and using a specific university entrepreneurship education Quality as the research object, on this basis, evaluate the quality of entrepreneurship education, provide ideas and methods for the quality evaluation of entrepreneurship education, and expand the theoretical field of entrepreneurship education.

2. Identification and Screening of Evaluation Indexes of Entrepreneurship Education in Colleges and Universities

2.1. Triple Helix Theory

The triple helix theory is a theory of interaction and interaction between genes, tissues and the environment in the field of biology, and is used to analyze the causal dialectical relationship between the three[5]. From the perspective of sustainable development, the innovation of entrepreneurship and innovation education in colleges and universities is mainly based on knowledge, skills, products, etc., while colleges, enterprises and governments carry out entrepreneurship and market activities around innovative products, as shown in Figure 1.Colleges and universities provide talents and knowledge for innovation and entrepreneurship. They are the main source of new technologies and new knowledge, and are also the main production factors of the knowledge economy. Enterprises are the main production sites that provide finance, services and materials, and provide products to society. And the government is a solid source of contracts, ensuring mutual stability between institutions. Only when these three are linked together, develop together, and continuously expand the interface with each other, will functions overlap and overlap [6]. First of all, the three spirals have different roles and share knowledge and technological achievements. Only by promoting the transformation of technological achievements through an effective mechanism can we transform from a single function of entrepreneurship and innovation education to a composite function; Secondly, each spiral has a cross-influence with each other, promoting the integration and sharing of talents and technical resources, and this integration and sharing is persistent; Finally, innovation and entrepreneurship education commercializes knowledge products and technological achievements, which can not only change college teachers' understanding of research results, but also strengthen the trilateral cooperative relationship between colleges and universities, enterprises and governments. Therefore, the triple helix theory is different from the traditional government-industry-university-research cooperation. Its ultimate goal is to seek general ideological knowledge from universities, enterprises, and governments, and strategic cooperation at the macro level to form a long-term dynamic mechanism for innovation and education [7].

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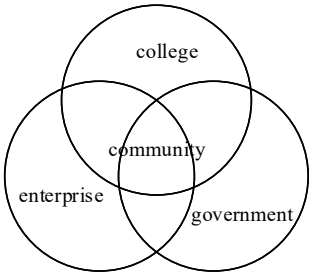

Figure 1. The triple helix model of sustainable development

2.2. CIPP Model

The CIPP model was first proposed by Stufflebeam, a well-known American educational evaluation scholar, in 1966. As a modern typical evaluation model with far-reaching influence, the CIPP model is composed of context evaluation, input evaluation, process evaluation and product evaluation, and product evaluation is a combination of the first letters of the English words of the four evaluation elements[8]. Because its decision-oriented, process-oriented, and improvement functions are suitable for the diversity of evaluation objectives of entrepreneurship education in different universities, the stages of evaluation, and the reform and development of evaluation, the CIPP model runs through the process of innovation and entrepreneurship education in colleges and universities. , penetrated into all aspects of innovation and entrepreneurship education activities.

2.3. Evaluation Index System of College Entrepreneurship Education based on Triple Helix Theory and CIPP

This paper will combine the triple helix theory to create a quality evaluation model for innovation and entrepreneurship education in colleges and universities based on the combination of the triple helix theory and the CIPP model, the framework of which is shown in Figure 2.

The background evaluation focuses on the necessity evaluation of entrepreneurship education in colleges and universities, that is, the diagnostic evaluation of the goals of entrepreneurship education in colleges and universities by describing the policy environment, knowledge and technology support, talent training programs of colleges and universities, and entrepreneurship curriculum goals. The premise of quality evaluation.

The input evaluation focuses on the feasibility evaluation of entrepreneurship education in colleges and universities, and analyzes the investment of teachers and funds in the evaluation of entrepreneurship education in colleges and universities, which is the guarantee for the quality evaluation of entrepreneurship education in colleges and universities.

The process evaluation focuses on the high-efficiency evaluation of entrepreneurship education in colleges and universities. It has obvious dynamics and feedback. It ensures the implementation of entrepreneurship education programs through entrepreneurship courses, entrepreneurial activities, entrepreneurial projects, and entrepreneurial implementation platforms, and improves the entrepreneurial efficiency of colleges and universities. It is the key to the quality evaluation of entrepreneurship education in colleges and universities.

Outcome evaluation is a formative evaluation of the actual results of entrepreneurship education activities in colleges and universities and a summary evaluation of the overall process. Through feedback on entrepreneurial quality improvement, entrepreneurial effect analysis, and entrepreneurial satisfaction surveys, the improvement of entrepreneurial education evaluation can be achieved. Therefore, achievement evaluation is the key to the quality evaluation of entrepreneurship education.

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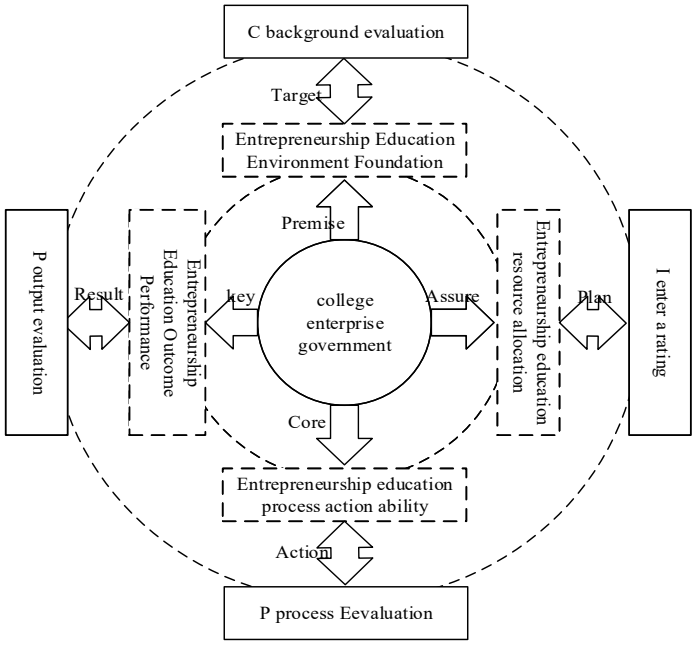

Figure 2. Framework of quality evaluation of entrepreneurship education in colleges and universities based on triple helix theory and CIPP model

By reading a large number of relevant literatures, sorting out and summarizing the literature, deleting duplicates, supplementing and modifying the indicators, and combining the triple helix theory, considering the factors that affect the quality of entrepreneurship education by universities, enterprises, and the government, the final result is based on the triple helix theory and CIPP. The quality evaluation index system of entrepreneurship education in colleges and universities is shown in Table 1.

Table 1. The quality evaluation index system of entrepreneurship education in colleges and universities based on triple helix theory and CIPP

First level indicator	Secondary indicators	three-level indicator
Background Evaluation (C) Entrepreneurship Education Environment Foundation	Entrepreneurship Policy Environment	Residential Entrepreneurship Policy Support in Colleges and Universities
		Social enterprise support for entrepreneurship
		Creating a Cultural Atmosphere for Entrepreneurship in Colleges and Universities
	Knowledge and Technology Foundation	Number of entrepreneurship education papers published
		Invention patents granted
		Number of contracts signed for technology transfer

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	Talent training plan and course objectives	Entrepreneurship and entrepreneurship are included in the talent training system
		Quality standards for the cultivation of innovative talents
		The degree of fit between the content and goals of the dual entrepreneurship and innovation courses
Input Evaluation (I) Entrepreneurship Education Resource Allocation	Teacher input	The age structure of the teaching staff of entrepreneurship and innovation
		Percentage of teachers with entrepreneurial or business management experience
		Student-teacher ratio of entrepreneurship and innovation courses
		The academic level of dual-creation teachers
	investment	The number of government financial appropriations for entrepreneurial projects
		Amount of business-supported entrepreneurial projects
		Supporting investment in entrepreneurship education in colleges and universities
	Organizational Guarantee	Number of entrepreneurship consulting and guidance service institutions
Process Evaluation (P) Entrepreneurship Education Process Action Capability	Entrepreneurship Course	Entrepreneurship Fundamentals Course
		Specialized integration courses
		Entrepreneurship Development Course
	Entrepreneurial activities	Entrepreneurship workshops, lectures, etc.
	Venture Project	Number of startup projects
		Actual participation in entrepreneurial projects
		Entrepreneurial competition
	Practice platform	Number of science and technology parks, entrepreneurial parks, and incubators

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Outcome Evaluation (P) Entrepreneurship Education Outcome Performance	Entrepreneurial quality improvement	Innovation and Entrepreneurship Ability
		Innovative thinking and entrepreneurial awareness
	The effect of entrepreneurship education	Increase in research activities
		Increase in innovation achievements
		Number of incubating companies
		Annual Entrepreneurship Rate
		Increased school-enterprise cooperation
	satisfaction survey	student satisfaction
		Employer satisfaction

3. Matter-element Evaluation Model based on COWA-G1 Combined Weighting

3.1. COWA-G1 Empowerment Act

The COWA method is an objective weighting method that uses the number of combinations to rearrange the data to account for the influence of extreme values on the weights. The G1 method is a subjective weighting method, which overcomes the shortcomings of the AHP that need to construct a judgment matrix and perform a consistency check, making the weighting simpler and more convenient. Therefore, the COWA-G1 empowerment method combines the advantages of COWA and G1 method, overcomes the shortcomings of single empowerment, and makes empowerment more scientific and reasonable.

(1) COWA Empowerment Act

1)Sort the decision index data r_{ij} from large to small to get a matrix: $S=\left(s_{ij}\right)_{m\times n}(i=1,2,\cdots,m;j=1,2,\cdots,n)$. Among them, m represents the number of evaluation indicators, n represents the number of evaluation objects, and s_{ij} represents the evaluation value of the j-th evaluation object for the i-th evaluation index.

2)Using the combination number to weight a_{ij} , the weight vector is:

$$W_{j+1}=\frac{c_{n-1}^{j}}{\sum_{k=0}^{n-1}c_{n-1}^{k}}=\frac{c_{n-1}^{j}}{2^{n-1}} \tag{1}$$

3)Calculate absolute weights:

$$w_i^{'}=\sum_{j=1}^{n}w_j s_j \tag{2}$$

4)Calculate relative weights:

$$w_i=\frac{w_i^{'}}{\sum_{i=1}^{m}w_i^{'}} \tag{3}$$

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(2)G1 Empowerment Act.

1)Experts sort according to the importance of indicators, Such as $U_1 > U_2 > \cdots > U_m$, And assign value according to the ratio of relative importance, the ratio of importance is expressed as:

$$r_k = \frac{w_{k-1}}{w_k} \tag{4}$$

w_{k-1}, w_k represent k-1, The weight value of the k indicator, The assignment of r_k is shown in Table 2.

Table 2. Value Reference Table

r_k	level of importance
1.0	Indicators y_{k-1} and y_{k-1} are equally important
1.2	Indicator y_{k-1} is slightly more important than y_k
1.4	Indicator y_{k-1} is obviously more important than y_k
1.6	Metric y_{k-1} is strongly more important than y_k
1.8	Indicator y_{k-1} is extremely important than y_k
1.1, 1.3, 1.5, 1.7	The ratio of indicators y_{k-1} to y_k is between two levels of importance

2) Calculate the weight coefficient of each index:

$$w_i = (1 + \sum_{k=2}^{m} \prod_{i=k}^{m} r_i)^{-1} \tag{5}$$

3.2. Matter-element Evaluation Model based on COWA-G1 Weighting Method

The Matter-element model [9] was founded by Professor Cai Wen in my country in 1970. This model can transform complex problems into a concrete model, which is suitable for studying the possibility and development law of the expansion of things, and is also suitable for multi-factor evaluation [10] .Therefore, this paper chooses to construct a Matter-element model to evaluate the quality of entrepreneurship education in colleges and universities.

1) The meaning of Matter-element.

Given the name of the thing M , its characteristics c and magnitude v, the ordered triple is used as the basic element to describe the thing, abbreviated as matter element, which can be represented $w_i = (1 + \sum_{k=2}^{m} \prod_{i=k}^{m} r_i)^{-1}$.

2) Classic Fields and Section Fields

Classical Matter-element matrix R_j:

$$R_j = \begin{bmatrix} M_j & c_1 & v_{1j} \\ & c_2 & v_{2j} \\ & \vdots & \vdots \\ & c_m & v_{mj} \end{bmatrix} = \begin{bmatrix} M_j & c_1 & (a_{1j}, b_{1j}) \\ & c_2 & (a_{2j}, b_{2j}) \\ & \vdots & \vdots \\ & c_m & (a_{mj}, b_{mj}) \end{bmatrix} \tag{6}$$

v_{ij} is the value range of M_j about c_i, called the classical field, and $v_{ij} = (a_{ij}, b_{ij})(i = 1, 2, \cdots, m)$

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section domain Matter-element matrix R_m:

$$R_p = \begin{bmatrix} M_p & c_1 & v_{1p} \\ & c_2 & v_{2p} \\ & \vdots & \vdots \\ & c_m & v_{mp} \end{bmatrix} = \begin{bmatrix} M_p & c_1 & (a_{1p}, b_{1p}) \\ & c_2 & (a_{2p}, b_{2p}) \\ & \vdots & \vdots \\ & c_m & (a_{mp}, b_{mp}) \end{bmatrix} \tag{7}$$

v_{ip} is the range of values that M takes with respect to c_i, which is called the section domain, where $v_{ip} = (a_{ip}, b_{ip})$, a_{ip} and b_{ip} are the upper and lower limits of the classical domain.

3) Calculation of distance and correlation degree

To better quantify the characteristics of the object element, the distance is introduced:

$$\rho(v_i, v_{ij}) = \left| v_i - \frac{1}{2}(a_{ij} + b_{ij}) \right| - \frac{1}{2}(b_{ij} - a_{ij}) \tag{8}$$

$$\rho(v_i, v_{ip}) = \left| v_i - \frac{1}{2}(a_{ip} + b_{ip}) \right| - \frac{1}{2}(b_{ip} - a_{ip}) \tag{9}$$

$k_j(v_i)$ indicates the degree of correlation between the evaluation index i and the j th level, Its value range and meaning are shown in Table 3. $|v_{ij}| = b_{ij} - a_{ij}$.

$$k_j(v_i) = \begin{cases} -\dfrac{\rho(v_i, v_{ij})}{|v_{ij}|}, v_i \in v_{ij} \\ \dfrac{\rho(v_i, v_{ij})}{\rho(v_i, v_{ip}) - \rho(v_i, v_{ij})}, v_i \notin v_{ij} \end{cases} \tag{10}$$

Table 3. Meaning of relevance degrees

The value range	significance
$k_j(v_i) > 0$	The i feature that indicates the thing to be evaluated belongs to the grade j, and the larger the $k_j(v_i)$, the more attributes the feature index has the j level
$k_j(v_i) < 0$	Indicates that the i feature of the thing to be evaluated does not belong to the grade j, and the smaller the $k_j(v_i)$, the less the feature index belongs to the attribute of the j level
$k_j(v_i) = 0$	The i feature that represents the thing to be evaluated is at the critical point of rank j.

4. Case Analysis

W universities were selected as evaluation samples for case analysis, and the above methods were evaluated and analyzed on the environmental basis of entrepreneurship education in W universities, the allocation of entrepreneurial education resources, the ability to act in the

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process of entrepreneurship education, and the performance of entrepreneurship education achievements.

(1) Calculate the weights of indicators at all levels.

A total of 10 experts were invited in this paper, of which 4 experts used the G1 method to subjectively sort the first-level indicators of the quality of university entrepreneurship education, and the other 6 experts objectively scored the third-level indicators of the quality of university entrepreneurship education according to the evaluation values in Table 4, and used the COWA method to calculate the index weights for the scoring results of these 6 experts, and finally obtained the weights of the indicators at all levels, as shown in Table 4.

Table 4. Evaluation scoring criteria

grade	Evaluation value
Fail(F)	[0, 60)
Pass(P)	[60,70)
Medium(M)	[70,80)
Good(G)	[80,90)
Excellent(E)	[90,100]

Table 5. Weights of indicators at various levels

Level 1 indicators	Weight	Secondary indicators	Weight	Three-level indicators	Weight
Background Evaluation (C) Entrepreneurship Education Environment Foundation	0.192	Entrepreneurial policy environment Knowledge and technical foundations	0.323	University resident entrepreneurship policy support	0.338
				The degree of support for entrepreneurship in social enterprises	0.332
				Create a culture of entrepreneurship in colleges and universities	0.330
		Talent Development Program and Curriculum Objectives	0.315	Number of papers published in entrepreneurship education	0.349
				The number of invention patents granted	0.338
				Number of contracts signed for technology transfer	0.313
		Faculty input Funding	0.362	Double creation is included in the talent training system	0.350

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				Double creation talent training quality standards	0.332
				The content of the double creation course is in line with the goal	0.318
Input Evaluation (I) Entrepreneurship education resource allocation	0.265	Teacher input	0.517	Age structure of the dual-creation teaching team	0.252
				Proportion of teachers with entrepreneurial or business management experience	0.252
				Dual-creation course student-teacher ratio	0.252
				Double creation of teachers academic level	0.244
		investment	0.367	The number of government financial allocations for entrepreneurial projects	0.343
				The amount of business support for entrepreneurial projects	0.326
				Colleges and universities supporting investment in entrepreneurship education	0.331
		Organizational Guarantee	0.116	Number of entrepreneurial consulting and guidance service organizations	1.000
Process Evaluation (P) Entrepreneurship education process action ability	0.261	Entrepreneurship Course	0.385	Fundamentals of Entrepreneurship Course	0.351
				Specialized integration courses	0.334
				Entrepreneurship Development Course	0.315
		Entrepreneurial activities	0.127	Entrepreneurship workshops, lectures, etc	1.000
		Venture Project	0.372	The number of entrepreneurial projects	0.350
				Actual participation in entrepreneurial projects	0.320

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				Entrepreneurial competition	0.330
		Practice platforme	0.116	Number of science and technology parks, business parks, and incubators	1.000
Outcome evaluation (P) Entrepreneurship Education Outcome Performance	0.282	Entrepreneurial quality improvement	0.231	Innovation and entrepreneurship capabilities	0.500
				Innovative thinking and entrepreneurial awareness	0.500
		The effect of entrepreneurship education Faculty input Funding	0.554	Increase in scientific research activities	0.206
				Increase in innovation	0.200
				Number of incubated enterprises	0.194
				Annual startup rate	0.197
				Increased school-enterprise cooperation	0.203
		satisfaction survey	0.215	Student satisfaction	0.502
				Employer satisfaction	0.498

(2) Construct the object-element matrix.

Due to the limited space of the article, we will take the entrepreneurial environment policy as an example, and objectively score the results of 6 experts to each indicator, Take the average value to get the matrix of things.

$$R_{11} = \begin{bmatrix} M_{11} & c_{111} & 76.17 \\ & c_{112} & 78.00 \\ & c_{113} & 86.00 \end{bmatrix}$$

(3) Determine the classic domain and the stanza domain.

According to the risk level division criteria in Table 5, the classical domain object element matrix and the region-saving object element matrix are constructed, of which the classical domain object element matrix is:

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$$R_{01}=\begin{bmatrix} M_{11} & c_{111} & \langle 0,60\rangle \\ & c_{112} & \langle 0,60\rangle \\ & c_{113} & \langle 0,60\rangle \end{bmatrix} R_{02}=\begin{bmatrix} M_{11} & c_{111} & \langle 60,70\rangle \\ & c_{112} & \langle 60,70\rangle \\ & c_{113} & \langle 60,70\rangle \end{bmatrix} R_{03}=\begin{bmatrix} M_{11} & c_{111} & \langle 70,80\rangle \\ & c_{112} & \langle 70,80\rangle \\ & c_{113} & \langle 70,80\rangle \end{bmatrix} R_{04}=\begin{bmatrix} M_{11} & c_{111} & \langle 80,90\rangle \\ & c_{112} & \langle 80,90\rangle \\ & c_{113} & \langle 80,90\rangle \end{bmatrix}$$

$$R_{05}=\begin{bmatrix} M_{11} & c_{111} & \langle 90,100\rangle \\ & c_{112} & \langle 90,100\rangle \\ & c_{113} & \langle 90,100\rangle \end{bmatrix}$$

The Matter-element matrix of the node domain is:

$$R_{p}=\begin{bmatrix} M_{11} & c_{111} & \langle 0,100\rangle \\ & c_{112} & \langle 0,100\rangle \\ & c_{113} & \langle 0,100\rangle \end{bmatrix}$$

(4) Determine the correlation degree of three-level indicators

According to formulas (8), (9), and (10), the correlation degree is calculated and the level is determined, taking the "university resident entrepreneurship policy support" in the entrepreneurship policy environment as an example.

$$k_{111}(v_1)=\frac{\left|76.17-\frac{0+60}{2}\right|-\frac{60-0}{2}}{\left|76.17-\frac{0+100}{2}\right|-\frac{100-0}{2}-\left|76.17-\frac{0+60}{2}\right|-\frac{60-0}{2}}=-0.40$$

$$k_{111}(v_2)=\frac{\left|76.17-\frac{60+70}{2}\right|-\frac{70-60}{2}}{\left|76.17-\frac{0+100}{2}\right|-\frac{100-0}{2}-\left|76.17-\frac{60+70}{2}\right|-\frac{70-60}{2}}=-0.21$$

$$k_{111}(v_3)=\frac{\left|76.17-\frac{70+80}{2}\right|-\frac{80-70}{2}}{80\text{-}70}=0.38$$

$$k_{111}(v_4)=\frac{\left|76.17-\frac{80+90}{2}\right|-\frac{90-80}{2}}{\left|76.17-\frac{0+100}{2}\right|-\frac{100-0}{2}-\left|76.17-\frac{80+90}{2}\right|-\frac{90-80}{2}}=-0.14$$

$$k_{111}(v_5)=\frac{\left|76.17-\frac{90+100}{2}\right|-\frac{100-90}{2}}{\left|76.17-\frac{0+100}{2}\right|-\frac{100-0}{2}-\left|76.17-\frac{90+100}{2}\right|-\frac{100-90}{2}}=-0.37$$

According to the meaning of the correlation degree in Table 3, the level of "university resident entrepreneurship policy support" in the entrepreneurship policy environment is "medium". According to the above calculation ideas, the correlation degree and correlation level of the three-level index of the quality evaluation of entrepreneurship education in colleges and universities can be obtained, as shown in Table 6.

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Table 6. Correlation degree and evaluation level of tertiary indicators

Three-level indicators	Relevance					grade
	$k_1(v_i)$	$k_2(v_i)$	$k_3(v_i)$	$k_4(v_i)$	$k_5(v_i)$	
University resident entrepreneurship policy support	-0.40	-0.21	**0.38**	-0.14	-0.37	M
The degree of support for entrepreneurship in social enterprises	-0.38	-0.17	**0.50**	-0.17	-0.38	M
Create a culture of entrepreneurship in colleges and universities	-0.38	-0.17	**0.48**	-0.16	-0.37	M
Number of papers published in entrepreneurship education	-0.43	-0.24	**0.28**	-0.11	-0.36	M
The number of invention patents granted	-0.36	-0.15	**0.45**	-0.18	-0.38	M
Number of contracts signed for technology transfer	-0.24	**0.03**	-0.03	-0.25	-0.40	P
Double creation is included in the talent training system	-0.72	-0.63	-0.44	**0.12**	-0.09	G
Double creation talent training quality standards	-0.61	-0.48	-0.22	**0.43**	-0.27	G
The content of the double creation course is in line with the goal	-0.53	-0.38	-0.07	**0.13**	-0.32	G
Age structure of the dual-creation teaching team	-0.50	-0.34	-0.01	**0.02**	-0.33	G
Proportion of teachers with entrepreneurial or business management experience	-0.50	-0.34	-0.01	**0.02**	-0.33	G
Dual-creation course student-teacher ratio	-0.50	-0.34	-0.01	**0.02**	-0.33	G
Double creation of teachers academic level	-0.45	-0.26	**0.22**	-0.09	-0.35	M
The number of government financial allocations for entrepreneurial projects	-0.44	-0.26	**0.23**	-0.09	-0.36	M
The amount of business support for entrepreneurial projects	-0.33	-0.11	**0.33**	-0.20	-0.38	M
Colleges and universities supporting investment in entrepreneurship education	-0.37	-0.16	**0.48**	-0.17	-0.38	M
Number of entrepreneurial consulting and guidance service organizations	-0.29	-0.05	**0.15**	-0.23	-0.39	M
Fundamentals of Entrepreneurship Course	-0.46	-0.28	**0.17**	-0.07	-0.35	M

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Specialized integration courses	-0.36	-0.15	**0.45**	-0.18	-0.38	M
Entrepreneurship Development Course	-0.28	-0.04	**0.12**	-0.23	-0.40	M
Entrepreneurship workshops, lectures, etc	-0.35	-0.13	**0.38**	-0.19	-0.38	M
The number of entrepreneurial projects	-0.38	-0.17	**0.50**	-0.17	-0.38	M
Actual participation in entrepreneurial projects	-0.23	**0.07**	-0.02	-0.26	-0.40	P
Entrepreneurial competition	-0.28	-0.03	**0.10**	-0.24	-0.40	M
Number of science and technology parks, business parks, and incubators	-0.21	**0.17**	-0.05	-0.27	-0.41	P
Innovation and entrepreneurship capabilities	-0.36	-0.15	**0.45**	-0.18	-0.38	M
Innovative thinking and entrepreneurial awareness	-0.36	-0.15	**0.45**	-0.18	-0.38	M
Increase in scientific research activities	-0.31	-0.08	**0.25**	-0.21	-0.39	M
Increase in innovation	-0.27	-0.03	**0.08**	-0.24	-0.40	M
Number of incubated enterprises	-0.22	**0.12**	-0.04	-0.26	-0.40	P
Annual startup rate	-0.24	**0.03**	-0.01	-0.25	-0.40	P
Increased school-enterprise cooperation	-0.27	-0.08	**0.08**	-0.24	-0.40	M
Student satisfaction	-0.23	**0.07**	-0.02	-0.26	-0.40	P
Employer satisfaction	-0.23	**0.08**	-0.03	-0.26	-0.40	P

(5) Determine the relevance of secondary indicators

According to the weight of the secondary indicator of the entrepreneurial policy environment calculated above ,calculate the degree of association.

$$k_{11}(v_1)=0.338\times\text{-}0.40+0.332\times\text{-}0.38+0.330\times\text{-}0.38=\text{-}0.39$$
$$k_{11}(v_2)=0.338\times\text{-}0.21+0.332\times\text{-}0.17+0.330\times\text{-}0.17=\text{-}0.18$$
$$k_{11}(v_3)=0.338\times 0.38+0.332\times 0.50+0.330\times 0.48=0.46$$
$$k_{11}(v_4)=0.338\times\text{-}0.14+0.332\times\text{-}0.17+0.330\times\text{-}0.16=\text{-}0.16$$
$$k_{11}(v_5)=0.338\times\text{-}0.37+0.332\times\text{-}0.38+0.330\times\text{-}0.37=\text{-}0.37$$

The environmental rating of the entrepreneurship policy is "medium". In the same way, the correlation degree and correlation level of the secondary indicators of the quality evaluation of entrepreneurship education in colleges and universities can be obtained, as shown in Table 7.

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Table 7. Correlation degree and evaluation level of secondary indicators

Secondary indicators	Relevance					Grade
	$k_1(v_i)$	$k_2(v_i)$	$k_3(v_i)$	$k_4(v_i)$	$k_5(v_i)$	
Entrepreneurial policy environment	-0.39	-0.18	**0.46**	-0.16	-0.37	M
Knowledge and technical foundations	-0.35	-0.12	**0.24**	-0.18	-0.38	M
Talent Development Program and Curriculum Objectives	-0.62	-0.50	-0.25	**0.23**	-0.22	P
Faculty input	-0.49	-0.32	**0.05**	-0.01	-0.34	M
Funding	-0.38	-0.18	**0.35**	-0.15	-0.37	M
Organizational safeguards	-0.29	-0.05	**0.15**	-0.23	-0.39	M
Entrepreneurship course	-0.37	-0.16	**0.25**	-0.16	-0.37	M
Entrepreneurial activities	-0.35	-0.13	**0.38**	-0.19	-0.38	M
Entrepreneurial projects	-0.30	-0.05	**0.20**	-0.22	-0.39	M
Practice platform	-0.21	**0.17**	-0.05	-0.27	-0.41	M
Improvement of entrepreneurial literacy	-0.36	-0.15	**0.45**	-0.18	-0.38	M
The effect of entrepreneurship education	-0.26	-0.01	**0.08**	-0.24	-0.40	M
Satisfaction surveys	-0.23	**0.07**	-0.02	-0.26	-0.40	P

(6) Determine the correlation degree of first-level indicators

Similarly, determine the degree of correlation of first-level indicators, as shown in Table 8.

Table 8. Degree of correlation of primary indicators

Level 1 indicators	Relevance					Grade
	$k_1(v_i)$	$k_2(v_i)$	$k_3(v_i)$	$k_4(v_i)$	$k_5(v_i)$	
Background Assessment (C)	-0.46	-0.28	**0.13**	-0.02	-0.32	medium
Foundations of the Entrepreneurship Education Environment	-0.43	-0.24	**0.17**	-0.09	-0.36	medium
Enter Rating(I)	-0.32	-0.08	**0.21**	-0.20	-0.38	medium
Allocation of entrepreneurial education resources	-0.28	-0.02	**0.14**	-0.23	-0.39	medium

(7) Determine the final correlation.

The weight of the first-level indicator determined according to the G1 method, Calculate the final correlation.

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$$k(v_1)=0.192\times-0.46+0.265\times-0.43+0.261\times-0.32+0.282\times-0.28=-0.36$$
$$k(v_2)=0.192\times-0.28+0.265\times-0.24+0.261\times-0.08+0.282\times-0.02=-0.14$$
$$k(v_3)=0.192\times0.13+0.265\times0.17+0.261\times0.21+0.282\times0.14=0.17$$
$$k(v_4)=0.192\times-0.02+0.265\times-0.09+0.261\times-0.20+0.282\times-0.23=-0.14$$
$$k(v_5)=0.192\times-0.32+0.265\times-0.36+0.261\times-0.38+0.282\times-0.39=-0.37$$

Therefore, the quality of entrepreneurship education in W colleges and universities was finally determined to be "M".

5. Conclusion

In this paper, the triple helix theory is combined with the CIPP model, and an index system for the quality of entrepreneurship education in colleges and universities based on the triple helix theory and cipp model is established. The COWA-G1-based object-element evaluation model is constructed by using the COWA empowerment method to eliminate the influence of extreme values on the weights, and the combination of the G1 empowerment method is combined with the G1 empowerment method. The model evaluates the quality of entrepreneurship education in actual colleges and universities, and obtains the evaluation results of the quality of entrepreneurship education in the university, which is consistent with the evaluation results of the actual quality of entrepreneurship education. Therefore, the object-element evaluation model based on the COWA-G1 empowerment method has certain applicability to the evaluation of the quality of entrepreneurship education in colleges and universities.

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