

Fuzzy Evaluation Model of Innovative Foreign Language Talents Based on Analytic Hierarchy Process

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Abstract

With the continuous deepening of the reform of university education and the continuous expansion of university enrollment, the quality of personnel training has increasingly become the focus of social attention. In different areas of teaching, how to establish evaluation model of personnel training to effectively guide personnel training model, is an important issue in the research of talent cultivation. With the establishment of innovative talents as the goal of the new colleges and universities, it is very important to establish an innovative talent training model and evaluation model. This paper takes the "trinity" model of talent cultivation. For example, use the analytic hierarchy process to construct the hierarchical structure and judgment matrix of the evaluation model of talent cultivation, and calculate the weights of the individual rankings and the total ranking weights of the hierarchy, and obtain the degree of influence of various factors on the quality of talents, so as to quantify the qualitative analysis. Talent training quality assessment provides a more objective basis

Keywords: Analytic hierarchy process, Innovative foreign language talent, Fuzzy evaluation

1. INTRODUCTION

From a literal point of view, innovative talents are first and foremost talents, with the general characteristics of talented people, that is, knowledgeable and capable; capable of creative work; and those who make contributions to the building of political, material, and spiritual civilizations. "Innovation" is relative to "conservatism", but "creation" and "keeping", "new" and "old" are the dialectical relations of inheritance and development. (Yang, 2017) "Innovation" agrees with "creating," "exploration," and "innovation," with the meaning of "creating," "exploiting," and "renewing." Therefore, the intension of innovative talent includes the following two aspects:

First, there are psychological and spiritual innovations. Including innovations in the field of intelligence (such as creative thinking and creative use of intelligence, etc.), innovations in the field of emotions (such as courage, obsession, willingness to innovate in mind and spirit, etc.), innovation in the field of will (such as strong, difficult to challenge, indomitable innovation will and perseverance, etc.);

Second, there are practical and hands-on

innovations. This includes innovations in the field of substance production, spiritual production, and social activities, and innovations in all major and minor aspects that include tech, art, daily life, and other human activities. (Shi, et al.2009)

Talent training is a process that requires the full participation of society, families and individuals. Therefore, evaluation of innovative talents must reflect the suggestions and ideas of all participants. In addition, the evaluation of innovative talents is not immutable. It should be accompanied by different requirements for innovative talents in different periods. However, the most basic ideas and connotations must be eternal, that is, innovation, innovation, and innovation (Dyer, 2011). Five characteristics, such as the spirit of innovation and potential for innovation, are the basic evaluation criteria. Due to the complexity and uncertainty of human beings, the evaluation system for formulating innovative talents generally contains multiple indicators, and each of the indicators is incomparable. The comprehensive evaluation process is a complex system engineering. The traditional evaluation method is that the experts give scores to each evaluation index, and then come to different levels of innovative talent standards by simply weighted average. Therefore, the subjective factors of the experts influence the evaluation process and the

objective accuracy of the results to a great extent. In this paper, the concept of fuzzy comprehensive evaluation is used, and the indicators are processed by the AHP based on the judgment matrix to determine the weights and simplify the evaluation procedure. (Yan, 2012)

2. THE SIGNIFICANCE OF CONSTRUCTING AN EVALUATION INDEX SYSTEM FOR INNOVATION TALENTS

In the 21st century, the goal of training foreign language talents in China has gradually shifted from the cultivation of foreign language talents to the cultivation of high-quality foreign language talents with innovative spirit and innovative ability. In recent years, with the continuous deepening of foreign language teaching reform, how to effectively train, boldly introduce, and flexibly use innovative foreign language talent has become the most important task for foreign language talents at present and in the future. In these three links, use is the key to the key, because the purpose of training and attraction is to use, use and cultivate, and it is also the largest and most powerful attraction for more foreign language talents. It is difficult to mobilize the enthusiasm and initiative of foreign language talents in the current process of employing talents and restrict their ability to innovate. It is bound to cause bruising to its creative ability and serious consequences of brain drain. This makes it particularly important to establish scientific and innovative foreign language talent performance management mechanisms and evaluation mechanisms. (Yang, 2017)

In our country, innovative talents are usually defined as "highly qualified with a solid theoretical foundation, reasonable ability structure and sound personality of innovation, able to break the norm by innovative thinking, create new results, new technologies or new methods, and promote social progress and development. (Shi, et al.2009) Therefore, to comprehensively evaluate the nature and connotation of innovative talents, we must not only evaluate the innovation ability of innovative talents, including learning ability, analytical ability, and practical ability, but also evaluate some indicators that have no reference to existing standards. For example, the quality of innovation, innovative thinking, innovative spirit, innovative potential and so on.

With regard to the research on innovative talents, the education community and the psychology community at home and abroad have basically reached a consensus that in addition to having normal intelligence factors, they must also

have original and innovative qualities. The reason why innovative talents can surpass others is the awareness of their motives, interests, and attitudes toward the world and themselves. These consciousness characteristics obviously belong to non-intellectual factors. The American psychologist Wexler had collected numerous Nobel Prize winners from the IQ data of young people's era. It was found that most of them were not high IQs, but medium- or upper-level IQs. (Dyer, 2011) However, these people all have a strong sense of curiosity and interest and a high degree of self-confidence. Their consciousness of intrinsic motivation, industrious and diligent study, and tenacious will quality are prominent. The research on innovative personality is better known as Gilford and Sternberg. In the 1970s, the two genres of the American psychologist Guilford's "creative talent" and "New Theory of Creativity and Innovative Thinking" made creative talent research a hot topic. Gilford believes that human creative talents are not equal to human intelligence quotients. The sensitivities of the questions, the fluency of thinking, the flexibility of thinking, the originality, the ability to reorganize, and the complexity of the conceptual structure play a role in the human creative ability structure. Important role (Song, et al. 2012). In 1967, he proposed eight characteristics:

- 1) highly conscientious and independent, and he did not agree;
- 2) has a thirst for knowledge;
- 3) has strong curiosity and has a deep motivation for the movement mechanism of things;
- 4) wide range of knowledge, good at observing;
- 5) work emphasizes rationality, accuracy, and strictness;
- 6) rich imagination, sharp intuition, like abstract thinking, and extensive interest in intellectual activities and games;
- 7) rich sense of humor, performance Outstanding genius of literature and art;
- 8) superior quality of the will can eliminate external interference, long-term focus on a problem of interest. Sternberg believes that human creativity is influenced by factors such as intelligence, knowledge, cognitive style, personality characteristics, motivation, and the environment. Personality and environment are factors that cannot be ignored.

In 1986 he proposed seven characteristics:

- 1) tolerance for ambiguity;
- 2) willingness to overcome obstacles;
- 3) willingness to allow his own point of view to develop;

- 4) activities driven by intrinsic motivation;
- 5) moderate adventurous spirit;
- 6) expectations to be recognized
- 7) willing to work hard for the recognition of being re-approved.

3. FUZZY COMPREHENSIVE EVALUATION MODEL BASED ON ANALYTIC HIERARCHY PROCESS

Analytic Hierarchy Process (AHP) is highly concise, logical, practical and systematic. It can combine qualitative and quantitative methods. For planning problems with many goals and complex levels, it is an extremely effective decision-making method. Analytic Hierarchy Process (AHP) treats all the items in the research object as a whole system, analyzes the various factors placed in the system, divides the various factors into different levels through analysis, and then does the same for each

level of factors. Objective comparison and judgment, given the corresponding quantitative expression, build a mathematical model. Calculate and rank the factors at each level quantitatively, and finally make decisions based on the sequential results. The fuzzy comprehensive evaluation method uses the theory and method of fuzzy mathematics to quantify the obscure things in the objective reality and uses it as a basis to carry out evaluations that are practical, objective, and accurate, thus providing an effective solution to practical problems. (Song, et al. 2012) The fuzzy comprehensive evaluation needs to prepare and collect the data of the evaluation object, plan the grades and factors of the evaluation, and then use the analytic evaluation method determined by the analytic hierarchy process to quantitatively allocate and build a mathematical model. (Shi, et al. 2009)

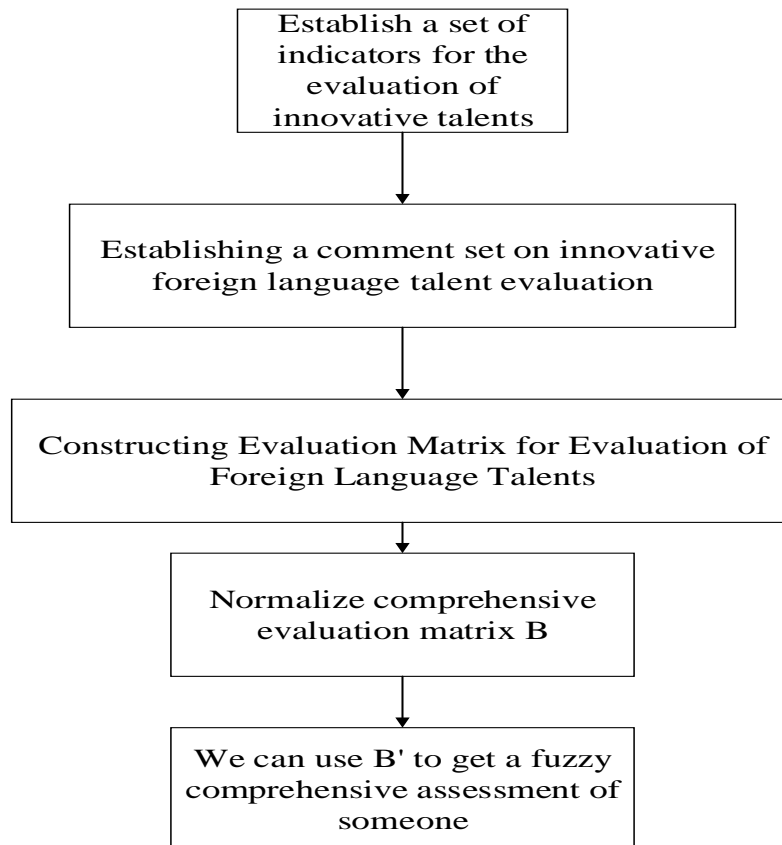


Figure 1. Evaluation Model of Innovative Foreign Language Talents

3.1. Constructing Evaluation Model Hierarchy Using Analytic Hierarchy Process

After explaining the innovative talents, the experts are invited to formulate the basic indicators of innovative talents and use Delphi technology to form an evaluation system. Then, according to the current needs of social development, the basic qualifications of innovative talents are known

through consulting scholars, entrepreneurs, and teachers and students of universities. (Yang, 2017)

First, the target layer evaluates innovative talents and represents the final result. Secondly, the criteria level includes four indicators, namely, innovation awareness, innovation personality, and innovation ability. Sub-indicators at the sub-criteria level respectively include the above-mentioned 10

factors. Finally, the program level is the innovative talent to be evaluated. After the establishment of this level of analysis structure, the evaluation problem is equivalent to the analysis of the student's various aspects relative to the individual's comprehensive innovation weight problem. The evaluation system structure is shown in Figure 2. From Figure 2, we can see that A is the innovative talent evaluation of the target layer. The four indicators of the criteria layer are represented by U_i ($i=1, 2, 3$). (Yan, 2012) Each index of the criteria layer has its own sub-index. The three indicators can be further divided. That is, the sense of innovation includes a wide range of creative interests, continuous innovation motives, and diligent and diligent study; the innovative personality includes a healthy life emotion, a positive attitude towards life, a strong will quality,

and good thinking methods and habits; innovation ability includes individuals Practical activity capabilities, team organization and collaboration capabilities, as well as achievements and rewards. Therefore, this paper establishes the Analytic Hierarchy Process (AHP) model to determine the weight of each index in the innovative talent evaluation system structure and provides a reference for the colleges and universities to implement innovative talents training. The use of Delphi technology to form the evaluation system structure, the summary of expert advice As a result, the following judgment matrixes are obtained after processing. Each value in the judgment matrix represents the value of the relative importance of the indicator of the row to the column, which is reflected by the quantity relationship. (Dyer, 2011)

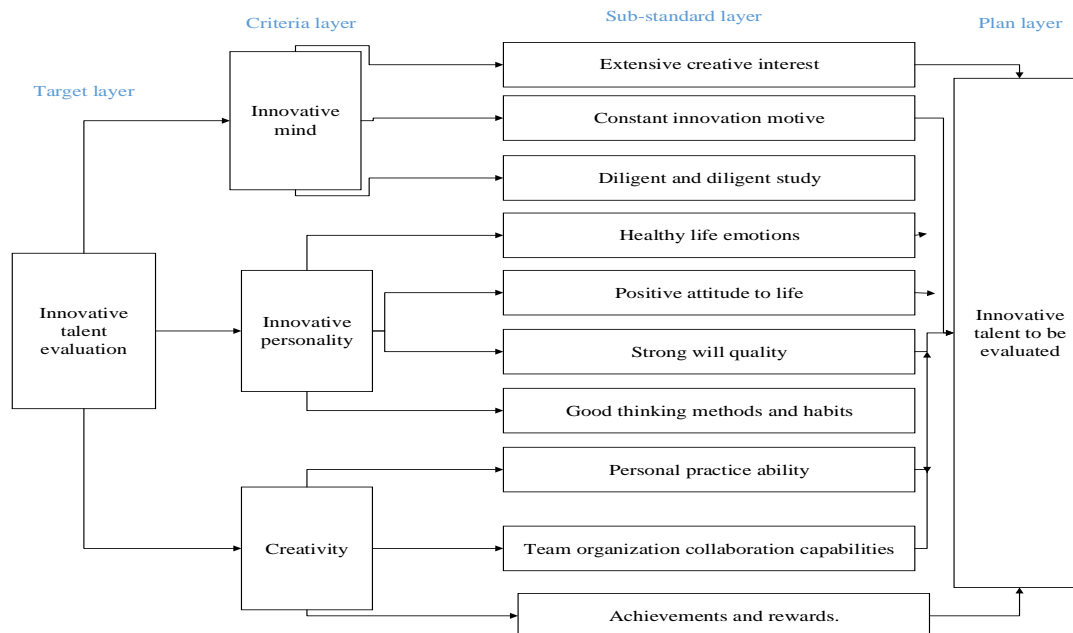


Figure 1. Innovative Talent Evaluation System

3.2. Establishing a judgment matrix

Prof. Satie's metric method gives quantitative

comparisons for different comparison results, as shown in Table 1.

Table 1. Correspondence table

Degree a_{ij}	Definition	Explanation
1	Equally important	The i element is as important as the j element
3	Slightly important	The i element is slightly more important than the j element
5	Obviously important	The i element is significantly more important than the j element
7	Much more important	The i element is much more important than the j element
9	Extremely important	The i element is more important than the j element
2 4 6 8	Between the above adjacent judgments	For the above two judgments of the compromise
The above number is reciprocal	Reverse comparison	i and j elements

According to the hierarchical structure of Figure 1, applying the method of representation of Prof. Satie, through a questionnaire survey of some teachers and experts of the school, according to the generation method and structural characteristics of the judgment matrix, establish a comparative judgment matrix for each level of the evaluation system. As shown in Table 2~5.

Table 2. Judgment matrix A

A	B1	B2	B3	W	Consistency check indicator
B1	1	1/3	1/2	0.16	$\lambda_{\max}=3.001$
B2	3	1	2	0.54	CI=0.005
B3	2	1/2	1	0.30	CR=0.0086<0.1

Table 3. B1 judgment matrix

B1	C1	C2	C3	W	Consistency check indicator
C1	1	1/3	1/5	0.11	$\lambda_{\max}=3.000$
C2	3	1	1/2	0.31	CI=0.002
C3	5	2	1	0.58	CR=0.0034<0.1

Table 4. B2 judgment matrix

B2	C4	C5	C6	C7	W	Consistency check indicator
C4	1	1/2	2	2	0.26	$\lambda_{\max}=4.000$
C5	2	1	4	4	0.50	CI=0
C6	1/2	1/4	1	1	0.13	CR=0.4<0.1
C7	1/2	1/4	1	1	0.14	

Table 5. B3 judgment matrix

B1	C8	C9	C10	W	Consistency check indicator
C8	1	1/3	1/5	0.11	$\lambda_{\max}=3.004$
C9	3	1	1/2	0.31	CI=0.002
C10	5	2	1	0.58	CR=0.0034<0.1

4. THE EVALUATION SYSTEM TO DETERMINE THE WEIGHT OF EACH FACTOR

4.1. Single-level sort of weight

The relative importance value of each factor is determined between a given matrix, the weight is

Table 6. Conformity test evaluation table

CR	Result
CR=0	Completely satisfactory consistency
CR<0.1	With satisfactory consistency,
CR>0.1	Need to re-evaluate relative importance until CR<0.1 is satisfied

By calculation, the CR values of the judgment matrix A, B1, B2, and B3 are all less than 0.1, and they have satisfactory consistency. It is concluded that they are all valid matrices, and the values of λ_{\max} , CI, and CR are entered in Table 2. ~5.

4.3. Hierarchical total sorting

Combining the calculation results of each level and single rank can get the three criteria indicators of "quality of talents training" and the weights of

calculated for each index in its determined weight matrix calculation steps:

(1) Multiplication of matrix elements by rows

$$Mi = \prod_{j=1}^n a_{ij}, i = 1, 2, \dots, n$$

(1)

(2) Calculate the weight value

$$Wi = \frac{Mi}{\sum_{j=1}^n Mj}, i = 1, 2, \dots,$$

,n

(2)

From the judgment matrix A, the weights of B1, B2, and B3 can be calculated. That is, the weights of innovation consciousness, innovation personality, and innovation ability in the criterion layer for the target layer "the innovative talents to be evaluated" can be determined, and the calculated weight vectors can then be calculated. Fill in the table 2 respectively, get the weight vector of the three criterion factors for the target layer. Similarly calculate the weight vector of the judgment matrix B1, B2, B3, and fill in the results in Table 3~5.

4.2. Consistency check of the judgment matrix

In order to scientifically reflect the relative importance of each index, after the weight vector of the judgment matrix is obtained, the consistency of its validity must be tested. The specific inspection steps are as follows(Yan, 2012):

(1) Multiply the judgment matrix by its corresponding weight vector.

(2) Calculate the maximum eigenvalue of the judgment matrix.

(3) Calculate the consistency index CI and select the average random consistency index RI, Among them, $CI = \frac{\lambda_{\max} * n}{n-1}$

(3)

(4) Calculate the consistency index ratio:

$$CR = \frac{CI}{RI} \quad (4)$$

(5) to determine the value of CR is determined based on whether a matrix consistency test by:

the factor indicators relative to the total goals. The calculation results are filled in Table 7, and the index system of the evaluation model of applied talents cultivation is constructed.

Table 7. Index System of Quality Evaluation Model for Innovative Talents Cultivation

Target layer A	Criterion level B	Factor Layer C	The weight of each factor index
Innovative talent evaluation A	Innovative mind B1	Extensive interest in creation C1	0.02
		Constant innovation motives C2	0.05
		Diligent and diligent study C3	0.10
	Innovative personality B2	Healthy life emotions C4	0.14
		Positive attitude to life C5	0.27
		Strong will quality C6	0.01
		Good thinking methods and habits C7	0.01
	Creativity B3	Personal practice activities C8	0.03
		Team organization collaboration capabilities C9	0.10
		Achievements and rewards C10	0.18

5. CONCLUSION

This article starts with the research of domestic and foreign scholars on innovative talents, sums up 10 factors and divides them into 3 main indicators of innovation consciousness, innovation personality and innovation ability, and uses AHP to draw 10 subdivisions. Indicators. According to their importance, they are, in order of importance, positive attitudes towards life, achievements and rewards, healthy life emotions, team organization and collaboration skills, diligent and diligent research, extensive and lasting interest in creation, individual practical activities, and unstoppable innovation. Motivation, good thinking and strong will quality. This article clarifies the priority relationship between various evaluation indicators for the cultivation of innovative talents and provides a scientific and effective standard for candidate innovative talents.

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