ISSN 2616-5902 Vol. 3, Issue 5: 91-94, DOI: 10.25236/AJBM.2021.030515

Evaluation and Analysis of the Health of Higher Education System

Chenghao Yue, Chenxu He, Shouxi Li*

School of Management, Shanghai University, Baoshan District, Shanghai, 200444, China
**Corresponding author*

Abstract: *First of all, provide standards on how to effectively evaluate the health of the* ***higher education system****. We start from three aspects: economy, higher education development, and technological level. Through consulting the data, the representative factors of these three aspects are selected as the indicators of FCE, and the weights of different factors on the health of the higher education system are obtained through* ***AHP****, and then the health value and health level of the higher education system are calculated. And take China as an example to demonstrate this set of evaluation models, and based on the* ***topological sorting diagram****, we planned the time schedule required for the change of indicators.*

Keywords: *higher education system, AHP, topological sorting diagram*

1. Introduction

The development of world higher education has experienced an era of elites, popularization and popularization. Up to now, the situation of higher education development dominated by developed countries has been broken, and the influence of higher education in developing countries has gradually become prominent [1]. The development of higher education in the world presents the characteristics of becoming more polarized, the process of popularization is closely related to the level of social and economic development, and the process of popularization is accelerating. How to adapt to the trend of social development and establish a healthy and sustainable higher education system and quality evaluation model is particularly important [2].

2. Model establishment and solve

2.1 Model analysis

The influencing factors and scope of higher education are extremely wide, and the evaluation of the health value of higher education in a country should consider multiple factors. This article uses the analytic hierarchy process to evaluate the health status of the higher education system, starting from three aspects: economic indicators, higher education development indicators, and scientific and technological lev el indicators, and adopts the method of expert inquiry, and uses Matlab software to calculate and test. Develop an accurate health value of the higher education system.

2.2 Model Establishment

Step 1: Build the judgment matrix *M - D*: Compare the three elements D_1, D_2, D_3 in pairs to obtain a comparison matrix, as shown in the following table (comparison matrix):

Table 1: Comparison matrix

M	D_1	D_2	D_3
D_1	1	5	4
D_2	1/5	1	1/3
D_3	1/4	3	1

Solve the eigenvalues of the M − D matrix, and the λmax value is 3.0020.

By formula:

ISSN 2616-5902 Vol. 3, Issue 5: 91-94, DOI: 10.25236/AJBM.2021.030515

$$CI=\frac{\lambda_{max}-n}{n-1}$$

Solve the consistency index CI = 9.9075×10^{-4}.

After review, when n <= 9, the RI value is shown in the following table:

Recalculate the consistency ratio CR.

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

Then, we used the arithmetic average method, geometric average method, and eigenvalue method to obtain the weights, and calculated the average of the three weights as the final result.

Table 2: Types of weights corresponding to the five factors

Arithmetic mean		Geometric averaging		Eigenvalue method		Average weight value	
Factor	Weights	Factor	Weights	Factor	Weights	Factor	Weight
D_1	0.3151	D_1	0.3150	D_1	0.3150	D_1	0.3150
D_2	0.6025	D_2	0.6026	D_2	0.6026	D_2	0.6026
D_3	0.0824	D_3	0.0823	D_3	0.0823	D_3	0.0823

Step 2: Construct judgment matrix $C-D_1$, $C-D_2$, $C-D_3$

Characteristic value $\lambda_1 = 1$, $CI_1 = 0$, $CR_1 = 0 < 0.1$, meeting the consistency requirement, Weight vector$\Omega_1 = 1$.

Characteristic value $\lambda_1 = 3.0055$, $CI_1 = 0.0028$, $CR_1 = 0.0053 < 0.1$, meeting the consistency requiremen.

Three methods are used to obtain the weights as follows:

Table 3: Weights

Arithmetic mean		Geometric averaging		Eigenvalue method	
Factor	Weights	Factor	Weights	Factor	Weights
C_2	0.5949	C_2	0.5954	C_2	0.5954
C_3	0.2766	C_3	0.2764	C_3	0.2764
C_4	0.1285	C_4	0.1283	C_4	0.1283

Weight vector $\Omega_2 = 0.5954, 0.2764, 0.1283$.

Characteristic value $\lambda_1 = 1$, $CI_1 = 0$, $CR_1 = 0 < 0.1$, meeting the consistency requirement, Weight vector$\Omega_1 = 1$.

In summary, we can get the total weight vector w of the scheme layer and its ranking, as shown in the following table, $W = [0.3150, 0.3578, 0.1666, 0.0773, 0.0823]$.

We can see that the proportion of the population with a university degree has the greatest impact on the health evaluation of the higher education system, followed by the ratio of higher education expansion to government education expenditure, and the total enrollment rate of higher educationhas a significant impact on the health evaluation of higher education.

2.3 AOE network and time planning

Since other indexes all depend on national economy index or the index of equal access right, the national economy index and the index of access right are taken as the starting apex of topological ranking. Similarly, in the above analysis of the relationship between the data, it is found that the change of the index of educational expenditure is lagging behind compared with the index of educational expenditure. The index of higher education popularization and scientific research are lagging behind compared with the index of educational expenditure [3].

We get the following *AOE* chart:

ISSN 2616-5902 Vol. 3, Issue 5: 91-94, DOI: 10.25236/AJBM.2021.030515

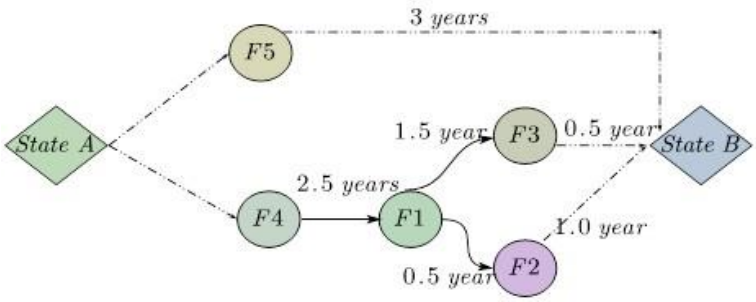

Figure 1: AOE chart

According to the *AOE* network, the specific implementation time is reflected as:

The first reforms were the issue of equality indicators for access to education and national economic indicators, both of which started in parallel.

After the national economic indicators have reached the target state, the education funding indica- tors can be reformed on this basis, and the lag time is 2.5 years. The popularization of higher education and scientific research indicators are lagging behind the education funding indicators, but the degree of lag is different, because the basic education funding required for the changes in the current indicators is different. The changes in the popularization of higher education will take six months to complete, and the reform of scientific research indicators will take up to one year to achieve the expected level of health [4].

2.4 Model Results

The expert review is performed first, and the expert review matrix *R* can be obtained, as shown in the figure below

$$R = \begin{matrix} 0.12 & 0.56 & 0.32 \\ 0.23 & 0.67 & 0.10 \\ 0.16 & 0.63 & 0.21 \\ 0.12 & 0.59 & 0.29 \\ 0.06 & 0.71 & 0.23 \end{matrix}$$

After determining the single factor evaluation matrix *R* and the factor weight vector *W*, the fuzzy vector *A* on *C* is changed to the fuzzy vector *B* on *V* through fuzzychange

$$B = A * R = [0.16, 0.63, 0.21]$$

It can be obtained from the calculation that the degree of membership belonging to the sub-health level is the highest with a value of 0.63. Therefore, the health level of China's higher education system should be Sub-health and the health value should be 103.60.

In terms of health value, China's higher education system is the unhealthy national higher education system among sub-healthy countries.

According to the evaluation results of this model on China, we can find that China has big shortcomings in the ratio of higher education expenditure to government education expenditure, the ratio of population with university degrees, and the gross enrollment rate of higher education.

3. Evaluation of Model

3.1 Strength

In the process of explaining the formation mechanism of the health level of higher education, we cleverly combined the principal component analysis and the multiple regression model. Through the dimensionality reduction of PAC, it can convert multiple indicators into a few principal components, simplifying the influence of the country. Influencing factors of the health level of higher education, the regression equations between various national macro indicators and the health level of higher education were finally obtained and discussed quantitatively.

ISSN 2616-5902 Vol. 3, Issue 5: 91-94, DOI: 10.25236/AJBM.2021.030515

3.2 Weakness

In the research, we oversimplify the health status of the higher education system and neglect the multi-dimensional promotion space, which makes our research model tend to be single and mechanized.

For AHP-FCE, although this method is easy to operate and requires a small amount of data, it uses a method of simulating the evaluator's decision-making method, and it still has a qualitative analysis component in the process of quantitative analysis. This will cause systematic errors in the analysis results.

References

[1] James A Bovaird and Natalie A Koziol. High-stakes education research: Enhanced scrutiny of the education system and its consequences. 2010.
[2] John H.|And Others Meier. An education system for high-risk infants: A preventive approach to developmental and learning disabilities. 1970.
[3] Maia Chankseliani and Tristan Mccowan. Higher education and the sustainable development goals. 2020.
[4] Owen Corrigan and Lucy Lee. Technical matters: building a high quality technical and vocational route through the education system. Policy Exchange,2013.