Research on the building and realizing of higher education evaluation index model

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ABSTRACT

In recent years, there has been an upsurge of higher education reforms around the world, the most significant measures among which is improving higher education evaluation index model. It is not only carried out within the higher education organizations, but is also integrated with the whole higher education system, which has served as the common goal for governments and higher education organizations. Higher education evaluation index model is a scientific management means for universities. There have been large quantities of research on determining higher education evaluation index model, yet it is easy to notice that most of the research lay extra emphasis on the principle of university working condition index systemrather than on building a higher education evaluation index model. This research first introduces the current evaluation model and means and then digs into building and realizing a higher education evaluation index model. At the end, it advises on building and realizing a higher education evaluation index model in order to provide reference for future innovation.

KEYWORDS

INTRODUCTION

Countries all around the globe identify developing education and cultivating talents as the priority in economic and social development. They increase investment in education and adopt new means of evaluation model to promote the development of education. The theory and practice of education evaluation is well received by leaders in higher education administrative departments, theoretical workers in education field and teachers. In this way, education evaluation has become another research field besides education basic theory studies and education development studies in the world education sciences.

The concept, history, social effect, implementing principles, current situation and characteristics have become the research topics of the education researchers. Therefore, higher education evaluation is a multi-faceted and complicated system. As to a university, there is a certain scope and method to manage the evaluation object, evaluation index system, obtaining evaluation information and counting and assessing evaluation information. On this basis, there is an urgent need for a higher education evaluation index model.

THE BUILDING OF HIGHER EDUCATION EVALUATION INDEX MODEL

Evaluation of higher education

Evaluation of higher education originated in China, yet due to all kinds of historical and social reasons, the current education evaluation in China lags behind the developed countries both in theoretical and practical aspects, among which the higher education evaluation has always been a natural method without a systematic and scientific system or standard. As to the way of evaluation, higher education evaluation solely depends on a top-down pattern without taking social evaluation factors, such as educational circles, intellectual circles and employer department into account. Higher education evaluation is a theoretical system that aims at researching higher education goals and practices. The practice of higher education evaluation is still in pilot phase.

When carrying out higher education evaluation, evaluators must abide by the evaluation criterion and the evaluation system should be conformed to the school rules. In this way, higher education routines can be objectively reflected and it is of great importance of coming up with scientific evaluation principle, developing evaluation system, carrying out evaluation activities, increasing evaluation quality an bringing the evaluation into full play. Since the higher education evaluation has a late start in China, now China is actively promoting the development of higher education evaluation and strengthening macro guidance and management on higher education. Education circles, intellectual circles and employer department should carry out assessment on universities and colleges regularly. We should support excellent schools with honor and material, while under-performed schools should be closed down[1]. Carrying out higher education evaluation is an important means for China's macro-management on higher education and also a significant part of higher education evaluation.

Higher education management evaluation

Higher education evaluation includes two parts: self-evaluation in the higher education system and social evaluation from outside the schools. Higher education management evaluation is a means for higher education management and guidance. There is a need for evaluation in every section of the school's planning, decision-making, management and inspection. Evaluation, as a component of scientific management system, has made special contribution in the shifting of traditional experiment management. First, the goal of evaluation is the same as the goal of the school, therefore, evaluation can propel the goal management; second, evaluation lays emphasis on the whole information from both within and outside the system which a prerequisite for scientific management; third, evaluation pays attention to the analysis and research on the system. Based on the comprehensive research, a university will demand for development and reform, thus creating a virtuous circle.

Meaning of establishing a higher education index model

Carrying out higher education evaluation is not only beneficial for the macro-management of the country and education management department, but also helps absorbing talents and increasing the quality of the talents for universities. Besides carrying out macro-management on higher education, higher education evaluation can provide a clear perspective for the society, promote the development of the higher education in China and foster a group of evaluation system that is able to strengthen the whole higher education evaluation system. Evaluation on the school management will provide scientific information for institution of higher education on management. With scientific analysis and comparison with controlled objects, we can make sure that the schools are heading the correct direction. Chinese government and education department can provide useful information for institutes of higher education and at the same time, institutes should evaluate themselves. All of the works will promote scientific management in schools and optimize their workforce. Under this evaluation mode, education becomes an open system and its relationship between production department and research institutions is developing under the requirement of the social economy and science that is evolving from a closed mode to an open mode that adapts itself to the economic and social development.

THE REALIZATION OF HIGHER EDUCATION EVALUATION INDEX MODEL

Sticking at the criterion of higher education evaluation index model

The core content of building a higher education evaluation index model is establishing a complete and scientific evaluation index system which to a large extent determines the scientific level of a higher education institution. Establishing an evaluation index system is a process of deeply analyze and know the evaluation objects which lays the foundation of coordinate operation and carrying out evaluation activity. Establishing an evaluation index system involves design criterion, design method and so on. The following criterion should be aided by: (1) goal congruence, which means the criterion of the higher education management evaluation should be consistent with the socialist education goal, objective law of education and detailed criterion within the system. (2) Direct measurability, means the evaluation index model should be able to measure the effect of all school management activities. (3) Independence means evaluation index models should be independent from each other and there should be no relationship like containing, overlapping or causality between the indexes. (4) Completeness means that evaluation index model should cover the whole process completely by paying attention to the connection and interaction of different factors. (5) Comprehensive comparability means that the model should reflect the common property of different evaluation objectives. (6)Feasibilitymeans that the model should be based on an evaluation goal and reflects the direction of the education management evaluation.

Determine the goal of higher education evaluation index model

Evaluation index model is designed with a certain object, a design principle and an evaluation goal. The model changes according to the disparity of the evaluation objects. Even with the same object, the model may differ due to different goals[2].

Determining the object and goal of the evaluation confirms the general goal of the evaluation. Due to the principle and abstractness of the general goal, the general goal should be disintegrated in a way of structural analysis into different levels of goals.

According to Figure 1, different levels of goals in higher education index model is not equal to evaluation index model. It offers the foundation of establishing a index system, yet converting from levels of goals system to evaluation index model because goals are often abstract and of high principle.
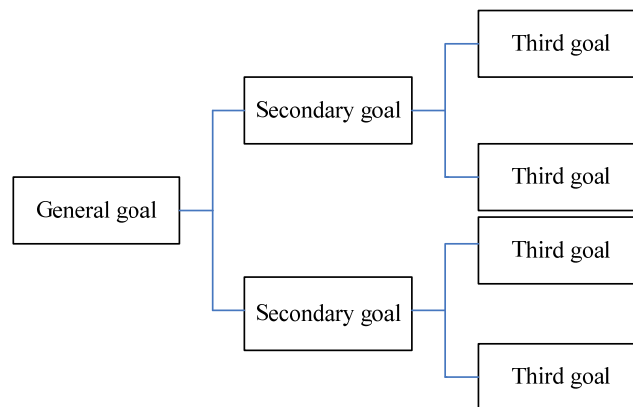

Figure 1 : Different level of goals in higher education index model

Improving higher education evaluation index model

Designing higher education evaluation index model is a process of value judgment based on a certain goal, but, generally, there is abstractness in it to some extent. Therefore, in order to improve the scientificity of the evaluation, abstract goals should be reificated. The most commonly used design technology in the management evaluation index model is the set of weights.

Constructing the set of weights is another important part of the education evaluation task, which is the factor sets consisted of the index system and also the relationship set consisted of all factors. It is a form that connects indexes that are physically dispersed but objectively closely-linked[4]. As to the evaluation of the higher education management, first all factors involved in the higher education management should be separately and comprehensively output and then synthetized into a mathematical model to complete a set of weights.

There are two situations of higher education evaluation in terms of output form, which are separate and comprehensive.

As seen in Figure 2, if the output value is a vector: $X_g = (X_1, X_2, \ldots\ldots X_3)$, the number is given by the evaluated value of level-g index (gradually synthesized from the level-k), when e＜g, there will be no result from level-e index and the result should be output separately. The number of dimensions of X_g is determined by the number of level-g indexes.
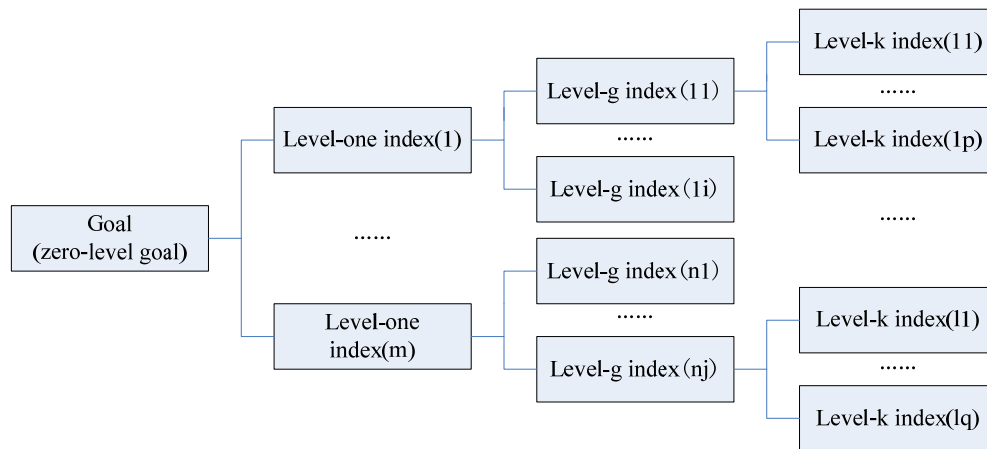
Figure 2 : The distribution of the higher education evaluation index system

There are two special situations in separate outputting: (1) g=K. Here separate outputting means separate according to the indexes. If there are S last indexes, then the output is an S vector; (2) g=0. Here X is a vector, a simple number. Here we call it comprehensive output. Besides the situation that g=k, separate output usually includes several comprehensive steps. g=0 is the exception. Therefore, as compared to comprehensive output, separate output in higher education management evaluation does not involve final evaluation value. So the conflict caused by the order of the names can be avoided, therefore the evaluators' anxiety and stress can be lifted to some extent. But we have to notice that sole dependence on adopting separate evaluation may not fully enable the evaluation objects to realize his/her own levels and may lower the stimulation rate. Therefore, separate and comprehensive output should both be taken into consideration when designing the higher education management evaluation index model.

The means to obtain comprehensive evaluation value from index evaluation value after gaining the separate index evaluation value by adopting the mathematical models of higher education management evaluation are as follows:

The Delphi method

The Delphi method collects and analyzes people's opinions by asking questions in order to obtain the consensus of opinion and predict the future[5]. The first thing about the Delphi method is to transform the events into weights, give evaluation to them, design a questionnaire and recall the data for assessment. The calculation formula is shown in formula 1:

$$\overline{M}(w_i) = \frac{1}{n}\sum_{j}^{n} w_{ij} \quad i = 1,2,...,m \tag{1}$$

By adopting this method, the evaluators can control the whole evaluation process, be clear about the questions and avoid ambiguity.

The hierarchy analytic process

The hierarchy analytic process is an evaluation method that is based on multiple targets and criterion. It selects the optional objects from the evaluation and forms the best order. The evaluation order is shown in TABLE 1.

TABLE 1 : The order of relative importance

relative importance	definition	Description
1	equally important	equal contribution to the target
3	slightly more important	according to experience, one evaluation is more favourable than another
5	fundamentally important or very important	according to experience, one evaluation is more favourable than another
7	virtually important	one evaluation is more favorable than another and is proved in practice
9	absolutely important	the highest importance level
2,4,6,8	the median between two adjacent levels	
case number of the above non-zero numbers	If i is one of the non-zero numbers when comparing i and j, then j will have the corresponding non-zero case numbers	

By adopting the hierarchy analytic process, we can compare the quantities which means the weights can be revised by experts if there should be deviation from consistency[7].

Rectangular operation method

Rectangular operation method regards fuzzy relation formula as a means for obtaining the sets. When the number of participating experts reaches to a certain number, the evaluated value will be added and calculate the hypothesis by using rectangular operation method. formula 2 is shown as follows:

$$(x_1, x_2, ...x_n) \bullet \begin{bmatrix} a_{11} & a_{21} & ... & a_{n1} \\ a_{12} & a_{22} & ... & a_{n2} \\ ... & ... & ... & ... \\ a_{1n} & a_{2n} & ... & a_{nn} \end{bmatrix} = (b_1, b_2, ...b_n) \tag{2}$$

If the right part of the above equationmultiplyA-1, then A-1 is A'sreciprocal matrix, hen we can get the weight vector needed in this evaluation. Shown in formula 3:

$$(x_1, x_2, ...x_n) = (b_1, b_2, ...b_n) \bullet \begin{bmatrix} a_{11} & a_{21} & ... & a_{n1} \\ a_{12} & a_{22} & ... & a_{n2} \\ ... & ... & ... & ... \\ a_{1n} & a_{2n} & ... & a_{nn} \end{bmatrix}^{-1} \tag{3}$$

By adopting the rectangular operation method, we can eliminate the chance factors during the process of determining the evaluation weights to the maximum extent. But this design requires investment in manpower and material; therefore it needs innovation and redesign.

CONCLUSIONS

Higher education management evaluation, as an important component, plays an irreplaceable part in strengthening education macro-control, deepening education reform and improving education quality. Building and realizing the higher education management evaluation index model is the foundation of higher education management. Therefore, besides paying attention to the theoretical research on education evaluation, we should also participate in practices and embrace the realistic meaning, core content and developing methods of education evaluation. Optimizing the current evaluation mode by adopting multiple evaluation index models, we can offer guidance and references for the development of higher education evaluation.

ACKNOWLEDGEMENT

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