Application of the Big Data Grey Relational Decision-Making Algorithm to the Evaluation of Resource Utilization in Higher Education

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ABSTRACT

In this article, the authors apply the big grey relational decision-making algorithm to improve performance evaluation effectiveness of the higher educational resources utilization. First, they discuss the performance evaluation indexes in higher education. Second, they propose the big data grey relational decision algorithm. Third, they establish the mathematical models of entropy weight and grey evaluation method. Finally, the authors carry out an evaluation simulation analysis on four cities as researching objects. The results show that the big data grey relational decision-making algorithm is an effective method for evaluating the higher educational resource utilization.

KEYWORDS


1. INTRODUCTION

Higher education resources, performance evaluation, decision support system has multi-function complex characteristics. The system should not only consider the ability of human, but also combine the increasing of economic benefits. Therefore, the evaluation system should conclude multifaceted indexes. At same time, university operation process is very complex, therefore it is difficult to evaluation utilization performance of higher education resource. With development of information technology, a lot of information has been digitized as the data to be processed through computer. For higher education resources utility, hundreds of millions of records will be produced per day. The development of network and storing technologies has made propagation and storage of data more convenient. The higher education resource utility needs analyze and process mass information. The useful information is found out from big data, and the rules containing big data should be mined to be applied. Therefore, the mature algorithm that is successfully used in small data should be extended. Then the new algorithm suitable for big data should be developed. In big era, the connotative development of higher education has put forward the new requirement, the innate thinking and models of higher education management have been broken. The traditional high education management has not adapted the resources utility requirement in big era. The ideas and technical means of big data should be fully applied to mine and analyze the resources data of higher education. Currently, many universities are short of perfect performance evaluation system, and there are many problems
to be coped with in education resource utility process. It is necessary to construct the performance evaluation system of higher education resources utility based on big data, and then the performance evaluation system can be more intelligent and information (Su, 2017).

2. LITERATURE REVIEW

The economic benefit of input and output of higher education resources cannot be quantified. For a long time, the higher education has been regarded as consumption and welfare, so it has only investment and no output. The university as nonprofit organization has no power and pressure of improving education resources utility. The problem of higher education resources utility has not been formed the systematic theory, and there is no specific evaluation index system. The current evaluation index system of economic performance concludes sales profit margin, rate of return on total assets, capital yield, ratio of capital accumulation, social contribution rate, social accumulation rate and so on (Ahed and Louis, 2010; Cheng & Zhou, 2015; Tian et al., 2017). These evaluation indexes are confirmed considering the corporate investors, creditors and corporate contribution to society, which are suitable for enterprise. The university is no-material production sector, and fruits of labor are talents and science and technology. It is difficult be measured in money because the labor fruits of it is not represented as material goods. Therefore, the higher education resources utility can be completely evaluated based on quantitative index (John, 2016; Xu and Li, 2007).

The educational process of higher education needs to invest a certain amount of living labor and materialized labor that appears as a certain amount of labor, material and financial resources. The higher education process can produce the educational results with a certain quality and quantity. Suppose that improving students’ knowledge, ability and comprehensive quality is viewed as output of higher education, and then the educational output can be described by a certain quality and quantity of students.

Grey relational decision-making algorithm has been successfully applied in many fields in recent years. Gao, Yang & Luo, Junzhou (2009) applied the grey relational decision-making algorithm to carry out information security risk assessment. Ke et al. (2007) put forward the multiple criteria decision-making algorithm based on similarity to ideal grey relational projection. A parking lot optimal routing is designed based on grey entropy relation grade multi-attribute decision making (Zhang et al., 2015). The performance measurement model of knowledge management is constructed based on grey relational analysis (Yang et al., 2015).

Some improved grey relational decision-making algorithm was put forward by some scientists (Ye et al., 2016; Rao et al., 2007; Jiang, et al., 2015). The geometric meaning of the correlation degree is the similarity and distance between the sequence of the subfactors and the geometric curves of the sequence of the mother factor (Hadi et al., 2017; Varun & Nasina, 2015; Pragadish & Kumar, 2016). If the geometric shape of the two-sequence curve is similar and the distance is close, the degree of association is large, and conversely, the degree of association is small. The grey relational analysis absorbs the quantitative characteristics of distance space and the overall comparison characteristics of the topological space of the grey prediction point set. And a comprehensive comparison mechanism is established, which is widely used in various fields (Gao & Luo, 2009; Kong et al., 2011; Xie et al., 2017). Based on the existing achievements, it is feasible to apply the grey relational decision-making algorithm to analyze the higher educational resources utilization in big era.

3. PERFORMANCE EVALUATION OF HIGHER EDUCATION RESOURCE UTILITY

The evaluation standards of utility rate of higher educational resources can be used as the scale of measuring and evaluating the economic benefits of educational funds, therefore the economical index should be used. It is necessary to confirm a set of objective and operable evaluation index and calculation method of educational economic benefits. These evaluation indexes have no absolute
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