Group Identification Method for Features of Human Capital Inner Quality Structure

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Abstract

The group identification model for features of human capital inner quality structure based on ideal solution evaluation model is built up. Based on the opinions of observer group, from the view of most beneficial to behavioral subjects according to the opinions of each observer, based on the mathematical model proposed, features of human capital inner quality structure can be analyzed based on group opinions. The procedure of applying the methods is also designed. A numerical example shows how the new model can be applied to identify characteristic of individual inner human capital quality advantage structure, which identifies the feasibility and scientific of the method.

Keywords: Human Capital, Inner Quality, Group Identification Method, Individual Advantage, Characteristics Identification

1. Introduction

Summarizing the human capital accumulating progress, it is not difficult to find that human resources working actively in accordance with individual human capital inner quality advantage structure. Different people have different characteristics, each has strengths and shortcomings, the decision maker should identify human resources by the purpose of promoting human resources to act according to the their strengths and avoiding their shortcomings. So, the identification method of individual advantage characteristics is very important.

Nowadays, the main methods for identifying human capital inner quality features are qualitative analysis; the conclusions are always varying from person to person, which are difficult to reach a consensus. In a broad sense, many evaluation methods have side effects on identifying human capital inner quality features. But the main purpose of evaluations are not identifying individual human capital inner quality, so the evaluation results may be not in great detail and specific, which makes it can hardly reach the analysis goals, and it can rarely provide suggestions for decision makers. The quantitative approach for identifying human capital inner quality features is rare. The statistical method can identify human capital inner quality features, but they can not show the process of generating results, and it may lose lots of useful information. Further more, since the complexity of the human capital inner quality; the method should be put forward according to the characteristic of human capital which is recessive.

This paper constructs human capital inner quality individual advantage identification model based on group decision making method. It can identify human capital inner quality individual advantages; it is applicable to find out the common opinions of evaluation objects' human capital inner quality individual advantage features through cluster analysis of evaluated object's advantage structures hidden in each respondent's evaluation opinions.

2. Literature Review

Individual human capital inner quality characteristic advantage structure has lots of expression ways. This paper chooses advantage structure to express the human capital inner characteristics. The identification model contains two aspects: the method of handling group decision information and the way of identifying individual human capital inner advantage structure. In the first aspect, recently, group decision making researches on mainly the way of changing individual decision maker preference into group preference(which is group decision)(Kerry F. Milch, Elke U. Weber, Kirstin C.

Appelt, Michel J.J. Handgraaf, David H. Krantz, 2009), mainly focusing on the consistency analysis and integration method. Consistency analysis often researches on consistency judgment and coordination method with inconsistency, typical way of integration method is synthesizing group opinions into only one result, it may supply reference for decision, but it has some shortages: firstly, the starting point of group decision making researches weaken that the disagreement between group members is objective and inevitable, with the purpose of achieving consensus may result in direction deviation, moreover, the "compromise way" may not be allowed in the actual condition; secondly, integrating original information directly is not good for data mining sufficiently. The quantitative methods which can reveal the distribution status are factor analysis and principal-components analysis methods (Che-Tsung Tung,Yu-Je Lee, 2009). Both of the above methods identify common features directly from sample data, it is easy but the main function of the methods are data reduction, and processing results are too rough to lose lots of useful details, especially for the advantage comparing among all the indexes which is very important.

There are two ways of identifying advantage structures. The first one is subjective evaluation, which varies from people to people, it is difficult to identify which opinion is right since different people have different angles, knowledge and experience; the second one is evaluation model which can identify individual advantage objectively by quantity methods. Among the existing methods, DEA is either objective with revealing individual advantage characteristic, there are many papers applying DEA methods for relative effectiveness analysis (Hakyeon Lee, Yongtae Park and Hoogon Choi, 2009), (Cooper, José L. Ruiz, Inmaculada Sirvent, 2009), (Asim Roy, Patrick Mackin and Jyrki Wallenius, etal, 2008),also there are many researchers putting their efforts to improve the methods. While, other researchers have tried to use non-DEA model to identify individual advantage characteristics. The above researches improve the efficiency of evaluation greatly, there are still some limitations, it is only applicable to single-layer evaluation index system, the premise of applying DEA methods is input-output situations, which boundaries for application and extension; it can only get irregular weight structure, which is not clear enough to find one's strength and weakness.

For this purpose, from the perspective of human capital inner quality advantage structure, the theory of quantitative identification methods for behavior features is studied.

This paper puts forward a model based on ideal solution evaluation model to identify human capital inner advantage structure, which can identify recessive characteristics.

3. Methods

Considering the characteristics of human capital inner quality, this paper constructs individual advantage identification model based on group decision making. It is applicable to find out the common opinions of evaluation objects' individual advantage features through cluster analysis of evaluated object's advantage structures hidden in each respondent's values. Taking ideal point evaluation model as example, mark F as human capital value indicator information of evaluated object, F^* is ideal value information, W is value indicator weight, the human capital advantage structure can be expressed as:

$$\arg\{\min_{w} d(F, F^*; W) \mid W \in \Omega\} \tag{1}$$

$d\left(F, F^*; W\right)$ is distance function constructed by weights W, Ω is composed by various of reasonable weights. $\arg$ is solving inverse function operator, the whole expression means: according to the evaluation normal formulas that is the nearest distance between the real value information and the ideal information the better, among all the reasonable weights, the weights which makes the evaluated objects the best evaluation result. From this, once the human capital inner advantage structure is settled, the final result is settled. Based on the above analysis, model (1) is to changed human capital advantage structure into solving mathematical programming by optimization techniques. That is to say, through human capital advantage mathematical modeling and the exploiting of solving technique, it can not only solve the problem of human capital advantage modeling, but also it can form processing technique of human capital advantage structure.

Specifically, in order to identify object's human capital individual advantage structure from the point of view of each respondent's evaluation results, to determine the vector weight by making the object most propitious. It can be carried out by model (2) (Fatih Emre Borana, Serkan Gença, Mustafa Kurtb and Diyar Akayb, 2009):

$$\min d_i^2\left(x_i, x^*\right)=\sum_{j=1}^{p} w_{ij}^2\left(x_j^*-x_{ij}\right)^2$$

$$s.t:\ \sum_{j=1}^{p} w_{ij}=1$$

$$w_{ij}\geq 0 \qquad j=1,2,\cdots p; i=1,2,\cdots n \tag{2}$$

The objective function in model (2) is continuous, and the feasible region of constrained conditions is bounded, so the most optimal solutions of model (2) exist. The solution set of function(2) is as following:(i)If there is at least one evaluation value equal to ideal value, then the sum of the components which reach the ideal value is 1, other index weights are all 0; (ii)If there is no evaluation value reaching ideal value, the weight can be obtained by:

$$\mathrm{w}_{\mathrm{ij}}^{*}=\frac{\dfrac{1}{\sum_{\mathrm{j}=1}^{\mathrm{p}}\dfrac{1}{\left(\mathrm{x}_{\mathrm{ij}}^{*}-\mathrm{x}_{\mathrm{ij}}\right)^2}}}{\left(\mathrm{x}_{\mathrm{ij}}^{*}-\mathrm{x}_{\mathrm{ij}}\right)^2}, \mathrm{i}=1,2,..,\mathrm{n},\ \mathrm{j}=1,2,...,\mathrm{p} \tag{3}$$

Getting each respondent's identification results based on the above model, in accordance with n observers' opinions, we can have a collection composing of n groups of value parameters $\{w_i^* \mid i=1,2,\cdots,n\}$, if there are some common traits of elements in the collection, the common character hidden from the concerning individual, which is the behavioral character. Getting common trait from value parameter collection $\{w_i^* \mid i=1,2,\cdots,n\}$ through cluster analysis.

4. Illustration with Numerical Examples

4.1 Indicator System.

Taking the general manager as an abstract individual, based on the previous method put forward, the characters of the manager human capital inner advantage structure is analyzed empirically, and then the advantage characters based on the group opinions and its distribution status are obtained. There are four indicators such as moral characteristics, ability, hard working and technique.

4.2 Identification Result

In order to get the group decision making information, the questionnaire was administered to a sample of 609 reverent persons. 505 pieces of effective evaluation vectors are obtained. According to model (2) and cluster analysis, the identification result is obtained in Table1.

<Table 1 about here>

4.3 Result Analysis

According to table 1, there are four types of evaluation opinions. In type 1, 70% relevant persons consider that managers take average effort on the four aspects. In type 2, 20% relevant persons consider that managers take more efforts on moral and character ability; managers take less efforts on hard working and technique. In type 3, the relevant persons consider that the managers take 80% efforts on ability; the managers take less effort on the other three indicators. In type 4, they think managers moral character the most important.

5. Conclusions

Identifying individual human capital inner quality advantage structure is vital to ensure sustainable development of human resources; this problem seeks for a systematic decision aid mechanism which could be adopted as a management tool. Hence, a method for individual advantage structure based on group decision making is set up. By means of weight vector in goal programming model, determined by making as small the distance between evaluation value vector and ideal value vector as possible. Applying the above model to identify the object's inner quality advantage based on each respondent's evaluation value one by one, data mining the quantitative relative strength and shortcoming structure, the advantage structure matrix can be analyzed by cluster analysis to obtain the distribution of individual advantage structures hidden in group opinion.

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Table1. Group identification result of characteristics human capital inner quality

Type	Person percentage	Moral character	Ability	Hard working	Technique
Type1	70%	0.25	0.25	0.25	0.25
Type2	20%	0.40	0.40	0.1	0.1
Type3	5%	0.05	0.8	0.05	0.1
Type4	5%	0.7	0.1	0.1	0.1