ISSN : 0974 - 7435 Volume 10 Issue 15

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(15), 2014 [8519-8524]

Fuzzy mathematics method's role in evaluating enterprise management system

Da Lei

Chongqing Technology and Business Institute, Chongqing,China,400052, (CHINA)

ABSTRACT

Fuzzy mathematics method plays a positive role in building enterprise management system. By evaluating production quota of an enterprise, it can make a scientific comparison in management level between different corporations. The evaluation model, as the result of applying fuzzy mathematics method, can reflect the fuzzy relations between production quotas clearly through relation matrix, making evaluation index analysis more comprehensive. This is the basis of comparing enterprise management systems and the complete reflection of fuzzy mathematics method's evaluating role in building enterprise management system. The application of fuzzy mathematics method not only provides support in data and theory for enterprise's sustainable development but reflects the application of mathematics model to enterprise's sustainable development in production.

KEYWORDS

Enterprise management; Fuzzy mathematics method; Evaluate model; Building and application.

INTRODUCTION

Fuzzy mathematics method is relatively important for the evaluating of enterprise management system because it is the "guarantee" condition deciding weather series of indexes can support corporation's healthy development, so that it can also drive the rapid rising of enterprise's management level and production index. Besides, what makes fuzzy mathematics method so important is that it, referring to features of modern social development, makes a scientific conclusion of enterprise's management, fully playing its role in evaluating enterprise management system.

This paper explores the importance of fuzzy mathematics method referring to its role in the evaluating of enterprise management system. Through scientific calculation and collation of datum achieved by building matrix of corporation K's evaluating indexes, the applying value of fuzzy mathematics method can be continuously improved. By carefully choosing fuzzy operators and ensuring weight vectors, we can improve mathematics evaluating model's rationality. And the conclusion and analysis of fuzzy comprehensive evaluation's results can enable fuzzy mathematics method to play a comprehensive role in evaluating enterprise management system.

FUZZY MATHEMATICS METHOD'S ROLE IN ENTERPRISE MANAGEMENT SYSTEM'S EVALUATION

The scientific evaluation of enterprise management system, as a guarantee element for enterprise's development, provides a efficient support in data and method for enterprise's development, and promotes the improvement of enterprise's management. Deeply exploring and analyzing the evaluating role of management system through mathematics evaluating model enables fuzzy mathematics method to provide endless energy for enterprise's growth. This also show people its outstanding role in enterprise management system. In terms of enterprise's survival, efficiently evaluating enterprise management, which is crucial to an enterprise's destiny, can make up the disadvantages existing in enterprise's management and avoid for ahead problems that would appearing in the future. Fuzzy mathematics method makes the building of evaluating model more completed, so that model's construction can be more theoretic and scientific.

The process of evaluating enterprise management, as a crucial part of enterprise management evaluating system, is mainly effected by enterprise's production. So it would be more efficient for us to make a comparison in evaluation between enterprise management systems, enabling enterprise management evaluating system to be objective and evaluating basis and results more persuasive. Because the recorded problems existing in management of different enterprises, even same with each other, have different complex causes, the comprehensive study of these problems through fuzzy mathematics method can make evaluating model fully reflect the causes, so that providing a strong support for improving enterprise management.

The way of concluding the evaluation of enterprise X's management system is to classify production indexes, then to conclude their common, making us more familiar with enterprise's production level. For example, classifying an index to one of five classes: first, second.. ifth class, according to information about enterprise's current production situation. By this way we can not only evaluate enterprise management but also find questions reflected by the classifying of a certain index.

Through comparing X's production index with same kind of indexes of other enterprise, we can clearly see distinct differences (as shown in TABLE 1). Fuzzy comprehensive evaluation can make a comprehensive analysis of all indexes, which cannot be bone by traditional mathematics methods, so that making it possible to do a scientific analysis of enterprise's management.

THE BUILDING OF FUZZY RELATION MATRIX

Because there are many factors influencing enterprise management, so the study of these factors is playing an important role in enterprise management. The scientific evaluation of enterprise through the comprehensive assess of indicators provides guarantee to enterprise's management and development, making enterprise management evaluating system more scientific to meet the need for development of enterprise and society. The fuzzy evaluating of enterprise indexes through fuzzy mathematics method can provide a data support for the building of enterprise management evaluating system, making its importance in promoting development of enterprise and society more persuasive.

The meaning of make a fuzzy comprehensive evaluation and judgment of enterprise indicators is that the scientific test of every indexes in enterprise management system is helpful to form an accurate evaluating process. For reaching this, we should build a relation matrix and the way of building r_{ij} is described as bellow:

The r_{ij} represents the subordinate level of enterprise's indicator of *i* to the class *j* (enterprise can be represented by K), which is more clear and persuasive. However, in the process of comparing there is no value of K's indicator of *i* in the class *j*, so the value of r_{ij} is equal to 0. On contrary, K's indicator of *i* can coordinate to the value in class *j*, and so the span can be represented by $x_{j+1} - x$. Classifying the span into five intervals, in each of which the left endpoint's membership value should be within $0.6-1$, among of which 0.1, as an indicator representing corresponding membership, divides every

interval into ten parts, so that we can test the accuracy of membership's percentage. For example, in the process of conducting fuzzy comprehensive evaluation of enterprise K, through the calculating the membership of a K's indicator in the second class, we get the span is between 58 and 68 and this indicator is 61. Through the method introduced above we can get that the membership of this indicator in second class is 0.650.

Through the introduction above we can see that the way of building fuzzy relation matrix can accurately calculate and the membership of an indicator in secondary class. And what's following is that we will, based on 14 production indicators in list below showing the degree of enterprise completing its upgrading indicators, build their fuzzy relation matrix. And in this process, we have efficiently explored indicators of six classes and seven fuzzy relations. The datum are shown in TABLE 2. This paper just takes two of them as examples and does some studies.

TABLE 1 : X's degree of completing its upgrading indicators in XX and the comparison with that of peer enterprises (part of datum)

Degree of completion	A	B	C	D	E	Ranking of X among peer enterprises		
						F	G	
I	0.18	0.10	0.10	0.08	0.19	0.18	0.12	4
II	3.68	5.38	2.69	1.4	4.10	1.64	2.63	4
III	1.11	0.93	0.03	0.68	1.33	1.01	0.40	2
IV	686	690	809	587	539	546	621	4
V	14	15.9	14.91	22.66	13.88	41.8	13.99	2
VI	51.85	53.96	53.73	51.09	57.58	45.06	55.02	2
VII	50.07	42.66	41.4	41.77	41.66	41.05	44.54	6
VIII	31.48	31.3	31.6	30.6	31.26	28.34	33.26	1
IX	80.14	77	79.96	77.2	77.57	76.03	80.21	1
X	80.31	78.2	80.73	80.1	81.30	79.4	80.14	4
XI	100	58.41	100	100	100	100	98.96	6
XII	3.7	3.55	3.22	3.6	3.81	5.98	2.01	7
XIII	135061	84493	121258	63801	103685	37750	126403	2
XIV	20.16	11.9	22.6	17.8	17.3	17.8	22.90	1

TABLE 2 : The list of enterprise's upgrading indicators

value	superfine	first grade	second grade	third grade	preparatory grade	out of grade
I	0.21	0.23	0.25	0.27	0.30	
II	2.96	3.04	3.12	3.20	3.78	
III	0.54	0.72	0.83	0.90	0.99	
IV	600	540	480	420	365	
V	—	14	16	18	20	
VI	≥58	≥50	≥45	≥40	≥35	
VII	≥50	≥40	≥35	≥30	≥25	lower than value of preparatory grade
VIII	≥35	≥30	≥25	≥20	≥15	
IX	≥80	≥75	≥70	≥65	≥60	
X	≥80	≥75	≥73	≥69	≥65	
XI	100	95	85	80	78	
XII	6.0	4.5	4.0	3.0	2.0	
XIII	131210	129911	128625	127351	124804	
XIV	20	15	10	5	0	

$$R1=\begin{bmatrix}0.65 & & & & \\ & & 0.51 & & \\ 0.7 & & & & 0.8 \\ & 0.5 & & & \\ & 0.51 & & & \\ 0.5 & & & & \\ & 0.63 & & & \\ 0.51 & & & & \\ 0.53 & & & & \\ 1.0 & & & & \\ & & 0.57 & & \\ 1.0 & & & & \\ 0.56 & & & & \end{bmatrix} \quad R2=\begin{bmatrix}1.0 & & & & \\ 1.0 & & & & \\ & & & & 0.8 \\ 0.71 & & & & \\ & & & 0.5 & \\ & 0.52 & & & \\ 0.5 & & & & \\ & 0.6 & & & \\ & 0.62 & & & \\ & 0.70 & & & \\ & 0.82 & & & \\ & & & & 1.0 \\ & & & 0.67 & \\ & & & & 0.95 \\ & & & 0.69 & \end{bmatrix}$$

THE CHOOSING OF FUZZY OPERATOR AND WEIGHT VECTOR

The example of fuzzy evaluation model

The correct choosing of weight vectors is the basis and also an important part of the building of fuzzy evaluating model. Weight vector's excess of standard means there are some mistakes made in the process of evaluating enterprise's indicators, which can lead to the disadvantages existing in the evaluating model. What decides whether weight vector exceeds standard in the process of building enterprise management evaluating model is the difference between expecting values and gradations. However the difference of extreme indicators can lead to uncommon performance existing in the corresponding grade. However what leads to the S weight vector's exceeding standard is more complex, which may involve in manager's psychology and other factors, ones hard to be handled efficiently. So here through building the mathematics matrix of indicators and grades, in which the calculation of weight vector is crucial, we make a scientific evaluation of enterprise management. In order to optimize enterprise management model, we also use mathematics methods to improve the pertinence of enterprise management. Besides the choosing of fuzzy vector, as an important technique for building fuzzy evaluation mode, plays an important role in building enterprise evaluation system. Through defining the range of weight vectors based on the results of comparing the corresponding indicators, we can get membership's weight vectors, making the compounding of fuzzy vectors more scientific. This plays an irreplaceable role in building enterprise management evaluating system and provides support in theory and data for building the matrix of fuzzy mathematics, so that to show us the operating efficiency of enterprise management evaluating system.

Based on the type of fuzzy evaluating model, its construction should follow the principle of "direct reflecting "to strengthen the ability to explore the building of enterprise management evaluating system. The features of "linear weighting model" lie in the strong visualization, the direct reflection of every indicator and grade, simple calculating procession and the acceptable program with a rapid original speed. In the process of building linear weighting model, we should first efficiently collocate the linear relation of false indicators. Because of the high requirements of high administrative level reflected by indicators, there must no relative relations between them, or there would appear combining phenomena between indicators, thus not only having a negative effect on building the model but also making evaluating results be wrong. However, seeing the building of linear weighting model from the view of systemics, there exists many disadvantages and the unreasonable factors influencing the collation of linear relations, leading to the decomposition of the model's building and shadowing the feature of "comprehensiveness "characterizing fuzzy mathematics model's building.

Different form the building of the linear model, the fuzzy analyzing model's construction is to evaluate efficiently based on datum from the fuzzy collection and its evaluating results share similarities with human thought, which are reflected through grades. Through evaluating and analyzing the qualitative factors, we can make a more scientific evaluation and description of enterprise's management system and production process. But because its reflection of datum is not clear and there are few datum supporting the building of the evaluating model, this method is not much persuasive. Referring to the distance of two fuzzy evaluating model introduced above, we can conclude that fuzzy mathematics method can do a more scientific data procession of the evaluating model, thus meeting the need for evaluating enterprise management evaluation.

Calculating the weighting vector through fuzzy mathematics method

By referring to The Comprehensive Evaluating of Mathematics Model's Method and Application, we can conclude that among five kinds of fuzzy comprehensive evaluating models, M (·, +) represents comprehensive judgment, through

which we can get the close internal relations between fuzzy operator and weight vector: normalization relation. The datum in list 2 have show that the 14 indicators representing enterprise's upgrading should be within (l, 1.2, 1.2, 1, …, l, 0.8). However, according to the relation between fuzzy operator and weight vector, the vector would be A=(0.07, 0.085, 0.085, 0.07, …, 0.07, 0.06), achieved after the normalizing of them.

THE RESULTS AND ANALYZING OF FUZZY COMPREHENSIVE EVALUATION

The results of fuzzy comprehensive evaluation

Through comprehensively evaluating M (·, +) among five fuzzy comprehensive evaluation models, we can calculate the fuzzy operator M (·,+) when $A_o R_i = 1,2,\ldots,7$. The fuzzy evaluating results of seven enterprises studied in this paper are bellow:

B_1=(0.3759 0.1148 0 0.0525 0.04335 0.068) ∑=0.65455
B_2=(0.2047 0.2282 0.0839 0.0469 0.1356 0.1356) ∑=0.7673

B_3=(0.4391 0.1904 0.0525 0.0427 0 0.021) ∑=0.7457

B_4=(0.3451 0.2736 0 0.049 0 0.125) ∑=0.793

B_5=(0.1561 0.3574 0 0.056 0 0.165) ∑=0.7345

B_6=(0.26625 0.2253 0.0945 0 0 0.1517) ∑=0.7431

B_7=(0.3538 0.2485 0 0 0.0357 0) ∑=0.6381

The datum above have shown that there is distinct difference in managing level between different enterprises, which can be more clearly reflected through building the fuzzy evaluating model, so that to reveal the problems existing in enterprise's management.

The analyzing of fuzzy comprehensive evaluation's results

In the process of building fuzzy relation matrix, the foundation of setting up fuzzy mathematics model, r_{ij} would conduct a relative respond, which would lead to the deviation existing in enterprise fuzzy comprehensive evaluation, thus creating wrong datum in the process of building fuzzy mathematics evaluating model. The specific situation is shown bellow.

The result r_{ij} achieved when indicators in every grade lean to the right end are close to 0.5, so the evaluating results is not very distinct. By contrary, when they lean to the left end r_{ij} would be close to 1, which cause the abrupt rising or decreasing of enterprise's evaluating value, so the final value would have some deviation. This deviation can reach above 15%, which can effect negatively enterprise's evaluating indicators. So we study the normalizing of the evaluating results, shown bellow.

B_1'=(0.574 0.175 0 0.080 0.066 0.104)

B_2'=(0.267 0.297 0.109 0.061 0.089 0.177)

B_3'=(0.589 0.255 0.070 0.057)

B_4'=(0.435 0.345 0 0.062 0 0.158))

B_5'=(0.213 0.487 0 0.076 0 0.225)

B_6'=(0.358 0.303 0.127 0 0 0.211)

B_7'=(0.555 0.389 0 0 0.056 0)

CONCLUSION

What introduced above in this paper is our study of fuzzy mathematics method's application to the evaluating of enterprise management system. Through taking K as the example, the function of mathematics method in evaluating enterprise management system has been fully reflected, helpful to make its application more extensive. Choosing enterprise's development as the researching point highlights the "advance" of mathematics methods, making it possible to promote

enterprise management. Besides, the comparing indicators of different corporations can provide a basis of data and method for resolving completely problems.

REFERENCES

[1] Li Xiaohong; The Optimizing of Stat-Owned Coal Enterprise's Evaluating System based on Fuzzy Mathematics, Coal Technology, **3**, 264-266 **(2014)**.

[2] Zhang Wenyan, Xiang Lianzhi, Wang Xiaofang; The Partitioned Management Model for Large Data and its Application, Journal of Harbin Technology University, **35(3)**, 353-360 **(2014)**.

[3] Huanggang; Fuzzy Mathematics Method's Application to Economic Analysis, Financial Research, **10**, 65-68 **(1985)**.

[4] Xu Zhaoming, Chen Jiaqiang; Fuzzy Mathematics's Application to the Comprehensive Evaluation of Economic Efficiency--the Mathematics Model for Comprehensively Evaluating Economic Efficiency, Financial and Economic Research, **4**, 32-37 **(1985)**.

[5] Heying; Fuzzy Comprehensive Evaluating of Listed Corporation's Performance. Journal of Xuzhou Institute of Technology: Social and Scientific Edition, **3**, 91-93 **(2005)**.

[6] Zhao Hebing; Building a Managing System of Construction Contracts Through Fuzzy Mathematics Method, Technology and Enterprise, **13**, 57-58 **(2013)**.

[7] Liu Shasha; The Study and Analysis of Enterprise's Environment Performance Audit Model--the Case Study based on the Model Advanced by the Fuzzy Mathematics Comprehensive Evaluation, The Internal Audit Association of China, **5**, 36-40 **(2013)**.