Fuzzy Comprehensive Evaluation Model of Accounting Information Quality

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Abstract: With the rapid development of China's socialist market economy and the improvement of the complexity of accounting business, the quality of accounting information has gradually become the focus of public concern. Most of the domestic and foreign scholars on the quality of accounting information is qualitative analysis, quantitative evaluation is rare. In this paper, on the basis of previous studies, from the quality of accounting information content and quality of accounting information disclosure from two aspects to determine the ten indicators related to accounting information quality characteristics, constructs the comprehensive evaluation model of enterprise accounting information quality, using analytic hierarchy process (AHP) and fuzzy comprehensive evaluation method examined the model by practical example, the results showed that the rationality and feasibility of the model.

1. Introduction

Accounting information is an important basis for people to make economic decisions, and its quality directly affects the level of decision-making. With the rapid development of China's socialist market economy and the improvement of the complexity of accounting business, the quality of accounting information has been paid more and more attention.

What kind of accounting information is helpful for decision-making, and what are the criteria for evaluating the quality of accounting information? Scholars at home and abroad have made extensive and in-depth discussions on these issues. The Canadian institute of chartered accountants presents four major quality requirements: understandability, relevance, reliability, and comparability. The British accounting standards board divides the quality of accounting information into three parts: the quality related to the content of statements, the quality related to the presentation of statements, and the constraint on the quality of information.[1] the quality characteristics of accounting information stipulated in China's new standards include reliability, relevance, comprehensibility, comparability, substance over form, importance, prudence and timeliness.[2]

In this paper, on the basis of related research at home and abroad for reference, establish the accounting information quality index system, use the analytic hierarchy process (AHP) to determine index weight, through the fuzzy comprehensive evaluation method to carry on the comprehensive evaluation to the enterprise accounting information quality, can be more intuitive and more rationally analyzing the current situation of enterprise accounting information quality, for enterprise accounting information quality evaluation has a certain theoretical and practical significance.

2. Accounting Information Quality Index System

2.1 Establish Accounting Information Quality Index System

This paper combines the basic characteristics of accounting information quality from the two aspects of accounting information content quality and accounting information disclosure quality to establish an enterprise accounting information quality index system, as shown in figure 1.[3]
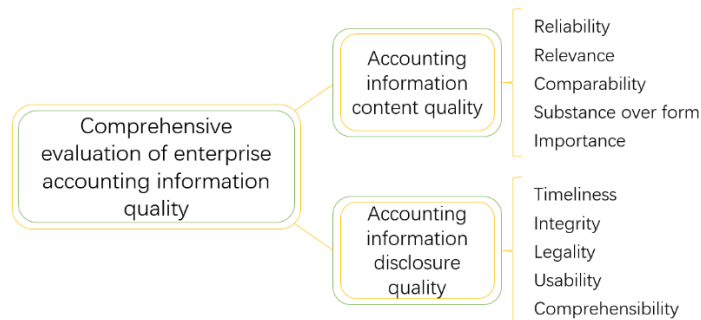
Fig. 1 Enterprise accounting information quality evaluation index system

2.2 Use Analytic Hierarchy Process to Determine the Weight of Each Index

2.2.1 Determination of the Weight of First-Level Indexs

Since enterprises also pay attention to the quality of accounting information content and accounting information disclosure quality, this paper gives the weight of accounting information content quality and accounting information disclosure quality is 0.5.

2.2.2 Determination of the Weight of Second-Level Indexs

To determine the weight of each index in the content and quality of accounting information, the

judgment matrix $B_1 = \begin{bmatrix} 1 & 3 & 5 & 7 & 5 \\ 1/3 & 1 & 3 & 5 & 3 \\ 1/5 & 1/3 & 1 & 3 & 1 \\ 1/7 & 1/5 & 1/3 & 1 & 1/3 \\ 1/5 & 1/3 & 1 & 3 & 1 \end{bmatrix}$, the maximum characteristic root $\lambda=5.1269$, the weight vector $W_1 = [0.5041 \quad 0.2452 \quad 0.1024 \quad 0.0459 \quad 0.1024]$, and the test coefficient CR=0.028 < 0.1, passing the consistency test.

Similarly, for the determination of the weight of each index in the quality of accounting

information disclosure, the judgment matrix $B_2 = \begin{bmatrix} 1 & 3 & 1 & 5 & 5 \\ 1/3 & 1 & 1/3 & 3 & 3 \\ 1 & 3 & 1 & 5 & 5 \\ 1/5 & 1/3 & 1/5 & 1 & 1 \\ 1/5 & 1/3 & 1/5 & 1 & 1 \end{bmatrix}$, the maximum characteristic root $\lambda=5.0556$, the weight vector $W_2 = [0.3595 \quad 0.1534 \quad 0.3595 \quad 0.0638 \quad 0.0638]$, and the test coefficient CR=0.012 < 0.1, passing the consistency test.

Table 1. Weight of each index

Target layer (B)	Criterion layer	Weight of the criteria layer	Index layer	Weight of each index under a single factor	Combined weight value
Comprehensive evaluation of enterprise accounting information quality	Accounting information content quality (B₁)	0.5	Reliability(B₁₁)	0.5041	0.2521
			Relevance(B₁₂)	0.2452	0.1226
			Comparability(B₁₃)	0.1024	0.0512
			Substance over form(B₁₄)	0.0459	0.0230
			Importance(B₁₅)	0.1024	0.0512
	Accounting information disclosure quality (B₂)	0.5	Timeliness(B₂₁)	0.3595	0.1798
			Integrity(B₂₂)	0.1534	0.0767
			Legality(B₂₃)	0.3595	0.1798
			Usability(B₂₄)	0.0638	0.0319
			Comprehensibility(B₂₅)	0.0638	0.0319

2.2.3 Determination of Combined Weight Value

The combined weight value is determined by the product of the first-level index weight value and the second-level index weight value, and the result is shown in table 1.

3. Fuzzy Comprehensive Evaluation Model

3.1 Establish Fuzzy Comprehensive Evaluation Model

Fuzzy comprehensive evaluation is to convert qualitative evaluation into quantitative evaluation according to membership theory of fuzzy mathematics, and to make an overall evaluation of things or objects restricted by many factors. The specific steps are as follows.

Firstly, determine the factor set, determine the factors affecting the quality of enterprise accounting information, set up the factor set B. Secondly, determine the evaluation set, and the evaluation grade of enterprise accounting information quality is composed of the evaluation set V. Thirdly, establish the fuzzy comprehensive evaluation matrix of the criterion layer, organize ten experts to evaluate each index, and divide the score by the total number of experts to get the fuzzy evaluation matrix Ri of each criterion. Fourthly, we get the evaluation results. Through $S_i=W_i*R_i$, the vector S that represents the evaluation result can be obtained, and then the evaluation result can be obtained according to the maximum membership degree principle.[4]

3.2 Application of Fuzzy Comprehensive Evaluation Model

This paper takes the accounting information quality of an enterprise in Baoding city as an example and applies the fuzzy comprehensive evaluation model to comprehensively evaluate its accounting information quality.

Firstly, determine the factor set. According to the accounting information quality indicator system established above, it can be concluded that enterprise accounting information quality evaluation factor set $B=(B_1, B_2)$, where accounting information content quality $B_1=(B_{11}, B_{12}, B_{13}, B_{14}, B_{15})$, accounting information disclosure quality $B_2=(B_{21}, B_{22}, B_{23}, B_{24}, B_{25})$.

Secondly, determine the evaluation set. Set the evaluation set as $V=(v_1, v_2, v_3, v_4)$, respectively representing the quality of accounting information is very good, good, general, poor. The judges will give a score of 10 out of 10. Where v_1 is 9, v_2 is 7, v_3 is 5, and v_4 is 3.

Thirdly, establish the fuzzy comprehensive evaluation matrix of criterion layer. The fuzzy evaluation matrix R_1 of accounting information content and the fuzzy evaluation matrix R_2 of accounting information disclosure quality can be obtained through expert scoring and dividing by the number of experts.

$$R_1=\begin{bmatrix} 0.3 & 0.5 & 0.2 & 0 \\ 0.2 & 0.6 & 0.2 & 0 \\ 0.1 & 0.5 & 0.3 & 0.1 \\ 0.2 & 0.4 & 0.4 & 0 \\ 0.1 & 0.5 & 0.4 & 0 \end{bmatrix} \qquad R_2=\begin{bmatrix} 0.2 & 0.6 & 0.2 & 0 \\ 0.1 & 0.8 & 0.1 & 0 \\ 0.3 & 0.7 & 0 & 0 \\ 0.1 & 0.7 & 0.2 & 0 \\ 0.2 & 0.7 & 0.1 & 0 \end{bmatrix}$$

Fourthly, get the evaluation results. To find out the criterion layer vectors $S_1= W_1*R_1=$ (0.2299 0.5199 0.2399 0.0102) and $S_2= W_2*R_2=$ (0.2142 0.6794 0.1064 0.0000), so as to determine the total evaluation matrix $R=(S_1,S_2)^T=\begin{bmatrix} 0.2299 & 0.5199 & 0.2399 & 0.0102 \\ 0.2142 & 0.6794 & 0.1064 & 0.0000 \end{bmatrix}$. According to S=W*R, the evaluation result vector S= (0.2220 0.5997 0.1731 0.0051). Therefore, the enterprise accounting information quality evaluation score is $Z=0.2220\times9+0.5997\times7+0.1731\times5+0.0051\times3=7.0767$.

The score shows that the quality of accounting information of this enterprise is close to a good level. Combined with the actual situation of the quality of accounting information of this enterprise, the comprehensive evaluation model of accounting information quality established in this paper reflects the quality of accounting information of the enterprise well. Therefore, this model has certain rationality and feasibility.

4. Summary

On the basis of previous studies, this paper determines ten indexes related to accounting information quality characteristics from two aspects of accounting information content quality and accounting information disclosure quality, and constructs a comprehensive evaluation model of enterprise accounting information quality. On the basis of determining index weight by analytic hierarchy process (AHP), the index system is evaluated by fuzzy comprehensive evaluation method.

According to the evaluation results, enterprises can find the key factors affecting the quality of enterprise accounting information, so as to make targeted improvements. Therefore, this model has certain practical significance.

However, because the fuzzy comprehensive evaluation method is to determine the weight through expert scoring, the scoring value will be different because of some subjective tendencies such as personal knowledge, so it has a certain subjectivity. In future applications, enterprises should be careful in selecting evaluation experts to make them more representative. In addition, enterprises can further refine the fuzzy evaluation criteria according to the actual situation, reduce the influence of subjective factors, and make the evaluation results more scientific.

References

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