



Research on Human Resource Management Performance Evaluation Based on Entropy Weight TOPSIS Method

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Abstract. In order to improve the accuracy and comprehensiveness of performance evaluation results, this paper proposes a human resource management performance evaluation method based on entropy weight TOPSIS. Establish a data analysis platform for human resource management to provide data basis for performance evaluation; Under the condition of meeting the principles of simplicity, scientificity, systematicness and consistency, an evaluation system containing multiple evaluation factors shall be established; Entropy weight method and TOPSIS method are used to calculate the closeness of each evaluation object to the positive ideal solution in the evaluation system, and this value is used to measure the performance level of human resource management. Through experiments, it is verified that this method has higher evaluation accuracy and comprehensiveness, and can provide reference for enterprise human resource management.

Keywords: Entropy weight method; TOPSIS method; Human resources; Performance evaluation; Closeness

1 Introduction

The level of human resource management has a certain impact on the core competitiveness of an enterprise, and a good human resource management scheme plays a vital role in the decision-making of an enterprise [1]. Therefore, it is of practical significance to evaluate the performance level of human resource management. At present, relevant scholars have put forward many research methods for the evaluation of human resource management performance level, but the existing methods have problems such as limited access to resources and incomplete evaluation, which cannot meet the actual development needs of enterprises. Therefore, the existing evaluation methods need to be improved [2].

Some scholars put forward a performance evaluation method of human resource management based on BSC matter-element model. This method takes strategy as the starting point, establishes a performance evaluation system based on BSC theory, and evaluates various evaluation indicators through BSC matter-element model to obtain the final evaluation results. The example analysis shows that this method can get a more comprehensive evaluation result, but there is a large gap in performance grades

and the evaluation results are unreasonable. In addition, some scholars have proposed a performance evaluation method of human resource management based on fuzzy comprehensive evaluation. This method uses fuzzy comprehensive evaluation method to establish an evaluation model, through which the human resource management level can be evaluated. The experimental results show that this method can convert qualitative evaluation indicators into quantitative evaluation indicators, but the evaluation does not relate to the actual situation of the enterprise, and the evaluation results are inaccurate.

Aiming at the problems existing in the existing methods, this paper proposes a human resource management performance evaluation method based on the entropy weight TOPSIS method, which aims to improve the accuracy of the evaluation results and provide reference for enterprise human resource decision-making.

2 Construction of HR management data analysis platform

As the source of human resource management data is relatively broad, the amount of data is large and there are many kinds of data in the process of data processing. Therefore, this paper combines cloud computing with data mining technology to build a human resource data analysis platform to provide a data basis for performance evaluation. The platform is mainly composed of data acquisition layer, data transmission layer, data storage layer and other modules. The platform structure is shown in Figure 1 below:

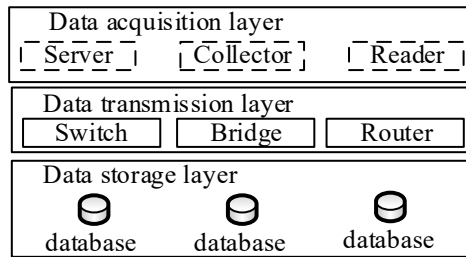


Fig. 1. Structure of HR Management Data Analysis Platform

3 Performance evaluation of human resource management

3.1 Evaluation principles

In order to comprehensively evaluate the performance level of human resource management, the principles of simplicity, scientificity, systematicness and consistency should be adhered to in the process of selection and evaluation. The following principles shall be followed:

- (1) Concise and scientific. The evaluation indicators should be as objective as possible, scientific, credible and scientific; At the same time, it is not allowed to select

more evaluation indicators for the sake of comprehensive evaluation results. It should be simple and not cumbersome.

(2) Consistency of process and purpose. In the process of evaluating the performance level of human resource management, both the final evaluation results and the actual work of employees should be taken into account.

(3) Systematicity. Building energy conservation is a systematic work. Since the performance evaluation system of human resource management is composed of multiple levels and factors, it must be considered from a systematic perspective to ensure that all evaluation factors are not only related to each other, but also independent of each other.

(4) Consistency. Since the evaluation content is diversified, we should pay attention to the actual availability of evaluation indicators and ensure the consistency of evaluation indicators as much as possible.

According to the above principles, establish human resource management performance evaluation to improve the comprehensiveness of evaluation results.

3.2 Construction of evaluation index system

Under the condition of meeting the principles of simplicity, scientificity, systematicness and consistency, an evaluation index system is established, as shown in Table 1.

Table 1. Evaluation Index System

	Primary indicators	Secondary indicators
Human resource management performance evaluation indicators	Management factors e_1	Manage Configuration e_{11}
		Talent allocation e_{12}
		Organization Configuration e_{13}
		HR management level e_{14}
	Innovative learning e_2	Training time for key employees e_{21}
		Department staff exchange and learning e_{22}
		Training time per employee e_{23}
	Internal processes e_3	Implementation of various systems of the Company e_{31}
		Timeliness of performance evaluation e_{32}
		Effectiveness of performance evaluation e_{33}
		Implementation effect of human resource management system e_{34}
	Other e_4	employee turnover rate e_{41}
		Human resources management and supervision system e_{42}

Table 1 shows that the evaluation system takes management factors and internal processes as the main evaluation indicators.

3.3 Realization of human resource management performance evaluation

3.3.1 Entropy weight method.

Different from the general subjective evaluation method, the entropy weight method is an objective weighting method. When this method is used to evaluate the performance level of human resource management, its weight needs to be calculated according to the attributes of each evaluation index [3-4]. The specific steps are as follows:

(1) Based on the human resource management performance evaluation system in Table 1, the initial matrix is established:

$$E = \begin{bmatrix} e_{11} & e_{12} & \cdots & e_{1n} \\ e_{21} & e_{22} & \cdots & e_{2n} \\ M & M & O & M \\ e_{n1} & e_{n2} & \cdots & e_{nm} \end{bmatrix} \quad (1)$$

Where: n describes the number of evaluation indicators; m describes the evaluation object.

(2) Standardize Formula (1) to get Formula (2):

$$S_{ij} = e_{ij} / e_{ij}^{\max} - e_{ij}^{\min} \quad (2)$$

Where: e_{ij}^{\max} and e_{ij}^{\min} describe the maximum and minimum weights of evaluation indicators respectively.

(3) The entropy value and entropy weight value of the evaluation index are calculated respectively:

$$u_{ij} = \sum_{i,j=1}^m P_{ij} \cdot P_{ij} \quad (3)$$

$$W_{ij} = \sum_{i,j=1}^m (1 - u_{ij}) \quad (4)$$

3.3.2 TOPSIS method.

TOPSIS [5-6] is a comprehensive evaluation method, which mainly faces multi-level and multi index problems. The implementation steps of this method are as follows:

(1) Further normalize the initial matrix E to improve the accuracy of the evaluation results:

$$D_{ij} = s_{ij} / \sqrt{s_{ij}^2} \quad (5)$$

(2) Based on Formula (4) and Formula (5), a weighted decision-making evaluation matrix is obtained as shown in Formula (6):

$$V_{ij} = W_{ij} \times D_{ij} \quad (6)$$

(3) Calculate the positive and negative ideal solutions of the evaluation index:

$$v_{ij}^0 = \begin{cases} \max\{v_{ij}\}j \in J \\ \min\{v_{ij}\}j \in J' \end{cases} \quad (7)$$

$$v_{ij}^1 = \begin{cases} \min\{v_{ij}\}j \in J \\ \max\{v_{ij}\}j \in J' \end{cases} \quad (8)$$

Where: J refers to benefit index; J' indicates a cost type indicator.

(4) Calculate the distance from the evaluation object to the positive and negative ideal solutions:

$$d_{ij}^0 = \sqrt{(v_{ij} - v_{ij}^0)^2} \quad (9)$$

$$d_{ij}^1 = \sqrt{(v_{ij} - v_{ij}^1)^2} \quad (10)$$

(5) Calculate closeness:

Proximity refers to the relationship between the evaluation object and the best object. Its value is [0,1]. The larger this value is, the better the enterprise's human resource management performance is. Its calculation formula is:

$$X_{ij} = d_{ij}^0 / d_{ij}^0 + d_{ij}^1 \quad (11)$$

According to the above analysis, the specific process of human resource management performance evaluation is given: determine the principles of evaluation index construction, and establish the human resource management performance evaluation index system on the basis of meeting the evaluation principles; The entropy weight method and TOPSIS method are used to realize the final evaluation of human resource management performance level [7-8].

4 Evaluation effect verification

In order to verify the practicability of human resource management performance evaluation method based on entropy weight TOPSIS method, experimental analysis is carried out. Select a small and medium-sized enterprise as the experimental object, collect the human resource management data of the enterprise in recent two years, and form a standard data set as the experimental data source. From the perspective of evaluation accuracy and comprehensiveness, the evaluation methods based on BSC matter-element model and fuzzy comprehensive evaluation are compared with the methods in this paper.

The comparison results of the evaluation accuracy of the evaluation methods based on BSC matter-element model, fuzzy comprehensive evaluation and this method are shown in Figure 2.

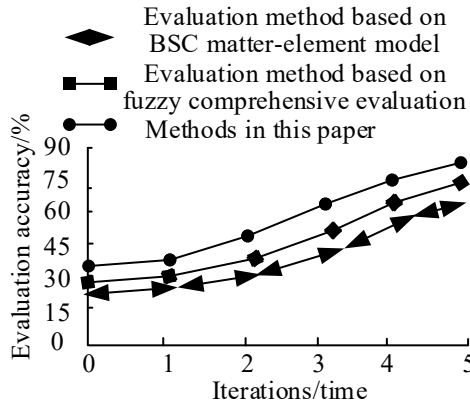


Fig. 2. Comparison Results of Evaluation Accuracy

It can be seen from the analysis of Figure 2 that, when the number of iterations is different, the evaluation accuracy of this method fluctuates between 37% and 82%, that of the evaluation method based on BSC matter-element model fluctuates between 17% and 65%, and that of the evaluation method based on fuzzy comprehensive evaluation fluctuates between 28% and 75%. The experimental results show that the evaluation accuracy of this method is the highest, indicating that the evaluation effect of this method is the best and the evaluation results are more reliable.

The comprehensive comparison results of the three methods are shown in Table 2.

Table 2. Comprehensive Comparison Results of Evaluation

Iterations/time	Evaluation method based on BSC matter-element model	Evaluation method based on fuzzy comprehensive evaluation	Methods in this paper
1	0.75	0.87	0.93
2	0.80	0.85	0.98
3	0.79	0.83	0.96
4	0.73	0.80	0.95
5	0.82	0.79	0.95
6	0.75	0.75	0.90
7	0.71	0.79	0.92
8	0.76	0.78	0.91
9	0.80	0.78	0.93
10	0.81	0.76	0.95

It can be seen from Table 2 that the comprehensiveness of the evaluation is demonstrated by numerical values. The higher the numerical value, the more comprehensive the evaluation results are. When the number of iterations is 5, the evaluation comprehensiveness of the evaluation method based on BSC matter-element model reaches the highest value of 0.82. When the number of iterations is 1, the evaluation comprehensiveness of the evaluation method based on fuzzy comprehensive evaluation reaches the highest value of 0.87. When the number of iterations is 2, the evaluation

comprehensiveness of the method in this paper reaches the highest value of 0.98. Through comparative analysis, it can be seen that the highest comprehensive evaluation result of this method is 0.98, which is much higher than the evaluation method based on BSC matter-element model and the evaluation method based on fuzzy comprehensive evaluation, which again verifies the effectiveness of this method.

5 Conclusion

This paper proposes a human resource management performance evaluation method based on entropy weight TOPSIS method. The implementation steps of this method are as follows: (1) Establish performance evaluation principles and human resource management performance evaluation system; (2) The entropy weight method and TOPSIS method are used to realize the performance evaluation of human resource management. (3) The experimental results show that the evaluation accuracy and comprehensiveness of this method are better than those of traditional methods, and this method can be widely used in human resource management research, providing reference for human resource management decisions of enterprises, institutions and government departments. Although the method in this paper has improved the evaluation effect to a certain extent, because the method is not applied to the actual scene, its application value needs to be further verified, which is the focus of the next step of research.

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