# Quality Evaluation of Human Resource Management Information System Based on Intelligent Optimization Algorithm

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**Abstract.** The conventional quality evaluation method of human resource management information system can not early warn the deterioration index with small weight, so a quality evaluation method of human resource management information system based on intelligent optimization algorithm is designed. Firstly, the experts' opinions are widely solicited, information is exchanged repeatedly, and the evaluation index system is established by determining the index type and the scale of the index set, and the weight of the index is assigned by using the quantitative index screening method; the McCall model is used as the quality evaluation model to accurately and quantitatively evaluate the software system index, and finally the ant colony algorithm is selected for the quality intelligent optimization evaluation So far, the research on the quality evaluation method of human resource information system based on intelligent optimization algorithm is completed. The simulation results show that the evaluation results of the method based on intelligent optimization algorithm are consistent with the data collection results, which can accurately reflect the real operation state of the system, and verify the effectiveness of the evaluation model.

**Keywords:** Intelligent optimization · Human resource · Information system · Quality evaluation

## 1 Introduction

In the background of the information age, the quality of the human resource information system determines the competitiveness of enterprises to a certain extent. Therefore, the evaluation of human resource information system is very important for enterprise information and enterprise development. However, due to the difficulty of quantitative and qualitative analysis, although many human resource information systems have been developed, the evaluation of human resource information system is a blank of human resource information system [1].


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For example, in reference [2], AHP fuzzy comprehensive evaluation method is used in the design of quality evaluation system. The purpose of quality evaluation of human resource management information system is to evaluate the technical ability, work performance and utilization rate of the system, improve the management level and improve the economic benefits of the enterprise. System evaluation measures the current performance of the system and provides a basis for further improvement of the system in the future. The maintenance of the system is to ensure that the information system can continuously coordinate with the requirements of user environment, data processing operation, enterprise or other relevant departments.

In the existing quality evaluation method of human resource management information system, it is impossible to early-warning the deterioration index with less weight. Therefore, this paper studies the quality evaluation of human resource information system. For the first time, the paper uses the evaluation method of AHP, expert scoring and intelligent optimization algorithm to analyze the human resource information system comprehensively, quantitatively and qualitatively, and compares the evaluation results.

# 2 Quality Evaluation of Human Resource Management Information System Based on Intelligent Optimization Algorithm

## 2.1 Establishment of an Evaluation Indicator System

The design of the evaluation index system is to correctly evaluate the human resource information system, provide data support for enterprises and relevant departments, make the human resource information system more perfect and produce greater economic benefits. Designing a scientific, reasonable and systematic evaluation index system is the basis and premise of accurate and effective evaluation results. The evaluation index system should comprehensively reflect the objectives and requirements of the system to be evaluated, be as scientific and reasonable as possible, conform to the actual situation, and be basically acceptable to the relevant personnel and departments. Therefore, the establishment of the evaluation index system needs to be based on the comprehensive analysis of the system. Firstly, the draft of the index should be drawn up. After extensive solicitation of expert opinions, repeated exchange of information, statistical processing and comprehensive induction, the index type and the scale of the index set should be determined. On the one hand, the more types and quantities of indicators, the more comprehensive and accurate the evaluation conclusion will be. On the other hand, the larger the scale of the indicator set, the more likely the selected indicators are to be associated with each other, and the greater the workload and the more types of indicators, the higher the complexity of the indicator system and the greater the risk. In the selection of evaluation index set, each index should be independent of each other, and there is no mutual calculation relationship.

To determine the evaluation index system is a complex work with many related factors, which requires the participation and guidance of technical experts who have a good understanding of the evaluation objectives. Generally, the Delphi method is used, that is, by asking questions to experts, collecting expert opinions, summarizing and synthesizing, and then feeding back to experts, and repeating the process for many times until the evaluation index system is determined [3, 4]. Finally, the evaluation index system of the system is determined. The index design process is carried out from four aspects of software characteristics, hardware characteristics, network characteristics and investment according to the method of layer by layer decomposition, thus forming the hierarchical structure of the index system, as shown in Table 1.

Through the evaluation of all these indicators, the goal of information system evaluation can be achieved. At the same time, after the completion of all the evaluation of these indicators, managers can accumulate a lot of information system development experience according to the evaluation results.

**Table 1.** Evaluation indicators architecture

| First level indicators | Secondary indicators | Third level indicators |
|---|---|---|
| Software features X1 | Functionality X11 | Accuracy X111 |
| | | Security X112 |
| | | Applicability X113 |
| | Reliability X12 | Maturity X121 |
| | | Fault tolerance X122 |
| | | Recoverability X123 |
| | Maintainability X13 | Analyzability X131 |
| | | Transformability X132 |
| | | Testability X133 |
| | Accessibility X14 | Intelligibility X141 |
| | | Easy to learn X142 |
| | | Easy to operate X143 |
| | Portability X15 | Consistency X151 |
| | | Replaceability X152 |
| | | Easy to install X153 |
| | Efficiency X16 | Time characteristics X161 |
| | | Resource characteristics X162 |
| Hardware features X2 | Functional X21 | Security X211 |
| | | Applicability X212 |
| | Reliability X22 | Stability X221 |
| | | Maturity X222 |
| | Maintainability X23 | Analyzability X231 |
| | | Extensibility X232 |
| Network characteristics X3 | Reliability X31 | Stability X311 |
| | | Fault tolerance X312 |

(*continued*)

**Table 1.** (*continued*)

| First level indicators | Secondary indicators | Third level indicators |
|---|---|---|
| | Security X32 | Physical security X321 |
| | | Technical safety X322 |
| | Efficiency X33 | Network bandwidth X331 |
| | | Communication equipment X332 |
| Investment X4 | Real income X41 | Efficiency X411 |
| | | Accuracy X412 |
| | | Cost X413 |
| | Hidden incomes X42 | Brand image X421 |
| | | Process reengineering X422 |
| | Budget performance X43 | Timeliness X431 |
| | | Accuracy X432 |

After the determination of the indicator system, the quantitative indicator screening method can be used to assign the weight of the indicators, that is, the statistical method is used to screen out the calculation weight of each indicator, and the information of the original indicator set is not lost [5–7]. Firstly, the conditional generalized variance minimization method is selected, assuming that there are $m$ indexes $X1, ..., Xm$ of $n$ group observation data

$$X = \begin{bmatrix} x_{11} \; x_{12} \; \ldots \; x_{1m} \\ x_{21} \; x_{22} \; \ldots \; x_{2m} \\ \ldots \; \ldots \; \ldots \; \ldots \\ x_{n1} \; x_{n2} \; \ldots \; x_{nm} \end{bmatrix} \tag{1}$$

In matrix $X$ of formula (1), each row is a group of observed data, and the covariance between the mean value and variance of $x_i$ and $x_i$ and $x_j$ can be obtained:

$$\begin{aligned} \overline{X}_i &= \frac{1}{n}\sum_{n=1}^{n} x_{ai} \\ S_{ii} &= \frac{1}{n}\sum_{a=1}^{n} (x_{ai} - \overline{X}_i)^2 \\ S_{ij} &= \frac{1}{n}\sum_{a=1}^{n} (x_{ai} - \overline{X}_i)(x_{ai} - \overline{X}_j) \end{aligned} \tag{2}$$

Matrix $S = \left(S_{ij}\right)_{p \times p}$ constitutes the variance and covariance matrix of these $m$ indicators, and $|S|$ is its determinant, which can reflect the changes of indicators, also known as generalized variance [8]. When $m = 1$, $|S| = |S_{ii}|$ is the variance of variable $X_i$. There has been a proven theorem: the value range of generalized variance is $0 < |S| < 1$. If all the values between $X_m$ are independent of each other X, then the value of generalized variance $|S|$ is the largest. If the data between $X_i$ are linearly correlated, then the value of generalized variance $|S|$ is 0. The value of $|S|$ reflects the importance of the indexes to be evaluated, so as to realize the weight between the indexes Assignment. After the selection of indicators is completed, the weight of each index needs to be analyzed. This paper uses analytic hierarchy process to calculate, constructs a multi-level and multi-structure model for each element of the problem, compares the elements of the same structure with the previous structure, establishes a discrimination matrix, judges the importance of the two factors according to the judgment scale, and calculates the relative weight of the elements to the level. When comparing the importance of n elements $B_1, B_2, ..., B_n$ to the previous layer, it is necessary to establish the proportion of them in the previous layer. For any two elements $B_i$ and $B_j$, the proportion of influence degree is represented by $b_{IJ}$. The scale table of importance constructed is shown in Table 2:

**Table 2.** Scale of importance

| Scale value | Meaning | Scale value | Meaning |
|---|---|---|---|
| 1 | Equally important | 2 | The tradeoff between 1 and 3 judgment |
| 3 | More important | 4 | The tradeoff between 3 and 5 judgments |
| 5 | Important | 6 | The tradeoff between 5 and 7 judgments |
| 7 | Very important | 8 | The compromise between 7 and 9 judgments |
| 8 | Extremely important | Remarks | $B_i$ is compared with $B_j$ to get $b_{IJ}$; $B_j$ is compared with $B_i$ to get $\frac{1}{b_{IJ}}$ |

That is, two judgment matrices $B = (b_{IJ})_{n \times n}$ are obtained. Then, the relative weight between each element needs to be calculated. After the weight of the previous level index is assigned to the current index, the weight of each indicator is recorded as $w_1, w_2, ..., w_n$, and the relative weight of $B_i$ and $B_j$ is:

$$b_{IJ} = \frac{w_i}{w_j}(i, j = 1, 2, ..., n) \tag{3}$$

Due to the diversity and one sidedness of human factors, and many evaluation factors, it is necessary to use the fuzzy theory of artificial intelligence technology for specific calculation and discrimination. Fuzzy theory is to use fuzzy logic to describe the level of things in real life, and quantify it fuzzy, then get the degree of belonging, and use the degree of belonging to complete the evaluation of curriculum design [9, 10]. The judgment matrix can be expressed as:

$$B = \begin{bmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \cdots & \frac{w_2}{w_n} \\ \cdots & \cdots & \cdots & \cdots \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \cdots & \frac{w_n}{w_n} \end{bmatrix} \tag{4}$$

The weight vector can be expressed as:

$$W = (w_1, w_2, ..., w_n)^T \tag{5}$$

The judgment matrix can be expressed as:

$$B = W \cdot \left( \frac{1}{w_1}, \frac{1}{w_2}, ..., \frac{1}{w_n} \right) \tag{6}$$

Fuzzy matrix is an important tool in the research of fuzzy relationships, which is based on the idea of the weighted average method, and can accurately calculate the weight of each index.

### 2.2 Design Quality Evaluation Model

Information system quality evaluation model is the basis of system quality evaluation. With the continuous development of the systematization industry, people are more and more aware of the importance of system quality evaluation. As the basis of system quality evaluation, more and more experts at home and abroad began to invest in this aspect of research work from the late 1970s. According to the evaluation index system established in this paper, the quality evaluation model used in this paper is the McCall model, which can divide the system quality evaluation into three levels, namely factor, quality and criterion [11–13]. The model divides the evaluation of software quality into 11 quality factors in three major aspects, including software correctness, reliability, efficiency, integrity, availability, maintainability, testability, flexibility, portability, reusability and interoperability, as shown in Fig. 1:

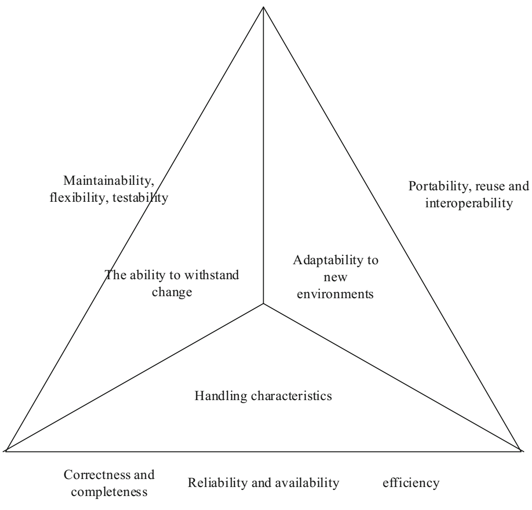


**Fig. 1.** McCall system quality assessment model

In addition, there are corresponding evaluation criteria for each quality factor. In the McCall model, 23 evaluation criteria are involved, which are extracted from software attributes. The 23 evaluation criteria are completeness, consistency, accuracy, fault tolerance, simplicity, modularity, generality, extensibility, instrumentality, self description, execution efficiency, storage efficiency, access control, access review, operability, training, communication ability, software system independence, machine independence, communication commonality, data commonality and simplicity. By evaluating the corresponding evaluation criteria of each quality factor, the evaluation of the software in the quality factor is obtained. According to the evaluation model in Fig. 1, the membership function of geometric elements is constructed. According to the characteristics of quantitative data, the triangular membership function is selected to calculate the average threshold of quantitative data, determine the range of comments set, and map to the function interval. According to the data characteristics of gesture recognition operation time, taking the minimum and maximum time of the task as the boundary points, the membership function of "very short time" can be obtained:

$$ux = \begin{cases} 1 & x < 1.0 \\ -2x + 3 & 10 \le x < 1.5 \\ 0 & 1.5 \le x \end{cases} \tag{7}$$

The membership function of "long time" can be expressed as:

$$ux = \begin{cases} 2x - 4 & 2.0 \le x < 2.5 \\ 1 & 2.5 \le x \\ 0 & else \end{cases} \tag{8}$$

Then, the membership function of "shorter time" can be obtained respectively:

$$ux = \begin{cases} 2x - 3 & 1.0 \le x < 1.5 \\ -2x + 4 & 1.5 \le x < 2.0 \\ 0 & else \end{cases} \tag{9}$$

The membership function of "long time" can be expressed as:

$$ux = \begin{cases} 2x - 3 & 1.5 \le x < 2.0 \\ -2x + 5 & 2.0 \le x < 2.5 \\ 0 & else \end{cases} \tag{10}$$

For the evaluation of these criteria, McCall model gives some measures. According to the above membership function, the membership function image of quality evaluation time is shown in Fig. 2

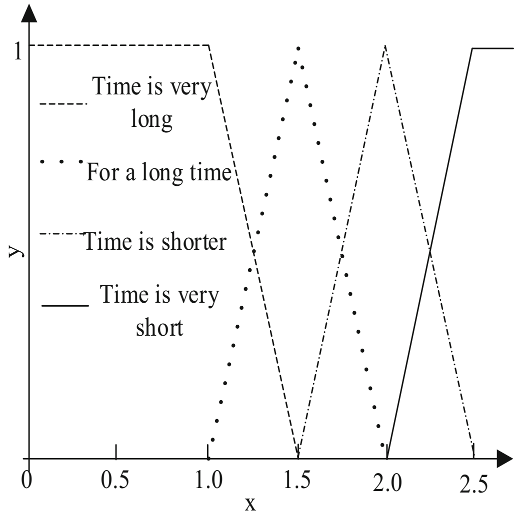


**Fig. 2.** Membership function diagram of gesture recognition operating time

The membership function is constructed according to the corresponding membership relationship of the input quantitative data, and the index weight of each fault in the system is calculated. Based on the membership function, the comprehensive fuzzy matrix of fault identification performance measurement is established. After the comprehensive evaluation is obtained, the comprehensive evaluation of user experience is output. The fuzzy multi-layer matrix evaluation is established through the above steps, and the comprehensive evaluation model is established through the above steps, It can objectively and accurately evaluate the quality of human resource management system The calculation method given in the model is comprehensive and accurate, and the software system analyzed by the model can be accurately evaluated quantitatively.

### 2.3 Introduction of Intelligent Optimization Algorithm

In this paper, the ant colony algorithm is selected to complete the quality evaluation of the system. In fact, the ant colony algorithm is to imitate the foraging behavior of ants to find the optimal path of quality evaluation. Based on the large number of individuals of ant colony, they communicate with each other through pheromones to transfer information for their peers. A large number of ants form a feedback system, which can find degradation indicators with any weight. Therefore, it has high efficiency and time complexity in the evaluation process, and has great value. It solves the problem that the slight deterioration index is easy to ignore. This paper studies the problem of system quality evaluation. The main goal is to check the deterioration index of human resource management information system in the process of operation, to create higher profits for enterprises.

Ant colony algorithm has a good search ability, but its initial information is rapidly lacking, and the convergence speed is relatively slow. Therefore, this paper combines ant colony algorithm with genetic algorithm, and proposes an improved hybrid ant colony algorithm for iterative solution. In ant colony algorithm, the number of ants needs to be set first. According to the characteristics of ant colony algorithm, when the number of ants is $m$ and the global search ability and convergence speed are guaranteed, there is the following relationship between the number of ants and the scale $n$ of scheduling problem:

$$m = \sqrt{n} \sim \frac{n}{2} \tag{11}$$

The scale $n$ of scheduling problem mainly includes the number of system evaluation indexes. Ant algorithm is a kind of evolutionary algorithm based on population, which is applied in path optimization. At the beginning, all ants will choose different paths to finding food. In the search process, ants will communicate with each other by pheromone, and choose the better path to search for food for the second time. If it iterates repeatedly, an optimal path will be found. The path search process is shown in Fig. 3.

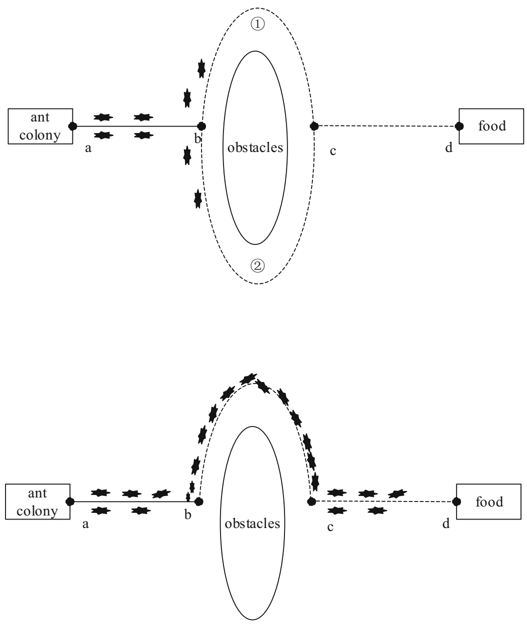


**Fig. 3.** Selection of ant foraging path

Combined with ant colony algorithm, the intelligent optimization algorithm flow of system quality evaluation in this paper is obtained, as shown in Fig. 4:

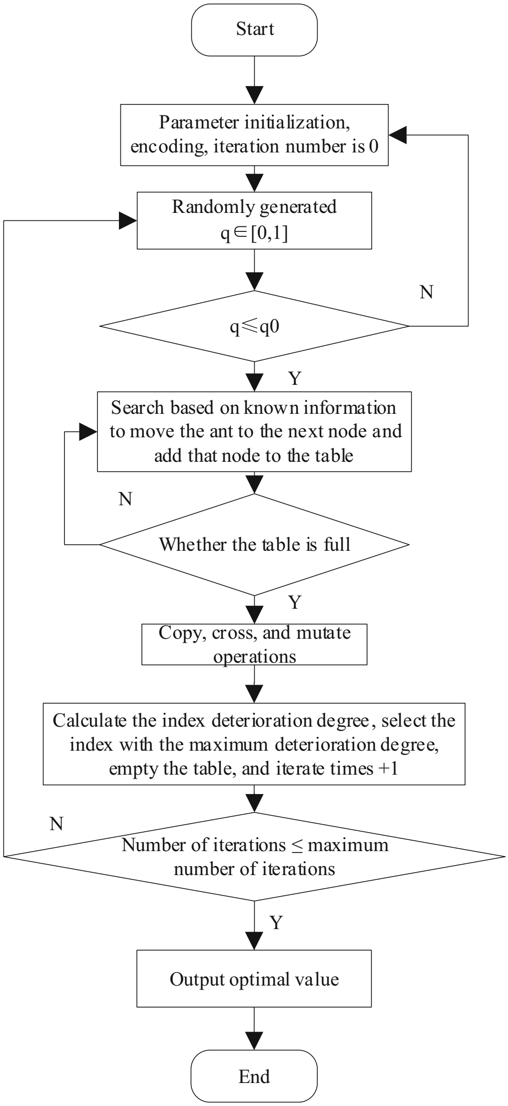


**Fig. 4.** Improved ant colony algorithm

The selection, crossover and variation of genetic algorithm are three genetic operations based on gene coding. The degradation index is coded by imitating chromosome coding, and a set of deterioration index codes composed of natural numbers are obtained. The core idea of selection is to copy, and the optimal solution in the reproduction inheritance parent continues to improve, so as to avoid the loss of high-quality solution, and the crossover can generate new individuals and increase diversity, prevent premature stagnation, mutation operation on the optimal individual, and save the optimal solution.

# 3 Method Testing

## 3.1 Design of Test Method

In order to verify the effectiveness of the quality evaluation method designed in this paper, the design method needs to be tested. A running human resource management information system is established through the simulation platform. A time node is set every 10 min to monitor the data of each evaluation index. At the same time, the traditional quality evaluation method and the designed evaluation method are used to evaluate the simulation system at the same time node. Finally, the evaluation results of the two systems are compared. The experimental platform is xsimstudio, and the topology is shown in Fig. 5:

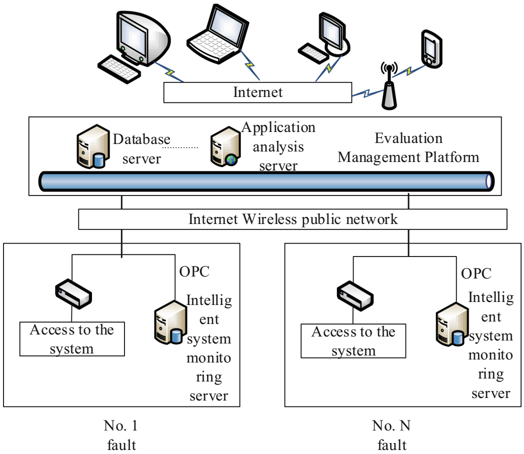


**Fig. 5.** Experimental topology

Based on the theory of AHP, the four experts of the project evaluation working group conducted a comprehensive study on the evaluation indexes of the system, and then compared the indexes of each level of the project to form a judgment matrix, and calculated the eigenvector and the maximum eigenvalue of the judgment matrix. Finally, the consistency detection of each judgment matrix was completed, and the results are shown in Table 3:

**Table 3.** Evaluation matrix under results

| Assessment results | Software features | Hardware features | Network characteristics | Investment |
|---|---|---|---|---|
| Software features | 1 | 5 | 7 | 3 |
| Hardware features | 1/5 | 1 | 3 | 1/3 |
| Network characteristics | 1/7 | 1/3 | 1 | 1/5 |
| Investment | 1/3 | 3 | 5 | 1 |

According to the eigenvector:

$$\begin{aligned} W &= (W_1, W_2, ..., W_n)^T \\ &= (0.5214, 0.1852, 0.0551, 0.3541)^T \end{aligned} \tag{12}$$

According to the maximum eigenvalue, the consistency test is passed. According to the above form, the judgment matrix of software characteristics, hardware characteristics, network characteristics, investment and other subordinate branches at all levels is obtained. The system with the above parameters runs normally on the platform, and each evaluation index is detected every 10 min, and the data is recorded to obtain the index data at time $T_1 - T_5$. The calculation results in Table 4 are obtained:

**Table 4.** Evaluation indicator monitoring data for each time point

| Index | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
|---|---|---|---|---|---|
| X111 | 0.54 | 0.73 | 0.96 | 0.21 | 0.19 |
| X112 | 0.58 | 0.43 | 0.70 | 0.87 | 0.25 |
| X113 | 0.95 | 0.30 | 0.50 | 0.25 | 0.77 |
| X121 | 0.60 | 0.25 | 0.12 | 0.40 | 0.75 |
| X122 | 0.87 | 0.73 | 0.59 | 0.23 | 0.96 |
| X123 | 0.95 | 0.38 | 0.15 | 0.96 | 0.88 |
| X131 | 0.28 | 0.78 | 0.94 | 0.11 | 0.55 |
| X132 | 0.62 | 0.53 | 0.83 | 0.90 | 0.61 |
| X133 | 0.03 | 0.65 | 0.22 | 0.49 | 0.54 |
| X141 | 0.67 | 0.28 | 0.44 | 0.28 | 0.70 |
| X142 | 0.23 | 0.14 | 0.91 | 0.82 | 0.29 |
| X143 | 0.81 | 0.80 | 0.58 | 0.82 | 0.81 |
| X151 | 0.70 | 0.70 | 0.43 | 0.83 | 0.28 |

(*continued*)

**Table 4.** (*continued*)

| Index | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
|---|---|---|---|---|---|
| X152 | 0.58 | 0.34 | 0.74 | 0.77 | 0.21 |
| X153 | 0.23 | 0.55 | 0.76 | 0.39 | 0.15 |
| X161 | 0.30 | 0.49 | 0.84 | 0.30 | 0.31 |
| X162 | 0.33 | 0.73 | 0.93 | 0.44 | 0.15 |
| X211 | 0.04 | 0.59 | 0.63 | 0.97 | 0.53 |
| X212 | 0.35 | 0.23 | 0.09 | 0.32 | 0.16 |
| X221 | 0.06 | 0.76 | 0.99 | 0.13 | 0.84 |
| X222 | 0.95 | 0.82 | 0.54 | 0.45 | 0.76 |
| X231 | 0.41 | 0.89 | 0.69 | 0.01 | 0.59 |
| X232 | 0.77 | 0.59 | 0.87 | 0.14 | 0.07 |
| X311 | 0.75 | 0.60 | 0.60 | 0.90 | 0.69 |
| X312 | 0.01 | 0.80 | 0.48 | 0.11 | 0.90 |
| X321 | 0.45 | 0.46 | 0.41 | 0.38 | 0.12 |
| X322 | 0.23 | 0.86 | 0.48 | 0.45 | 0.04 |
| X331 | 0.07 | 0.91 | 0.10 | 0.13 | 0.87 |
| X332 | 0.27 | 0.87 | 0.73 | 0.99 | 0.54 |
| X411 | 0.17 | 0.83 | 0.43 | 0.26 | 0.97 |
| X412 | 0.08 | 0.40 | 0.22 | 0.46 | 0.66 |
| X413 | 0.49 | 0.67 | 0.98 | 0.62 | 0.42 |
| X421 | 0.27 | 0.96 | 0.21 | 0.99 | 0.12 |
| X422 | 0.20 | 0.15 | 0.11 | 0.66 | 0.01 |
| X431 | 0.91 | 0.83 | 0.01 | 0.21 | 0.41 |
| X432 | 0.34 | 0.46 | 0.37 | 0.65 | 1.00 |

From the detection data of the above five time points, at $T_3 - T_4$ time, the change trend of X121 increased significantly, and the deterioration phenomenon appeared. At the subsequent time points, the deterioration of X131 and X211 also gradually appeared, indicating that the operation state of the system was abnormal. Therefore, the users of the system at $T_4$ time should be vigilant, check the problem, and serious problems appear at $T_6$ time.

### 3.2 Simulation Results and Analysis of Single Fault Case

Under the above experimental conditions, the traditional evaluation method and the evaluation method designed in this paper are used to evaluate the simulation index data of six time points, and the evaluation vector is analyzed. Firstly, it is set in the case of single fault. The evaluation results of the two methods are shown in Table 5:

**Table 5.** Comparison of single fault assessment results

| Point of time | Evaluation vectors obtained by traditional methods | The evaluation vector obtained by this method |
|---|---|---|
| $T_1$ | (0.37,0.63,0,0) | (0.37,0.63,0,0) |
| $T_2$ | (0.16,0.84,0,0) | (0.17,0.80,0.03,0) |
| $T_3$ | (0.24,0.76,0,0) | (0.25,0.75,0,0) |
| $T_4$ | (0.18,0.71,0.1,0.01) | (0.24,0.69,0.06,0.01) |
| $T_5$ | (0.14,0.57,0.27,0.02) | (0.18,0.53,027,0.02) |
| $T_6$ | (0.25,0.26,0.46,0.0,3) | (0.23,0.50,024,0.03) |

The format of the evaluation vector is $(a_1, a_2, a_3, a_4)$ and $a_1 + a_2 + a_3 + a_4 = 1$. when $a_4$ is 0, the running state of the human resource management information system is normal. When $0 < a_4 \leq 0.02$, the running state of the human resource management information system is abnormal. When $a_4 > 0.02$, the running state of the human resource management information system is serious. From the evaluation results of the simulation experiment, although the traditional evaluation model and the evaluation model designed in this paper have some differences in the specific value of the vector, the result of the running state judgment is more in line with the actual situation, the evaluation result is "abnormal" at $T_4 - T_5$ time, and the evaluation result is serious quality problem at $T_6$ time. The experimental results show that the design is feasible in the case of a single fault The performance of the quality evaluation method of human resource management information system is very good compared with the traditional methods, which can accurately reflect the real running state of the system.

### 3.3 Simulation Results and Analysis of Double Fault Situation

Under the same experimental conditions, two failures occurred in the same time. In the case of double faults, the evaluation results of the two methods are shown in Table 6:

**Table 6.** Comparison of double fault assessment results

| Point of time | Evaluation vectors obtained by traditional methods | The evaluation vector obtained by this method |
|---|---|---|
| $T_1$ | (0.24,0.76,0,0) | (0.24,0.76,0,0) |
| $T_2$ | (0.17,0.80,0.3,0) | (0.17,0.79,0.04,0) |
| $T_3$ | (0.18,0.76,0.06,0) | (0.25,0.70,0.05,0) |
| $T_4$ | (0.31,0.61,0.08,0.00) | (0.24,0.69,0.06,0.01) |
| $T_5$ | (0.17,0.64,0.18,0.01) | (0.18,0.53,027,0.02) |
| $T_6$ | (0.20,0.31,0.46,0.03) | (0.23,0.47,0.24,0.03) |

From the evaluation results of simulation experiment, the traditional evaluation model is still evaluated as “qualified” at $T_4$ time, as “abnormal” at $T_5$ time, as “serious quality problem” at $T_6$ time; the evaluation model designed in this paper is evaluated as “abnormal” at $T_4 - T_5$ time, as “serious” at $T_6$ time, which is consistent with the results of data acquisition. Compared with the traditional evaluation method, there are some differences, but the final result is not much different, which shows that in the case of double failure, the performance of the designed method is better than the traditional method, and it can accurately reflect the real operation state of the system.

### 3.4 Simulation Results and Analysis of Multi-fault Situation

Under the same experimental conditions, the system is set to have multiple faults in the same time. In the case of multiple faults, the evaluation results of the two methods are shown in Table 7:

**Table 7.** Comparison of multi-fault assessment results

| Point of time | Evaluation vectors obtained by traditional methods | The evaluation vector obtained by this method |
|---|---|---|
| $T_1$ | (0.25,0.75,0,0) | (0.25,0.75,0,0) |
| $T_2$ | (0.24,0.76,0,0) | (0.25,0.75,0,0) |
| $T_3$ | (0.25,0.75,0,0) | (0.25,0.75,0,0) |
| $T_4$ | (0.25,0.75,0,0) | (0.24,0.69,0.05,0.02) |
| $T_5$ | (0.25,0.47,0.28,0) | (0.23,0.50,024,0.03) |
| $T_6$ | (0.25,0.26,0.02) | (0.23,0.50,024,0.03) |

From the evaluation results of simulation experiment, the traditional evaluation model is still evaluated as “qualified” at time $T_3 - T_4$, and it is only “abnormal” at time $T_5$. The evaluation model designed in this paper is evaluated as “abnormal” at time $T_3$, and serious at time $T_4$, which is consistent with the result of data collection. It shows that in the case of a single fault, the designed human resource management of detection is very important compared with the traditional methods, the information system quality evaluation method can accurately reflect the real running state of the system.

To sum up, the evaluation results of the two evaluation methods are consistent and relatively accurate in the case of single fault and double fault, but in the case of multiple faults, the shortcomings of the traditional evaluation methods are revealed, and the evaluation results are quite different from the actual situation, which shows that the quality evaluation method based on intelligent optimization is better than the traditional method, It has certain validity.

## 4 Conclusion

The quality of human resource management information system is related to the development technology of the system, the quality of the developers, the organization of the development, the control of the development process and the utilization rate of the development equipment. The above analysis is based on a single factor, but the various factors interact. It is very complex to accurately measure the cost, benefit and quality of the management information system, which should be considered comprehensively according to the characteristics of the enterprise itself. At the same time, the existing success and failure cases should be treated dialectically, and the cost-benefit prediction provided by IT department should be fully demonstrated. The most important thing is the accurate positioning and evaluation of the enterprise's own situation. Otherwise, the detailed cost-benefit analysis and its conclusion may lead to huge deviation after the operation of the system.

In addition, system evaluation itself has many inherent difficulties, namely, single evaluation is easy, comprehensive evaluation is difficult; quantitative evaluation is easy, qualitative evaluation is difficult; hard index (Science and technology, production, level) evaluation is easy, soft index (society, economy, organization) evaluation is difficult. Even if the evaluation index can be designed, the evaluation practice will be a difficult thing because of the inherent relationship between the index system and decision-making and the constraints of the environment. Therefore, further study on the theory of system evaluation, combined with the current situation of social and economic development to make the application of evaluation theory and method, still needs relevant scholars to continue to make efforts.

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