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Research Article

Optimization of Digital Management Path for Human Resource Performance Evaluation Based on Multiobjective Decision-Making Mathematical Model

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Talent is an indispensable and important factor for the development and growth of an enterprise. Therefore, human resources have become an important resource of enterprises, and performance appraisal in human resource management has also become one of the important contents of modern enterprise management. Without a set of scientific and standardized performance appraisal systems, it will make it difficult for the daily human resource performance management of enterprises to achieve the expected goals. This study analyzes the actual needs, business processes, and existing problems of an enterprise in performance management and uses the multiobjective decision-making mathematical model to obtain an optimization plan for human resources performance assessment. Finally, a digital management system for enterprise performance appraisal is designed. The main work of this study is as follows: (1) based on the work characteristics of a certain enterprise, the key indicators of enterprise performance evaluation are analyzed; (2) a multiobjective decision-making mathematical model is constructed for the optimization of human resources performance evaluation; (3) the Hungarian algorithm is used to solve the construction The mathematical model of multiobjective decision-making can obtain the optimal work arrangement. This study combines performance appraisal with practical work and uses the proposed multiobjective decision-making mathematical model to obtain the optimization results of human resources, guide practical work, and improve the efficiency of enterprise operation.

1. Introduction

At present, the competition for human resources is becoming more and more fierce, and the most important thing for enterprises to win in the competition for talents is to build a team with both ability and political integrity. In an enterprise, senior managers are responsible for decision-making, middle managers are responsible for implementation, and ordinary employees are responsible for implementation, which determines whether the strategic goals of the enterprise can be achieved. The key to personnel team building is to strengthen performance appraisal management. In order to implement corporate goals and ensure the realization of corporate business goals, many companies are promoting performance appraisal systems. Through regular performance evaluation, we can timely understand the ability and evaluation of each personnel to ensure the realization of enterprise management goals. At present, the main global performance management methods are key performance indicator (KPI) and balanced scorecard (BSC). The key performance indicator method is to decompose the strategic objectives of the organization to generate operational objectives and promote the realization of enterprise objectives through the completion of performance indicators. This method points out that the design of key performance indicators should be matched with corporate goals. BSC is to transform the goals of the enterprise into a comprehensive set of performance indicators, as a monitoring tool for the operation of the enterprise. Foreign research on performance appraisal is earlier and has been widely practiced in enterprises. However, due to the different management concepts in different regions, there are also differences in specific practices. Performance evaluation in

European and American countries focuses on the evaluation of individual behavior and qualifications. In recent years, the assessment of qualifications has also been widely used in the performance appraisal of organizations. Most scholars summarize performance management into eight aspects: the first is the proficiency in specific work.

References [1, 2] argue that performance is not a result, but it is a behavior. It includes goal-related behavior under the individual's control. Whether these behaviors are cognitive, driven, spiritual, or interpersonal is determined. Reference [3] expresses their view of performance behavior by distinguishing "behavior," performance," and "result." They see behavior as what people do when they work. Performance is behavior with measurable elements. These behaviors have a positive or negative effect on individual or organizational effectiveness. Outcomes are the states of people or things that change as a result of performance, thereby benefiting or hindering the achievement of organizational goals. Reference [4] states that behavior is a part of any definition of performance, just as results or outcomes that can theoretically be linked to behavior. Simply defining performance as either an action or an outcome is not comprehensive enough. Perspectives of performance as outcomes and processes each have their advantages and disadvantages. Compared with the performance appraisal of enterprises in western developed countries, the performance appraisal of enterprises in my country started relatively late, and it is still in its infancy. Although my country's enterprise performance appraisal system and methods have been continuously improved in recent years, with the deepening of economic and political system reforms, more and more problems have been exposed in my country's enterprise performance appraisal. The problems that are mainly reflected in are as follows: (1) the assessment system is difficult to implement. First, there is a gap with the actual requirements. The grass-roots assessment management system either copied the assessment system of the higher level or made simple modifications and did not refine and quantify it according to its own reality, which is easy to deviate from reality. Second, the assessment criteria were not refined and quantified, which affected the objectivity and fairness of the assessment. The third is that the responsibilities of different positions in the grass-roots units are different, the daily management and management work are difficult to quantify, and the assessment results cannot completely and truly reflect the performance of the unit and individual. (2) There are flaws in the performance appraisal process. First, it does not pay attention to the performance appraisal management in daily work. The second is the poor combination of performance appraisal management and inspection guidance. After the assessment, the underlying reasons behind the assessment results were not analyzed, and the grass-roots units were not promptly helped to improve measures and strengthen management. The third is that the performance appraisal method emphasizes the form rather than the actual effect. The assessment is mainly based on written materials. If the written materials are confirmed, then it is considered that the work has been carried out or carried out well. Conversely, if the written materials cannot be verified, then it will be deemed that the work has not been carried out or that the work has not been carried out well. (3) The incentive function of the assessment has not been brought into full play. First, the demonstration effect of the assessment is not obvious. Second, there is not enough attention to the further application of the assessment results.

To sum up, in order to truly reflect the scientificity and rationality of performance appraisal settings, it is necessary to put people first, optimize the appraisal system, and design a digital performance appraisal management system. The information platform is used to enhance the transparency of assessment, the entire assessment process is standardized, and supervision is strengthened. This study analyzes the actual needs, business processes, and problems of an enterprise's current performance management and uses the multiobjective decision-making mathematical model to obtain an optimization plan for human resource performance assessment. Finally, a digital management system for enterprise performance assessment is designed. The main work of this study is as follows: (1) based on the work characteristics of an enterprise, a performance appraisal system is designed to lay a solid foundation for the optimal management of human resources; (2) a multiobjective decision-making mathematical model is constructed for the optimal design of human resources performance appraisal; (3) performance appraisal is combined with actual work, using the proposed multiobjective decision-making mathematical model to get the results of human resource optimization, so as to guide practical work and improve enterprise operation efficiency.

2. Human Resource Performance Appraisal-Related Theories

2.1. Overall Structure of Performance Appraisal Digital Management Platform. The performance appraisal system is a part of the human resource management platform. Usually, the human resource management platform adopts a B/S structure. The client does not need to be installed, and the user layer, application service layer, and data service layer are reasonably distributed. Database servers and application servers are centrally deployed within the enterprise. At present, the human resource management system can not only achieve high performance, easy expansion, easy integration, high reliability, high security, etc., but also general enterprise organizational structure management, user management, user group management, role management, fine-grained authority control, workflow management, etc. The human resource management system has high performance and high reliability, so that the enterprise project team can focus on the realization of the business function of the project itself, thereby reducing development investment and resource consumption in software stability, ease of use, scalability, security, etc. The system architecture of the human resource management platform is shown in Figure 1.

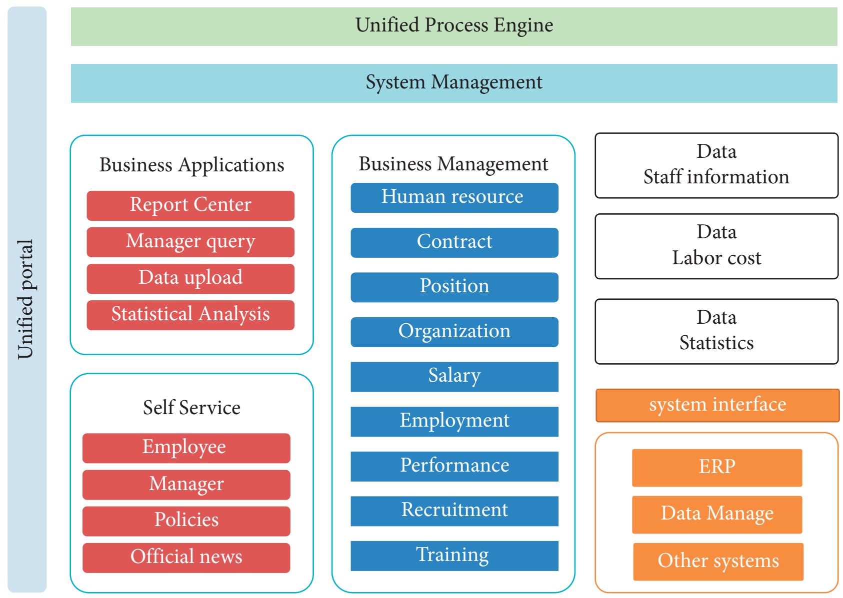

Figure 1: Architecture of the human resource management system.

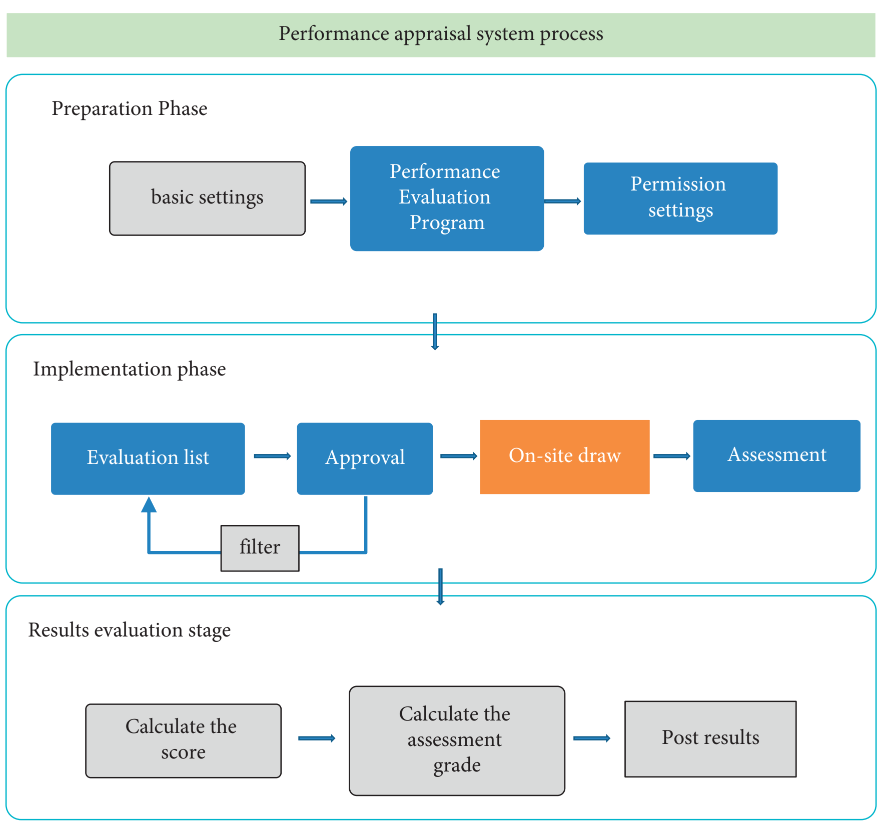

Figure 2: Performance appraisal process.

2.2. Performance Appraisal Process. The performance appraisal process is shown in Figure 2. The performance evaluation system has completed the monitoring and adjustment of performance evaluation information through three stages: preplanning, in-process control, and postevent management. Since the overall business process of managerial performance evaluation and employee performance evaluation is basically the same, differences in individual business scenarios, the management performance evaluation system process, and the employee performance evaluation system process are combined into an overall system functional process.

3. Construction and Solution of the Multiobjective Decision-Making Mathematical Model

3.1. Model Construction. Enterprise human resources performance appraisal is not simply based on the number of completed tasks to increase performance, but it belongs to the situation of multiobjective decision-making. The traditional task assignment research is to arrange N people to complete N tasks, and each task has one and only one person to complete. It is known that the efficiency of the jth job done by the ith person is P_{ij}, where $i, j = 1, 2, \ldots, N$, and finding the optimal assignment makes the overall work efficiency the highest. However, in actual work, it is often limited by many conditions, such as working time, work effect, and work risk. Therefore, the use of multiobjective decision-making can achieve an optimal assignment in the case of considering multiple factors. There are two situations in the multiobjective decision-making assignment problem, one is that the number of people is more than the number of tasks, and the other is that the number of tasks is more than the number of people. The construction methods and calculation principles of these two models are the same. Therefore, this article describes the selection of any one of them.

Suppose that J people are arranged to complete I work, where $J > I$, each person has one and only one work, but each work can be done by one or more people. There are K targets to be considered in the process of arranging. It is known that under the kth target, the target attribute value of the jth job when the ith person does it is $P^k{}_{ij}$, where $j = 1,2,\ldots, J$; $i = 1,2,\ldots, I$; $k = 1,2,\ldots,K$. A mathematical model is constructed so that each target can get the optimal assignment scheme:

$$\max F_k = \sum_{i=1}^{I}\sum_{j=1}^{J} p_{ij}^{k} h_{ij}, k = 1, 2, \ldots, K, \tag{1}$$

$$s.t \begin{cases} \sum_{j=1}^{J} h_{ij} = 1, \\ \sum_{j=1}^{J}\sum_{i=1}^{I} h_{ij} = J, \\ h_{ij} = 0, 1. \end{cases} \tag{2}$$

where $h_{ij} = 1$ means assigning the ith person to do the jth job; otherwise, $h_{ij} = 0$. For the target whose value is larger, the better, the maximum value of $\max F_k$ indicates that the higher the quality of work, the higher the efficiency. For the target whose value is smaller, the better, the minimum value of $\max F_k$ indicates that the shorter the working time, the higher the efficiency. Through the above example, we transform the actual problem into a mathematical method; that is, the number of people J is 4, the number of tasks I is 3, and the number of goals K is 2, which are the time goal and the work quality goal respectively.

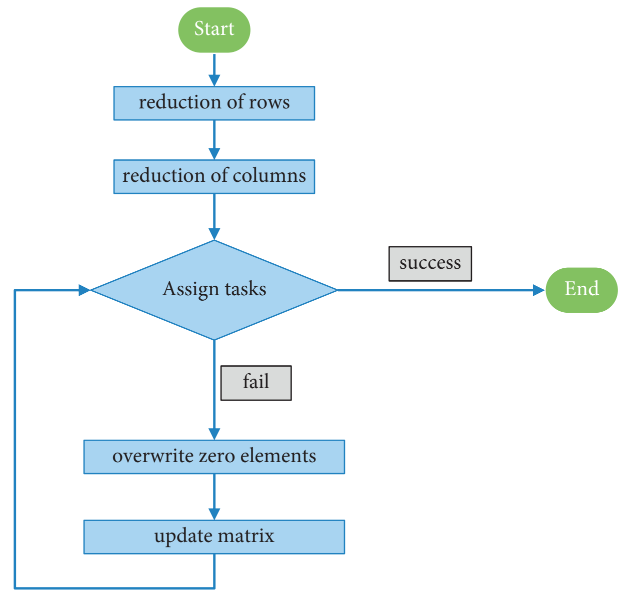

Figure 3: Flowchart of the Hungarian algorithm.

3.2. Hungarian Algorithm for Model Solution. The above problem is a typical assignment problem. There are two main methods to solve the assignment problem: one is the deterministic analytical algorithm Hungarian algorithm [5–7]. The other is the heuristic intelligent algorithm, such as genetic algorithm [8–10], simulated annealing algorithm [11–13], ant colony algorithm [14–16], and particle swarm algorithm [17–19]. The heuristic algorithm has the advantage of high speed for large-scale assignment problems, but it cannot guarantee the optimal solution, and the algorithm is relatively complex, so it is not widely used in engineering practice [20]. The Hungarian algorithm [21] has the characteristics of simple steps and can get the optimal solution without verification. The algorithm is widely used to solve small- and medium-scale assignment problems. The algorithm's theoretical foundation is that adding or deleting a constant from any row or column of the benefit matrix has no effect on the optimal allocation scheme. Figure 3 shows the algorithm's flow chart.

The following uses a simple example to illustrate the usage of the Hungarian algorithm. Suppose a company has four tasks of T1, T2, T3, and T4, which need to be assigned to four people P1, P2, P3, and P4 to complete. The remuneration they need to pay for completing the task is listed in Table 1. The problem that needs to be solved is how to allocate the task to minimize the total cost. The process of solving using the Hungarian algorithm is as follows:

The resulting payoff matrix is as follows:

$$\begin{bmatrix} 3 & 8 & 2 & 10 \\ 9 & 7 & 5 & 3 \\ 1 & 5 & 4 & 3 \\ 4 & 5 & 7 & 9 \end{bmatrix}. \tag{3}$$

Table 1: Details of the fees paid.

Personnel\tasks	T1	T2	T3	T4
P1	3	8	2	10
P2	9	7	5	3
P3	1	5	4	3
P4	4	5	7	9

Step 1. Row Reduction. Find the smallest element of each row, and subtract this smallest element from each row respectively. The transformed matrix is as follows:

$$\begin{bmatrix} 1 & 6 & 0 & 8 \\ 6 & 4 & 2 & 0 \\ 0 & 4 & 3 & 2 \\ 0 & 1 & 3 & 5 \end{bmatrix}. \tag{4}$$

Step2. Column Reduction. Find the smallest element of each column and subtract this smallest element from each column respectively:

$$\begin{bmatrix} 1 & 5 & 0 & 8 \\ 6 & 3 & 2 & 0 \\ 0 & 3 & 3 & 2 \\ 0 & 0 & 3 & 5 \end{bmatrix}. \tag{5}$$

After the above two-step transformation, each row and column of the matrix have at least one zero element. The third step is to assign tasks.

Step 3. Assigning Tasks. First, the independent zero elements need to be determined. i starts from the first row or column. If there is only one zero element in the row or column, then mark the zero element with 1, indicating that the task is assigned to the corresponding person. Each time when 1 is marked, the other zero elements in the same column of the zero element are marked as 2, indicating that this task can no longer be done by others. This is repeated until all zero elements in the coefficient matrix have been marked as 1 or 2. The resulting matrix is as follows:

$$\begin{bmatrix} 1 & 5 & 0(1) & 8 \\ 6 & 3 & 2 & 0(1) \\ 0(1) & 3 & 3 & 2 \\ 0(2) & 0(1) & 3 & 5 \end{bmatrix}. \tag{6}$$

Second, we assign tasks. The zero element marked 1 in the coefficient matrix is exactly equal to 4, which means that the optimal assignment scheme has been determined. At this time, the position of 0 (1) is recorded as 1, the other positions are recorded as 0, and then the optimal solution of the problem is obtained. The optimal solution is as follows:

$$\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}. \tag{7}$$

As can be seen from the above matrix, task T1 is handed over to P4, task T2 is handed over to P3, task T3 is handed over to P1, and task T4 is handed over to P2. The total reward currently is as follows: $1 + 5 + 2 + 3 = 11$.

3.3. Model Solution. The Hungarian method is used in this research to tackle the above problem. The steps for solving the problem are as follows:

(1) *Complete the Benefit Matrix*. Suppose ${P_{ij}}^k$ is the jth job under the kth objective, which is determined by the ith person attribute value when an individual comes to do it, where $i \in [1, I]$, $j \in [1, J]$, and $k \in [1, K]$. The attribute value matrix $P_k = ({P_{ij}}^k)_{\mathrm{IxJ}}$ under the condition of target k is composed of multiple attribute values. Then, according to the matrix P_k, the optimal fuzzy relation matrix is obtained as $U_k = ({u_{ij}}^k)_{\mathrm{IxJ}}$. Equation (2) represents the larger the value, the better the target, and equation (3) represents the smaller the value, the better the target:

$$u_{ij} = \frac{p_{ij}^k - p_{k\min}}{p_{k\max} - p_{k\min}}, \tag{8}$$

$$u_{ij}^k = \frac{p_{k\max} - p_{ij}^k}{p_{k\max} - p_{k\min}}, \tag{9}$$

(i) where p_{kmax} represents the maximum value of the matrix P_k, and p_{kmin} represents the minimum value of the matrix P_k. According to the above formula, the attribute value matrix P_k is transformed into the fuzzy relation matrix $U_k = (u_{ij})_{\mathrm{IxJ}}$. Then, the weight vector is determined mainly based on the target weight vector given by experts.

(ii) In actual work, the leader will comprehensively consider the importance of the task and make a trade-off between the quality of the task and the time required. For example, this task is relatively complex and important. Obviously, the quality of the task will play an important role, and the time required for the task will be longer. Then in combination with this model, when assigning weight vectors, the quality of the task completion must be larger than the time required for the task. If the task is simple and unimportant, then obviously the opposite is done when assigning weights. First, the target weight vector $W = (w_1, w_2, \ldots, w_K)$ is given by the group leader, and then

$$u_{ij} = \sum_{k=1}^{K} w_k u_{ij}^k, \tag{10}$$

(i) where u_{ij} represents the relative membership degree synthesized by each attribute value after considering K targets comprehensively. In this way, (IxJ) u_{ij} is combined into a multiobjective fuzzy relation synthesis matrix as follows:

$$U = \begin{bmatrix} u_{11} & u_{12} & \cdots & u_{1n} \\ u_{21} & u_{22} & \cdots & u_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ u_{m1} & u_{m2} & \cdots & u_{mn} \end{bmatrix} = \left(u_{ij}\right)_{I\times J}. \quad (11)$$

(i) u_{ij} represents the fuzzy comprehensive work efficiency of the ith person doing the jth job. A larger value indicates higher efficiency, so it assigns the problem's fuzzy benefit matrix to multiobjective decision-making.

(ii) The method of determining the fuzzy benefit matrix of workers is as follows: first, the attribute value of the ith person doing the jth job is determined under the target k. These attribute values need to be based on the evaluation of the professional ability and work quality of the staff in the process of work in the past, and then the comprehensive quality evaluation of the staff is converted into a hundred-point system for work assessment. The full score is 100 points. Second, according to equations (2) and (3), the fuzzy relative membership degree of the staff to complete the task under a certain goal can be calculated. Finally, the target weight vector $W = (w_1, w_2)$ is given according to the leader's requirements for the task, and the multitarget fuzzy relation matrix is obtained by equation (4).

(2) The Kuhn–Munkres algorithm solves multiobjective assignment decisions. When the number of jobs is less than the number of people, that is, $J > I$, it means that each job can be done by multiple people, and it also shows that the relationship between the number of tasks and the number of people is a one-to-many relationship. Assuming that each job is first assigned to one person, then among the remaining *J-I* individuals, each person can also participate in any one of the I jobs; that is, each job may be performed by at most *J-I* individuals. Therefore, it may be assumed that there are other *J-I* virtual jobs that are completely equivalent to each job, and the comprehensive benefit value of each person doing these equivalent jobs is the same. Therefore, there are *I*(*J-I*) jobs. There are more jobs than people. This ensures that each person is assigned one and only one job, and that at most one person does each job. Suppose there are still *I(J-I+1)-J*= (*J-I*) (*I*-1) employees whose overall efficiency is 0 when they do any work. Therefore, the number of people currently is equal to the number of jobs. This further ensures that each job is done by one and only one person, satisfying the requirements of traditional assignment problems. Therefore, the multiobjective assignment decision extension benefit matrix can be constructed as follows:

$$E = \left(\beta_{ij}\right)_{(I(J-I+1))\times(I(J-I+1))} = \begin{bmatrix} U & U & \cdots & U \\ 0 & 0 & \cdots & 0 \end{bmatrix}. \quad (12)$$

Row 1 in the above matrix has (*J-I*+1) U. The 0 in row 2 represents a zero matrix of *I*(*J-I*+1) row and I column. The optimal solution to the traditional assignment problem corresponding to the extended benefit matrix E by the Hungarian algorithm is $N = (n_{ij})_{K\times K}$, where $K = I\times(J-I+1)$. The solution of the multiobjective assignment problem can be determined according to the elements equal to 1 in the first J rows of $N=(n_{ij})_{K\times K}$.

4. Design of the Digital Management System for Human Resource Performance Appraisal Based on Multiobjective Decision-Making Mathematical Model

4.1. Application of the Multiobjective Decision-Making Mathematical Model in Performance Appraisal. In order to optimize the enterprise human resources performance appraisal, this section uses the multiobjective decision-making model mentioned above for the actual task assignment scenario of an enterprise. Suppose a company has four workers involved in three tasks. The number of personnel J is 4, and the number of tasks I is 3. The completion of the task has two goals, namely, $K = 2$. The two goals are high-quality task completion and short task time. Then, the attribute matrix of the person is determined. It is assumed that under the kth goal, the full score of each secondary indicator is 100 points. A score between 100 and 90 is considered excellent. A score between 90 and 80 is considered good. A score between 80 and 70 is a pass, a score between 70 and 60 is a basic pass, and a score below 60 is a failure (Table 2).

The original data are determined through the above process. For the convenience of calculation, the staff attribute value is obtained by rounding the staff performance appraisal result. The attribute value matrix is as follows:

$$P_1 = \begin{bmatrix} 80 & 75 & 90 \\ 80 & 85 & 90 \\ 90 & 85 & 75 \\ 75 & 85 & 95 \end{bmatrix}, \quad P_2 = \begin{bmatrix} 70 & 90 & 80 \\ 60 & 70 & 80 \\ 75 & 85 & 90 \\ 90 & 80 & 70 \end{bmatrix}. \quad (13)$$

Here, P_1 is the quality matrix for completing the task and P_2 is the time matrix required for the task. For the quality matrix P1, the larger the target value, the better the quality matrix P1 will be. Equation (2) is used to calculate its fuzzy relation matrix. For the time matrix P2, the smaller the target value, the better the time matrix P2 will be. The calculated results are as follows:

Table 2: Quantitative table for employee performance appraisal.

First-level indicator	Weight	Second-level indicator	Weight
Morality	0.15	Moral quality	0.2
		Political literacy	0.2
		Professional ethics	0.3
		Solidarity	0.3
Ability	0.35	Total knowledge	0.2
		Operational capacity	0.4
		Learning ability	0.3
		Coordination	0.1
Diligent	0.2	Attendance	0.3
		Work attitude	0.7
Achievement	0.3	Job completion	0.3
		Work quality	0.2
		Results of the work	0.2
		Work efficiency	0.3

$$U_1 = \begin{bmatrix} 0.25 & 0.00 & 0.75 \\ 0.25 & 0.50 & 0.75 \\ 0.75 & 0.50 & 0.00 \\ 0.00 & 0.50 & 1.00 \end{bmatrix},\quad U_2 = \begin{bmatrix} 0.29 & 0.86 & 0.57 \\ 0.00 & 0.29 & 0.57 \\ 0.43 & 0.71 & 1.00 \\ 0.86 & 0.57 & 0.29 \end{bmatrix}. \tag{14}$$

In this study, we take the quality of task completion as the main goal and the time required for the task as the secondary goal. If the superior leader gives the weight $W = (0.7, 0.3)$, then the result of the multiobjective fuzzy relationship synthesis matrix calculation is as follows:

$$U = \begin{bmatrix} 0.26 & 0.17 & 0.71 \\ 0.20 & 0.46 & 0.71 \\ 0.69 & 0.54 & 0.20 \\ 0.17 & 0.51 & 0.86 \end{bmatrix}. \tag{15}$$

The extended work benefit matrix for multiobjective assignment decision-making is constructed according to the multiobjective fuzzy relation synthesis matrix as follows:

$$S = \begin{bmatrix} 0.26 & 0.17 & 0.71 & 0.26 & 0.17 & 0.71 \\ 0.20 & 0.46 & 0.71 & 0.20 & 0.46 & 0.71 \\ 0.69 & 0.54 & 0.20 & 0.69 & 0.54 & 0.20 \\ 0.17 & 0.51 & 0.86 & 0.17 & 0.51 & 0.86 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix},\quad S' = \begin{bmatrix} 0.60 & 0.69 & 0.14 & 0.60 & 0.69 & 0.14 \\ 0.66 & 0.40 & 0.14 & 0.66 & 0.40 & 0.14 \\ 0.17 & 0.31 & 0.66 & 0.17 & 0.31 & 0.66 \\ 0.69 & 0.34 & 0 & 0.69 & 0.34 & 0 \\ 0.86 & 0.86 & 0.86 & 0.86 & 0.86 & 0.86 \\ 0.86 & 0.86 & 0.86 & 0.86 & 0.86 & 0.86 \end{bmatrix}. \tag{16}$$

The result obtained according to the Hungarian algorithm is as follows:

$$N = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \end{bmatrix}. \tag{17}$$

From the above matrix N, the first person and the fourth person do the third job, the second person does the second job, and the third person does the first job. In accordance with such a division of labor, work efficiency can be maximized while ensuring the completion of work objectives.

4.2. Performance Appraisal System Functional Architecture. The performance appraisal designed in this study can be integrated into the large system of human resource management. The performance appraisal mainly interacts through the portal website, to realize the centralized management of application data, and the data level mainly realizes the analysis and processing of data through data sharing and process control. Setting modules such as module management, interface setting, and other tools preserve various parameters of the system. After the user logs in, according to the identity authentication, it is determined whether the user has the authority of this module through the authority of the platform. If we have permission, then the configuration information of the module from the database can be read, and the corresponding module on the interface can be displayed. The functional architecture of the performance appraisal system is listed in Figure 4.

The performance appraisal management system mainly includes the following modules: (1) basic settings module includes evaluation period, evaluation dimension, and evaluation template. (2) KPI assessment module mainly includes the KPI assessment approval relationship and KPI assessment process function. (3) Evaluation relationship module includes evaluation object grouping, evaluation subject grouping, and evaluation relationship maintenance

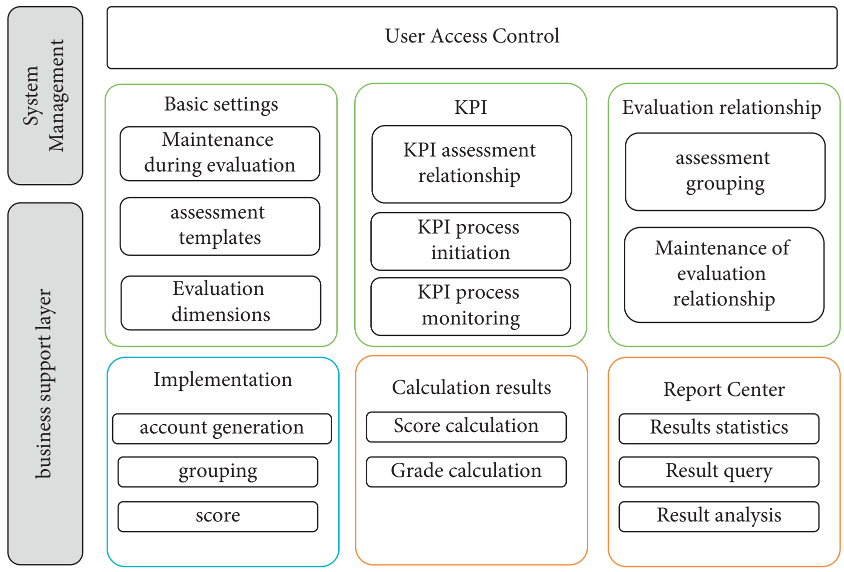

Figure 4: Functional architecture diagram of the performance appraisal system.

functions. Corresponding evaluation subjects and evaluation weights can be set according to different evaluation dimensions, different evaluation forms, different evaluation units, and different evaluation objects. (4) Evaluation implementation module mainly includes anonymous account generation, grouping, and scoring functions. After the performance administrator configures the evaluation group and the evaluation relationship, the evaluation relationship can be activated to enter the scoring state. At this time, the system will automatically generate anonymous accounts in groups. (5) Result calculation module can calculate the data collected by the performance evaluation form to obtain data, such as the number of test scores and the ranking within the group, and calculate the evaluation status of the evaluation objects by different evaluation subject groups according to the evaluation method. (6) Report center module mainly includes the functions of evaluation result statistics, query, and analysis. It supports the analysis and statistics of the evaluation results from different angles and provides reporting functions such as the traceability of the original evaluation results, the evaluation result table of each subject, and the comprehensive analysis of the evaluation results.

5. Conclusion

It is of great significance to apply the quantitative results of performance appraisal to actual work. Using scientific mathematical models, the division of labor can be further rationally optimized and the overall work efficiency can be improved. Increased productivity is a win-win situation for businesses as well as employees. Under normal circumstances, the number of tasks of a company is generally far greater than the number of employees, and the increase in the number of employees generally cannot keep up with the increase in the number of tasks. In view of this situation, it is very important for business leaders to arrange reasonable arrangements for employees and tasks. This study uses a multiobjective decision-making mathematical model to optimize performance appraisal in human resource management. This optimization method is applied to the performance appraisal digital management system. The evaluation of the employees' work in this study is entirely based on the reform of the performance appraisal system and the quantification of the appraisal results. However, there is still a lot of room for improvement in the development of human resource management. The reform of the performance appraisal system has not been taken seriously, and qualitative appraisal is still used as the evaluation result of personnel. This also makes it difficult to achieve the goal of scientific management using information tools or intelligent models.

Data Availability

The labeled datasets used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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