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Discussion on the Construction and Application of Performance Appraisal in Human Resource Management under the Background of Big Data

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Abstract: *With the arrival of the big data wave, data has become an important information asset. With information about data, we have the opportunity to gain insight into market conditions and strengthen management. Using big data technology to count, analyze and extract massive information can make information resources play an important role in the accuracy of enterprise strategy and decision-making. In this context, the application of big data technology to the evaluation of enterprise human resource management performance is an important problem faced by enterprises today. Therefore, based on the big data background, it is very important to build the performance appraisal of human resource management. Based on big data technology, this paper designs a performance appraisal framework of human resource management. Firstly, it discusses the traditional methods of human resource management and performance appraisal. On the basis of the original theory, it creatively uses the data mining technology in big data technology to construct the framework of performance appraisal, and then designs the specific content of performance appraisal. Finally, through analysis and discussion, the following suggestions for the application optimization of performance appraisal are obtained. According to the ability and quality indicators of enterprise employees, appropriate posts are allocated to promote the best match between posts and people, so as to achieve the strategic objectives of the enterprise and improve the level and efficiency of the organization.*

Keywords: *Big Data, Human Resource Management, Performance Appraisal, Resource Application*

1. Introduction

Data mining is a frontier research topic of current information and database technology, and it is considered to be one of the most promising key technologies. Data mining includes a variety of technologies such as mathematical statistics, fuzzy theory, neural networks, and artificial energy. It has a relatively high technical content and is difficult to implement [1]. As an important part of advanced business models, human resource management has attracted more and more attention in various fields.

There are some results in the performance evaluation research of big data technology in human resource management. For example, some researchers have proposed an improved K-Means clustering algorithm, based on the improved K-Means algorithm, established a cluster analysis model of the human resource management system, and conducted experiments with company data [2-3]. Facing the basic principles of a priori algorithm based on data mining association rules, some researchers introduced the composition of the main functional modules of the personal data mining system in colleges and universities, focusing on the design and implementation of a priori algorithm. The research results of these researchers laid a solid foundation for future generations to apply big data technology to human resource management.

Creating the efficiency of human resource management in the context of big data is a complex systematic project, which not only requires companies to establish a scientific and reasonable evaluation system, but also requires continuous innovation and improvement. This article discusses and analyzes on the basis of big data, reveals the problems existing in modern human resource management under the background of big data and proposes solutions.

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2. Theoretical Research

2.1 Traditional Human Resource Management Methods

(1) Statistical methods

Statistical methods refer to the comparative analysis of data by calculating statistical indicators such as probability, total, mean, and variance. This technique is useful for many aspects of human resource management, especially quantitative data processing. A typical use of statistical techniques is the part of salary management [4-5].

(2) Econometric methods

The econometric method is based on economic theory. The econometric method can be a unary regression model Y = a + bx based on the output X (or income) and the number of employees Y in a certain period of time. If the company needs to increase in production, the model can be used to predict labor demand [6-7].

(3) Investigation method

Investigation is a method for managers to systematically and scientifically study phenomena related to human resource management activities through certain procedures in accordance with certain management goals, and to provide comprehensive information for understanding the laws of activities. Questionnaire survey is a method commonly used by human resource managers and is widely used in job analysis. Its advantages are fast speed, large sample size, wide content coverage, etc. [8-9].

The above three methods have been used in practice and achieved good results, and they are currently the main methods used by HR managers. However, the problems in the field of human resource management urgently need to be solved by human resource managers. If the manager's cognition is complete and objective, the results of the assessment can truly reflect the real situation; if the manager recognizes a certain aspect, the results of the assessment will inevitably be different. In short, it is very important to reduce subjective factors in personnel management, otherwise the credibility of personnel management will slightly decrease [10-11].

2.2 Commonly Used Methods of Performance Appraisal

(1) Basic work completion analysis method. This method starts from the most basic job responsibilities of engineering project team members and evaluates employees mainly from two perspectives. The first is the job requirements: it is the professional skills, physical strength, intellectual requirements, work discipline compliance and work effect evaluation required in a specific job position, and the completion of the project evaluation. The second is the job description, the conditions, environment, and development trend for completing a certain job. And contact with other positions and industries. The first point that the basic work completion method is emphasized is that the ability of a member in a specific position is the most important part of the assessment [12].

(2) Special case analysis method. This method is different from the first method, emphasizing that through individual cases, long-term investigation and summary, to summarize methods to find the law.

(3) Questionnaire survey method. This method first needs to design a set of relatively complete and reasonable questionnaires, and the survey objects should be as wide as possible. There are both internal team members and external experts. And as much as possible to ensure the efficiency of the questionnaire recovery and the authenticity of the answers to the questionnaire. Finally, return the questionnaire, summarize the results, and get the final appropriate evaluation system.

(4) Thematic interview method, the formulation and design of assessment indicators, the main person in charge of each department of the project, experienced team members, and the staff of the human resources department will obtain various indicators and information in the assessment process in the way of conversation Research methods. The individual method can be used. This method has a relatively relaxed atmosphere and can obtain information quickly, but the conversation object is relatively single and cannot fully reflect the assessment objectives. What distinguishes it from individual conversations is group discussions, which can also be called brainstorming, which brings everyone together so that they can brainstorm.

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2.3 Principles of Performance Appraisal Construction

2.3.1 Principle of Comprehensiveness

The whole project will have a big goal at the beginning. Around this goal, it will be broken down into various departments of the project and become several small goals. Due to the differences in the nature of work and time between departments, there may be conflicts in objectives. How to formulate the objectives and responsibilities of departments and teams, balance all parties, so that although the objectives of each department are different, they can still work towards the common goal, which is very important for the construction of performance appraisal model.

2.3.2 The Principle of Practicality

The construction of the assessment model should be based on reality and cannot be formulated based on the preferences of managers or other participants. Rather, it is necessary to fully investigate and research before formulating. Go to the construction site to observe, talk to the front-line team members, understand everyone's views on the assessment, and give full play to their enthusiasm. Consult with experienced human resource workers and related experts, everyone gathers together, discusses in a brainstorming way, everything starts from reality, and builds a practical and operational evaluation model.

2.3.3 Multi-level Principle

Within a team, there are different work areas and types of work. If the same evaluation model is adopted, it will lead to a “one size fits all” phenomenon, and it will also undermine the enthusiasm of members for work. The assessment method must be different according to the different positions, and the different members are assessed at different levels under the premise of the same big goal.

2.3.4 Principle of Flexibility

Engineering projects generally have a long experience and are greatly affected by external policies and economic environment. When constructing the evaluation model, we should leave space for timely adjustment.

2.4 Application of Big data Technology in Human Resource Management

2.4.1 Introduction to Data Mining

Data mining, also known as database knowledge discovery, refers to the process of extracting useful information from a database or warehouse. It solves the problem of large amount of data and lack of useful information in the development of information technology, and completes the transformation of enterprises from business data to decision-making information. The flow chart of knowledge discovery is shown in Figure 1:

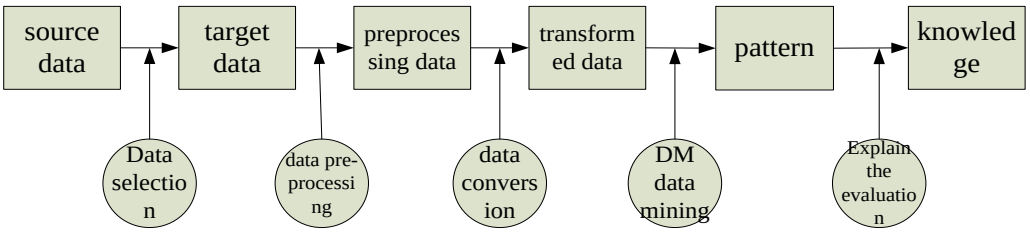

Figure 1: Flow charts for knowledge discovery

2.4.2 Classical Algorithms of Data Mining

K-Means algorithm is also called K-Means algorithm. Since the cluster analysis in this article uses the K-Means algorithm, here is an important introduction to the principle of the K-Means algorithm:

The K-Means algorithm uses k as a parameter to divide N objects into k clusters, so that the similarity between clusters is high, and the similarity between clusters is small. The similarity is calculated based on the average score of the objects in the cluster (with k as the center of the cluster). The processing sequence of the K-Means algorithm is as follows: first randomly select k objects, and each object initially represents the mean or median value of a group. According to the distance between each remaining object and each cluster center, place it in the next cluster. Then recalculate the average

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of each group. Repeat this process until the criterion function converges. The quadratic error criterion is usually used, which is defined as follows:

$$N = \sum_{i=2}^{K} \left| p - j_i \right|^3 \tag{1}$$

Among them, N is the sum of the mean square deviations of all objects and the corresponding cluster centers, p is a point in the object space, and j_i is the mean value of the cluster C_i.

When calculating the distance function in this iteration, you can make this element closer to the cluster with the most allocation times based on the previous times. Assuming there are k clusters, for each element Q, in the m-th iteration process, the formula for calculating the distance to the j-th cluster center is as follows:

$$\mathrm{d} = \left(1 - \sum_{\text{m-1}} t \right) \times d_i^k \tag{2}$$

Among them, t represents the i-th element. Represents the center of gravity of the j-th cluster, the number of times assigned to the m-th cluster in the iterative process, and d represents the traditional Euclidean distance, where divided by k is the achieved data. We need to determine whether the weight is too large. If the size of the weight is uncertain, it is best to choose a smaller weight, so here we choose to divide by k to reduce the weight.

3. System Construction

3.1 Construction of Performance Appraisal Framework

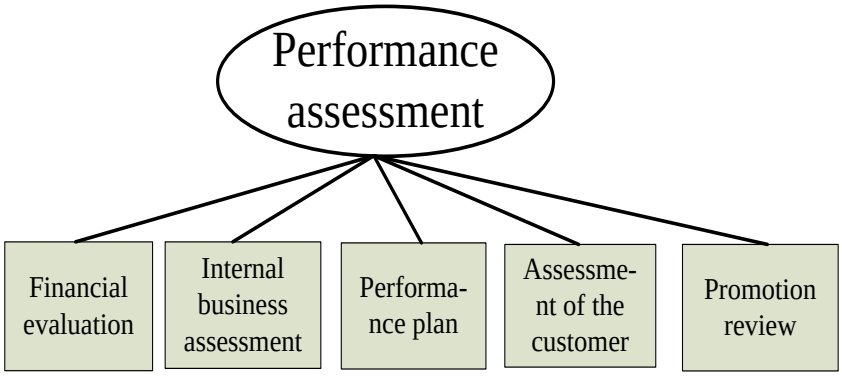

Figure 2: Performance appraisal framework

From Figure 2, it can be seen that the performance appraisal framework is mainly divided into five parts, namely: financial work appraisal, internal business appraisal, customer maintenance appraisal, promotion performance appraisal, and managerial performance appraisal.

3.2 Performance Appraisal Content

(1) Higher-level assessment. The company's top-level assessment is composed of two parts: the company's management's performance appraisal of middle managers and the middle manager's performance appraisal of managing directors. The evaluation content and scoring method are shown in Table 1. The advantage is that managers have the opportunity to better communicate with their subordinates, and the company and middle-level managers can understand the needs and ideas of their subordinates and discover the potential of their subordinates. The downside is that the higher-level ratings are often reduced to preaching, leading to one-way communication, or the higher-levels cannot guarantee the fairness of the ratings, which dampens the enthusiasm of the lower-levels.

(2) Evaluation at the same level. The same level is the person who gets along with the candidate day and night, and the colleagues observe, understand and are most familiar with the candidate's skills, methods and results. The advantage is that colleagues cooperate with each other at work, understand

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each other comprehensively and honestly, and fair competition between colleagues can improve overall performance. However, when it is linked to rewards, the drawbacks are prominent, and the evaluation results are often out of touch with the actual situation.

Table 1: Performance assessment content

Value	Develop employees	Pay attention to customers	Implement the ability of implementation	Emphasize conduct	Teamwork	Pay attention to innovation
1-2	Unable to effectively guide the new employees	Can not understand the customer's needs in time	Cannot execute the company strategy very well	People are sometimes criticized by others	Instead of teamwork, but Accustomed to fighting alone	Conformist work, rarely innovative
3-4	Can basically provide effective guidance to new employees	Basically can meet the requirements of the customers	Basically, you can implement the company's strategy	Be able to get along happily with most people	You can generally use the power of the team Quantity to complete the work	You can make good suggestions after being familiar with your work
5-6	Good able to guide new employees	Proactively understand the further customer needs	Able to be flexible and creatively execute company strategies	Staff and customers rate it very well	Always creatively give play to the power of the team Quantity completes the company's tasks	Can quickly discover the original problems, and put forward creative methods

(3) Lower rating. Subordinates' evaluations of superiors play an important role in maintaining the company's democratic style and improving the cohesion of the company's employees. On the downside, concerns about management attitudes and reactions often make employees afraid to express their opinions realistically.

(4) Self assessment. Now most enterprises must submit a work summary at the end of the year to reflect and evaluate their work performance and reflect on their performance. The advantage is that the self-assessment method is the simplest and will not pose a threat or pressure to the assessed person. The disadvantage is that employees overestimate their performance, which is far from the evaluation of their superiors or colleagues.

(5) Customer evaluation. Customer ratings are not universal in companies. This is usually a simple questionnaire for the sales and service departments, in the form of a customer satisfaction questionnaire. It does not comprehensively analyze customer feedback on certain aspects of the company and employees, nor does it integrate customer reviews into specific performance evaluations, although this aspect is difficult to use because customers are often the only ones that can be observed.

4. Discussion

4.1 Evaluation of Enterprise Employees on Performance Appraisal System

Table 2: Employee attitude towards performance appraisal

Employee age class	Excellent	Good	Common	Bad
20-30	21%	30%	50%	7%
30-40	30%	24%	14%	2%
Above 40	23%	41%	23%	8%

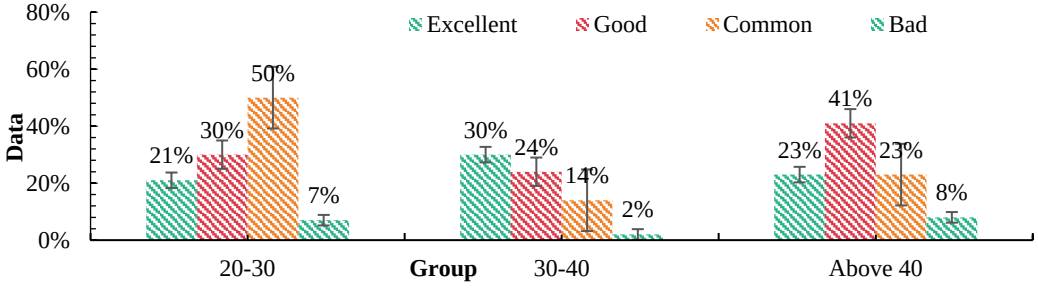

Figure 3: Employee evaluation of the enterprise performance appraisal system

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It can be seen from table 2 and figure 3 that employees aged 20-30 hold a good view of the optimized performance appraisal system. Only a small number of employees believe that the improved performance appraisal system is still unreasonable.

The unreasonable points obtained from the above data are caused by the following reasons:

(1) The management concept is backward. The traditional human management concept only changed the Human Resources Department to the Human Resources Department, but the management system has not fundamentally changed. The staff in the human resources department still do the traditional low-tech, detailed work, and the leadership has not considered the human resource management and the strategic decision-making of the enterprise. In addition, leaders have not paid much attention to the value of talents. Even if there are some highly educated talents, they are not used for learning, resulting in a waste of human resources. Did not realize the urgency of human resource management and development, and did not pay attention to the introduction of talents.

(2) The management system is not standardized. Income distribution is still suspected of "big pot". The wages of people with different contributions at the same level are not separated. Some scientific and technological talents and managers who have made great contributions to the enterprise take the same money as ordinary cadres, so it is not easy to give full play to the enthusiasm and creativity of employees.

4.2 Recommendations for Performance Appraisal Optimization Based on Big Data Technology

Ability and quality indicators are high-end methods of enterprise human resource management and an important extension of human resource management. Take the starting point and organizational structure of the position as the background. Another important direction is to start with the people required by the position. The direction of vertical mining expansion and skill improvement is the main goal of encouraging the best match between positions and people. The importance of competency indicators is to measure the degree of fit between "people and positions", and to provide a basis for analyzing company positions, recruitment, assessment, training, and motivating employees.

Ability indicators are indicators to evaluate whether employees have the abilities and qualities required for the job, which are divided into professional skills and general skills. Professional competence refers to the professional competence, knowledge and professional qualities required for the position, such as the staff's programming skills and certificates, relevant academic qualifications and professions, and the length of service of the relevant position. Comprehensive ability refers to the basic ability required by employees for outstanding performance.

5. Conclusion

In the context of big data, human resource management performance construction is very important. This article mainly elaborates on the existing problems in employees' jobs, positions and salaries. Then put forward effective measures to solve this problem in response to these problems, in order to achieve corporate strategic goals and improve organizational efficiency and benefits for the purpose of management work; in addition, it is necessary to establish a scientific and reasonable performance appraisal system and strengthen its supervision. I hope to help provide reference opinions and suggestions for performance construction in human resource management in the era of big data in our country, so as to better promote the development of employee enthusiasm and creativity.

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