

# Using data technology to optimize human resource management in colleges and universities

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**Abstract.** The rapid development of knowledge economy provides a new opportunity for the development of human resource management in colleges and universities. Many emerging technologies have been widely used in the field of human resource management in colleges and universities, but there are still some development problems. Using the accumulated data in the information management system of colleges and universities, using the information technology such as data mining to analyze the human resource management situation in an intelligent and automatic way, and extracting valuable information from a large number of complex data provides decision-making information and support for the human resource management in colleges and universities.

## 1. Introduction

Since the 18th national congress of the communist party of China (CPC), the comprehensive reform in the field of education has been pushed forward in an all-round and in-depth way, and has entered a critical stage from the initial stage. Historic achievements and revolution have also taken place in China's educational business. But, we should be clearly aware that on the new journey of education, there are still many problems to face up to and study, many challenges and difficulties to tackle and achievements to consolidate. To cultivate first-class talents and improve their abilities in an all-round way is the main theme of colleges and universities, as well as the core essence of their response to the times and historical missions. Taking improving quality as the most important and urgent task of educational development, and high-quality development as the fundamental requirement, colleges and universities should comprehensively deepen education reform, systematically improve education mode, school running pattern, management system and safeguard mechanism, and strive to form a dynamic, efficient, and more open education mechanism, which is conducive to the development of high quality education. Full-time teachers are the strong support for the talent cultivation in colleges and universities, and realizing scientific human resource management is the main direction of improving education quality.

## 2. The Current Situation Of University Human Resource Management

The quality of human resource management in colleges and universities directly affects the talent development strategy. First of all, there are relatively insufficient full-time teachers in university at this stage. With the continuous expansion of colleges and universities, the number of students increases accordingly. The training period of teachers is too long to keep up with the expansion speed, resulting in the relative shortage of teachers. Second, the state has gradually introduced incentive policy to stimulate the teaching staff construction in colleges and universities, and comprehensively deepen the reform of teachers development in the new era, improving the faculty structure and enhancing the staff quality, but there are some problems, such as: unreasonable faculty structure, relative shortage of the talent with high academic qualifications and professional titles, imbalanced personnel distribution, and the imperfection of the talent team. Third, the unreasonable human resources allocation makes teachers fail to play to their strengths and have to engage in the work they

are not good at, which hinders their enthusiasm and the improvement of work efficiency. The insufficiency of human resource management and the unscientific and non-standard human resource management method is the bottleneck of talent team construction in colleges and universities. Along with the rapid development of information technology, colleges and universities have set up various types of business system and management system, effectively improving the management quality and efficiency, providing reliable data. However, a large number of complex data retrieval and statistic mechanisms in universities are far from meeting the needs of reality, so it is urgent to turn the processed data into useful information and knowledge intelligently and efficiently. Data processing technologies, such as data mining, dig out hidden knowledge and rules that users may be interested in from a large amount of data, which may be of potential value to personnel decision-making, and provide information support for the scientific development of colleges and universities.

### **3. The Application Process Of Data Processing Technology**

In the information age, data resources are valuable strategic resources. Big data has diversified value, known as "new oil of the future ". At present, various universities' human resource management information system store and record a lot of personnel information, such as basic information, work attendance, title, position change, and talent flow. Exploring information and rules hidden behind the data, multi-dimensional and multi-level analysis of the data of human resource management in colleges and universities, and finding the value and connection between the data are the essential and important fuel for colleges and universities to carry out various work. Strengthening analysis and application of talents big data can promote human resource management with high accuracy and improve the contribution rate of human resource management to quality improvement.

#### **3.1 Scientific data acquisition and storage is an important basis for the application of human resource data**

University personnel information data is the solid foundation of human resource management using data technology. The comprehensive management system of personnel information in colleges and universities collects and stores the basic information of personnel and the data of employment experience and other aspects. All kinds of information systems are used to collect comprehensive information data of various aspects and stages of personnel's "recruiting, employing, promoting, training and resigning", including basic information, such as, training, working experience, moral and talent performance, check and evaluation, rewards and punishments, performance in carrying out major tasks, family and social relations and other elements. Based on these data, continuous technological change and data analysis research are carried out to form a systematic data ecology, providing front-end guarantee for the management and application of human resource.

#### **3.2 Efficient data analysis and mining is the core module of human resource management in colleges and universities**

University human resource management carries out dynamic, in-depth and near-real-time analysis, obtaining the value of knowledge mining from massive big data. Data analysis and mining ability is the core ability to use big data technology in human resource management. All the university human resource management businesses are based on data models, conducting accurate data analysis on data sources such as personnel behavior, personnel identity characteristic and professional ability, and drawing "data images" of personnel growth. In terms of unstructured data processing, many java-based tools structure unstructured data and process it through corresponding data models. For example, relevant data of different databases that reflect teachers' professional ability are assigned, and different kinds of information are reordered to realize accurate judgment of the staff. Through efficient data analysis and mining, we can accurately grasp the historical status of human resources, reveal their changing rules and predict their future development trends. Facing the reform of higher education system, how to activate the human resources and optimize the talent structure is an urgent problem in the human resource management in university. Using data analysis and mining technology, human resource management in university advances the ability of data analysis and

mining, and builds more real and effective portraits of college talents through the large-scale collection of personal information, structural analysis, data integration and in-depth mining to provide colleges and universities with personalized and adaptive big data talent application model.

### **3.3 Providing data results is the fundamental purpose of human resource management in colleges and universities**

It is aimed at diagnosing present situation of talent development in colleges and universities and giving some suggestions through basic data analysis of the personnel, such as the education status, ability status, working performance and personality traits, combined with personal development expectations. The real information, huge data and multi-dimensional network connection can ensure the best match between talents and posts, and give full play to the maximum benefit of the entire information system. If there is no strict standard and definition of the ability requirements for a certain post, it will lead to the vacancy and weakening of the post allocation, either "putting a man of little ability in high capacity", being incompetency, or "wasting one's talent on a petty job", being a waste of talents, which cannot stimulate the internal motivation of talents, and will also cause different employment standards and disorder competition. We should plan the path of talent growth and development in colleges and universities in a scientific way, define the discipline and professional development fields and growth ladder of all kinds of talents, and avoid the disconnection between training and application in talent development and the discrepancy between personnel and posts, to implement the choice of personnel by post and ensure people suitable for post, striving to make human resources in colleges and universities converted into real teaching strength.

## **4. Application analysis of data analysis and mining technology**

Beth Axelrod, director of human resource at the well-known enterprise eBay, wrote in her book "Talent Wars": "it is a great value and significance to apply big data technology to human resource management. Human resource management continuously adds value through data analysis. "Big data thinking" has become an important guiding philosophy, which optimizes human resource management. With the support of big data technology, human resource management is established on the basis of objective data analysis. Human resource management system is constantly updated and developed, and management modes and means are constantly enriched. University human resource management should take the initiative to adapt to the new situation, strengthen the research of technology related to big data, innovate the existing human resource management system, and persist in practice and exploration to promote the strategic transformation of talent development in colleges and universities.

### **4.1 Scientific Planning Of Human Resource in Colleges and Universities**

It is of great significance for colleges and universities to correctly grasp the structure and types of talents and reasonably build up the talent team. Managers can conduct in-depth mining and analysis of massive human resource data by using classification algorithm, discover connections and patterns between various types of data, group homogeneous classes together, and set up class libraries, objectively reflecting the organization of the talent team construction. Therefore they can clearly understand the characteristics of different teachers, and develop different management methods based on types and characteristics of talents, sequentially implementing target management. The actual application process includes: First it is a data preprocessing. It will organize and classify the data from all kinds of information system, including personnel information, teaching quality, scientific research achievement, team construction, comprehensive appraisal and so on, to construct the required data sets, perform cleansing, integration, transformation and reduction on data from different sources and database, and store them in the form of a data warehouse. Secondly, to select appropriate analysis tools, such as SPSS software to build the model according to the data information in the data warehouse. This is an iterative process. Different models need to be carefully examined to determine whether they are useful for solving problems. The third is to output the analysis results which can be provided to analysts as reference after the model is established and

verified. At this time, the analysis results should be compared with the actual situation. If there are problems or errors, the analysis should be adjusted again to ensure the accuracy. Last of all, to make corresponding human resources planning according to the analysis results of human resources data.

#### **4.2 Scientific Introduction of University Human Resource**

The colleges' information system collects and stores a large amount of data, which can be analyzed and explored by using data mining technology to reveal the rules contained therein and generate the corresponding decision-making information, which has an important reference value for the introduction of talents in colleges and universities. For example, establishing specialized talents database. We can make use of analytical method and association rule to mine data through the talent introduction information in recent years, such as age, title, academic discipline, and the introducing channels to get the correlation between attributes and related rules. In this way, important clues such as talent introduction channels can be obtained to help colleges and universities to find talents, grasp the trend of talent flow, make talent introduction plans and strategies, and introduce satisfied talents.

#### **4.3 Scientifically Realize the Match of Personnel and Posts in Colleges and Universities**

The construction of university talent team is the most important part of university quality construction. Person-post matching is one of the important tasks of human resource management in colleges and universities, and also an important factor affecting the future development of colleges and universities. Analysis report can be made based on the data of faculty who have left in recent years to record in detail the identity information of each resigned person, post related information and other personnel portraits. By analyzing the reasons of resignation and establishing the relationship model, the influential factors with high correlation degree can be obtained. For example, the influence of working years on dimission, what kind of remuneration is easy to drain talents, and a certain type of talents is easy to leave. Based on those analysis results and targeted analysis of the existing salary structure and management system, colleges can take corresponding measures to set personalized service goals, reduce the rate of talent turnover, and achieve the goal of attracting and retaining talents.

#### **4.4 Scientific Assessment of Human Resource in Colleges and Universities**

As an important content of human resource management in colleges and universities, performance appraisal plays an important role in talent retention and motivation. Many colleges and universities are unable to achieve scientific and rational performance appraisal, resulting in the brain drain. The valuable information behind performance appraisal data can be explored, using data, to provide decision support for human resource managers and avoid brain drain. The actual application process includes: first, to extract key variables of performance appraisal data and extract assessment indicators according to relevance, such as teachers' education background, teaching ability, scientific research ability, innovation ability and professional ability. The second is to build a performance appraisal system, which mainly examines the correlation between various indicator variables. Finally, to conduct data analysis and evaluate the performance appraisal results, according to the analysis results and the actual situation, to help human resource management personnel to formulate targeted performance appraisal, reward and punishment system to prevent brain drain.

### **5. Summary**

The application of data analysis and mining technology in human resource management in colleges and universities has been preliminarily recognized, and the application theories and methods involved need to be explored and studied by developers and applicators, which is a promising research field. Data mining tools can be used to analyze and extract human resource information, through the graphical visualization methods, to optimize understanding and mastery, constantly update working mode to improve the efficiency of personnel management, assist colleges and universities to provide optimized decision-making information, and accelerate colleges and universities to make contributions to talent cultivation, scientific exploration and serving the society.

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