Research Article
The Monitoring Method of Enterprise Human Resource Efficiency under the Smart City Management Mode

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In order to improve the monitoring effect of corporate human resource efficiency under the smart city management model, this paper establishes an evaluation model for the human resource management model between different growth stages of the organization, different organizations in different industries, and different organizations in the same industry. The proposed human resource management model is based on the deduction result of human resource planning and design, work system design and employee system design, and the dynamic matching of the three. Moreover, this paper uses the three-factor vector evaluation model to modify the management efficiency of the human resource model and designs the corresponding intelligent enterprise human resource efficiency monitoring model. In addition, this paper analyzes the system functions and designs experiments to test the model in this paper. Through experimental testing, it can be seen that the enterprise human resource efficiency monitoring system under the smart city management mode proposed in this paper has good practical results.

1. Introduction

With the advent of the information age, smart cities will surely become the direction of future urban development, and human resource management on this basis must also keep pace with the times [1].

With the advent of the era of the knowledge economy, knowledge workers have replaced physical capital such as traditional labor, capital, and land and have become the key to enterprise success. Organizational competition strategy has also changed from a market competitive position to an organization’s internal resources and integration capabilities. Moreover, human resources have evolved from traditional personnel management to today’s strategic human resource management in response to environmental changes and organizational needs. The so-called strategic human resource management refers to planning the allocation and activities of human resources to assist the organization in achieving organizational goals. When an organization wants to increase productivity, increase customer satisfaction, expand market share, and improve organizational performance, it must also consider employees’ level of knowledge and skills, learning and innovation capabilities, level of motivation and commitment, and recognition of organizational culture, goals, and decision-making capabilities. Since the value of human resources can be continuously developed and improved, that is, human resources have strategic value, we can say that the purpose of human resource management is to support business performance, and it is one of the main sources for corporate organizations to gain competitive advantages [2].

Human resource management efficiency is the effect of human resource management or the degree of tasks and expectations that can be completed for the organization. The improvement of human resource management efficiency can provide the organization with more competitive advantages in the market. At the same time, the effectiveness of human resource management as an important evaluation indicator of human resource management practice can enable enterprises to find serious problems in internal human resource management and solve them in time, thereby improving the effect of human resource management and achieving organizational goals better and faster. Moreover, it can also enable the company to continuously produce
managers, professionals, and technical personnel that are consistent with the development strategy and enable employees to achieve optimal allocation. Thus, the unity of human resource management efficiency with the company’s development strategy goals has become the key basis for the company to make important decisions [3].

From a macro perspective, China’s economic growth model is undergoing transformation. China’s social economy has moved from a stage of quantity accumulation to a stage of quality improvement. China’s economy has entered a new development cycle and will become the norm for some time in the future. Prior to this, China’s enterprise development had relatively low management requirements, and the investment and management of various resources such as human, financial, and material were relatively extensive. In the new development state and cycle, China will continue to emerge a series of problems such as insufficient labor supply, reduction of human resources, lack of talents, and low quality of talents. The original management level of Chinese enterprises is no longer compatible with the development needs under the new normal. Therefore, companies have begun to focus on strengthening their own soft power and scientific management, which means that companies need more talents and put forward higher requirements for human resource management.

With the construction of China’s market economy system, the acceleration of the process of world economic integration, and the development of science and technology, business operations are increasingly internationalized; labor costs are rising; and traditional industrial technology upgrades are facing bottlenecks, making Hebei enterprises face high uncertainty and change quick environmental challenge. Compared with Chinese and foreign enterprises, the enterprise gap in Hebei Province is significant, which is manifested in the small scale of enterprises, low per capita assets, and low per capita income, reflecting the low level of equipment and relatively labor-intensive characteristics of Hebei enterprises; moreover, the development of Hebei province level reveals the gap between Hebei’s enterprises and the national and world advanced levels, that is, the lack of enterprises that occupy a leading position in the industry that represents today’s productivity level and the world’s industrial development trends. It only relies on local abundant natural energy as its own advantage for development, and this advantage can easily be imitated and replaced in a competitive business environment without borders until it finally disappears.

This article researches on the detection method of enterprise human resources efficiency under the smart city management mode and, on this basis, evaluates the performance of the system in this paper and improves the effect of enterprise human resource monitoring under the smart city management mode.

2. Related Work

Research on strategic human resource management has been ongoing, and related scholars hope to provide managers with more scientific methods when making human resource management decisions through research in this field. The literature [4] discussed the increasing importance of strategic human resource management (SHRM) for SMEs. The research results show that human resource management in SMEs is highly descriptive and fragmented, and the strategic labor allocation model (SLAP) is used to analyze the human resource problems of SMEs. This model focuses on the balance between labor supply and labor demand at an enterprise level. The literature [5] believed that line managers, especially those who show real leadership behavior, can strengthen the human resource system by implementing human resource practices. The research results show that by providing a more dynamic method to establish consistency in human resource management, it will help human resource management obtain more authenticity and credibility in the organization. The literature [6] seemed to make the heterogeneity of skills required by the big data industry clearer by analyzing a large number of real jobs posted online. The research results show that this analysis method can help business leaders and human resource managers formulate clear strategies and use big data in the best way to acquire and develop the right skills. It also shows that the structured classification of work families and skill sets will help establish a common dictionary used by human resource recruiters and education providers in order to more effectively meet the supply and demand of the job market.

In the development process of innovative human resource management, continuous innovation is also needed to have a sustained force. How to improve the innovation of human resource management has also become an area of concern for many scholars. The literature [7] found that innovative human resource management practices can improve performance but ignore the impact on individual-level results (such as employee health and welfare). Its research results show that innovative human resource management practices can bring positive and negative happiness. When employee welfare is increased in one dimension, it will be harmful to the other. The literature [8] discussed the impact of human resource management and nonfamily members’ innovation ability on family business performance. Its research results show that training and innovation capabilities affect performance, while strategic planning strengthens the relationship between human resource policies and performance. In addition, family businesses with weak governance practices can initially benefit from innovation, but they must strengthen governance to maintain performance growth. At the same time, family businesses should pay attention to the selection and training of nonfamily members to improve their innovation capabilities and performance.

Human resource management will be affected by the environment in the process of management, and the concept of green human resource management comes out. Scholars realize the match between human resource management and the environment by studying green human resource management. Literature [9] discusses how to improve employees’ environmental behavior and hotel environmental performance through green human resource management. The research results show that green human resource
management can improve employees’ organizational commitment, eco-friendly behavior, and hotel environmental performance, and hotel senior managers and human resource managers should establish green human resource management policies. Literature [10] grouped and coded 106 human resource management practices that can be combined with environmental management using principal component analysis to evaluate the environmental performance of the organization. The green human resource management model established in the research process can be used to analyze the relationship between GHRM functions and environmental management dimensions to support the improvement of environmental performance. Literature [11] drew two important conclusions by analyzing the green level of human resource management practices, organizational culture, learning, and teamwork. The research results show that: systematically considering the consistency of human resource practices can enable workers to control environmental management; the degree of formalization of incorporating environmental issues into traditional human resource practices is very low, which will seriously affect team formation, organizational culture, and good performance observed in learning, which leads to a negative cycle.

Literature [12] pointed out that identifying the factors that affect the effectiveness of human resources will help the management and leadership achieve success, organizational goals, and the realization of high efficiency. The literature [13] tried to evaluate the factors and weights of employees’ effectiveness in Tehran Industrial Park through interview method, Delphi method, multicriteria decision-making method (MCDM), and analytic hierarchy process (AHP). Literature [14] collected quantitative data through questionnaire surveys to evaluate the effectiveness of the human resource allocation. The research results show that in the context of the investigation, the personnel deployment model is not optimal. Literature [15] evaluates the effectiveness of human resources department by studying Vietnamese line managers. The research results show that the philosophy of human resources affects the practice of human resources. Through the experience of implementing human resource management, it is possible to understand the evaluation of the performance of the human resources department by frontline managers. Literature [16] believes that adjusting job distribution can maximize employee productivity and minimize company costs, which is the goal of organizational optimization. The research results show that intimacy and loyalty are the basis of turnover rate, which, respectively, indicate the influence of personal and professional relationships. During the operation of the organization, changes in intimacy and loyalty will cause network turbulence. Literature [17] establishes and tests a conceptual framework that links socially responsible human resource management with competitive performance suitable for small businesses. The results of its research confirm the effective contribution of SHRRM to corporate competitiveness and include two variables that have additional interest in the relationship being studied: employee commitment and the multiple effects of relationship marketing.

3. Theoretical Framework and Connotation of the Three-Dimensional Vector Evaluation Model

This article adopts the content analysis method to analyze and demonstrate the specific connotation of human resource management models at home and abroad. The study found that all human resource management models are basically designed around the three dimensions of human resource planning, work system design, and employee system design. A human resource management model may involve one, two, or three of the three dimensions. For example, the Harvard model, the Gerst model, the Storey model, and the strategic human resource management model involve three dimensions. The diagnostic human resource model only involves the dimension of human resource planning, and the Devana model only involves the design dimension of the employee system. The specific definitions of the three dimensions are as follows:

1. The first dimension is “determining the direction”: human resource planning refers to planning in a broad sense and also refers to the factors that operators need to consider before formulating a human resource management model. It mainly includes, but is not limited to, beliefs and assumptions, external environment, company strategy, organizational conditions, management objectives, relevant stakeholders, long-term impact, and so on [18].

2. The second dimension is “determining method”: work system design mainly refers to a series of activities carried out around ensuring the effectiveness of human resources work, through intervention in the implementation process of human resources management mode, so as to ensure the realization of planning goals. It mainly includes, but is not limited to, the role positioning of management functions, the institutionalization of work processes, the penetration of cross-departmental cooperation, the application of information technology, and so on.

3. The third dimension is “determining the content”: employee system design mainly refers to the development of various links around employee selection, employment, education, and retention. It is the core part of the human resource management model, including the recruitment and allocation of employees, performance compensation management, training and development, the establishment of employee quality models, and so on.

The composition of the three-dimensional vector human resource management evaluation model is shown in Figure 1. The three-dimensional evaluation system starts with the “direction,” “method,” and “content” of the human resource management model and focuses on answering the three questions of “where to do,” “how to do,” and “what to do.” It takes human resource planning as a foothold, work system design as a guarantee, and employee system design as the core. The three interact, restrict each other, and
dynamically match, thus ensuring the maximization of organizational performance.

According to the composition and influencing factors of human resource management models at home and abroad, the composition of key evaluation factors of each dimension is shown in Table 1 [19].

This article is based on the theoretical basis of the three-dimensional vector human resource model evaluation system, looking for an empirical method that can evaluate the effects of different human resource management models to guide managers to match and optimize human resource management models to achieve maximum organizational performance change. Based on the comprehensive evaluation method of multi-dimensional vector machinability, a universal three-factor evaluation model is established, which can quickly and easily characterize material cutting qualitatively and quantitatively, which is beneficial to guide and optimize the selection of cutting process parameters. There is a great similarity between the human resource management mode and the selection of cutting parameters. The principle is the same. They are all through the selection of various uncertain and biased factors, and the interaction between the factors is used to seek an optimal result. Therefore, this article innovatively applies the three-dimensional vector evaluation model to the research of human resource management mode, which is also a useful exploration to enrich the empirical research in the field of human resource management.

In order to quickly and easily evaluate the quality of material processing performance, especially when selecting three rating indicators for rapid evaluation, a simple three-dimensional vector comprehensive evaluation simplified model can be established in the Cartesian coordinate system. The principle is to characterize each evaluation index in the form of a vector and then obtain the final comprehensive evaluation vector and its corresponding evaluation value according to the vector algorithm and use this as the basis for parameter selection.

The three-dimensional vector evaluation model is shown in Figure 2:

The process of 3D modeling mainly includes the following steps:

One is to establish a working space, which is composed of a control arc and a control vector. The establishment of the workspace is to build a platform for a comprehensive evaluation to ensure the unity and comparability of various indicators under different conditions. The control vector in this paper is the best human resource management mode, and the control vector in Figure 2 is OM [20].

The second is to select evaluation indicators. This article is based on the previous theoretical research on the three-dimensional human resource management model, and the evaluation indicators are, respectively, selected as human resource planning (x-axis), work system design (y-axis), and employee system design (z-axis).

The third is data processing. Considering that different indicators have different dimensions and values, before the evaluation, the value should be standardized and normalized so that the vector value becomes a dimensionless and unitary value.

Standardized processing method: \( x_{ij} \) represents the j-th index of the i-th object, where the maximum value is \( x_{ij}^{\text{max}} \) and the minimum value is \( x_{ij}^{\text{min}} \). The processing formula for the standardized value is as follows:

\[
x_{ij} = \frac{x_{ij} - x_{ij}^{\text{min}}}{x_{ij}^{\text{max}} - x_{ij}^{\text{min}}}.
\]

Normalized processing method: for beneficial indicators, that is, the larger the indicator value, the better the organizational performance, and the positive correlation between the two indicators, we set

\[
y_{ij} = e^{-x_{ij}}.
\]

For unhelpful indicators, that is, the larger the indicator value, the greater the hindrance of the organization’s performance development, we set

\[
y_{ij} = 1 - e^{-x_{ij}}.
\]

The fourth is the acquisition of the evaluation index vector. In order to simplify the calculation process of the evaluation value, the corresponding unit vector is set along the direction of each coordinate axis. The numerical value of the evaluation index is expressed by \( K_i \), and \( K_j \) and \( k_j \) are, respectively, the i-th evaluation vector and its corresponding unit vector.

\[
K = K_i \cdot k_j.
\]

The fifth is the acquisition of the evaluation vector of the human resource management model. The vector sum of each evaluation index vector is the evaluation vector of human resource management model.

\[
M = \sum_{i=1}^{n} K_j.
\]

Sixth is the acquisition of the evaluation value of the human resource management model. The smaller the modulus length of the human resource model evaluation vector and the smaller the angle between it and the control vector, the better the human resource management model. The area of the parallelogram represented by the evaluation vector and the control vector of the human resource management model is used to represent the efficiency index.
of human resource management. The calculation formula is as follows [21]:

$$S = |C \times M| = |C| \cdot |M| \cdot \sin(C, M). \quad (6)$$

The smaller the area of parallelogram shows that the adopted human resource management model is the closest to the best human resource model and the better the management efficiency of the model. On the contrary, it is relatively poor. When the area of $S$ is $0$, that is, $C$ and $M$ overlap, indicating that the management mode adopted by the organization at this time is the best human resource management mode.

If the normalized and processed values of the three evaluation vector values are $R$, $W$, and $E$, respectively, the calculation of the management efficiency index of the human resource model can be further expressed as follows:

$$\text{management effectiveness} = \sqrt{R^2 + W^2 + E^2} \cdot \sqrt{3 - \frac{(R + W + E)^2}{(R^2 + W^2 + E^2)}}. \quad (7)$$

The above-mentioned three-dimensional vector comprehensive evaluation system can quickly carry out qualitative subjective judgment and quantitative mathematical analysis on the human resource management model at different stages of the organization and can provide guidance for the organization in the optimization and transformation of the human resource management model.

4. Energy Efficiency Monitoring of Enterprise Human Resources under Smart City Management Mode

Competitive value structure stems from the fact that researchers on organizational effectiveness actually share an implicit theoretical structure. This structure contains three aspects of values, that is, whether the organization hopes to
focus on internal or external, whether the organization structure is stable or flexible, and what is the purpose and means to be achieved by the organization. It has established a concise and clear structure, namely the competitive value structure, as shown in Figure 3.

This article simplifies the structure diagram of the competitive value architecture, changes the representation method of the third dimension (purpose and means) in the architecture, and changes it to be expressed only in words, thereby removing the relevant straight lines and making the diagram more concise and clearer. As shown in Figure 4, the simplified architecture retains only two main dimensions, and the indicators are classified into four main clusters.

When humans scan and perceive the environment in which they are located, their cognitive system will classify the information and clues they obtain according to standards, and there are at least two classification standards. One is the clarity of the clues, that is, the identifiability, predictability, and comprehensibility of information and clues. The second is the urgency of the response action, that is, whether it is necessary to take immediate action to respond. According to these two standards, the horizontal axis and the vertical axis, four types of information processing and scenarios are formed, as shown in Figure 5.

People also have different tendencies when formulating organizational policies. Summarized four philosophical orientations are used to analyze organizational policy: social system theory, social action theory, phenomenology, and logical empiricism. There are also four cognitive systems used to analyze organizational policies: rationalism, idealism, existentialism, and empiricism. Since people will process information and organize their cognitive system according to their own preferences when analyzing organizational problems, they often attach different degrees of importance to these four philosophical orientations and cognitive systems, so the insights they obtain are often limited. The integrated architecture forms a four-quadrant diagram interwoven by two axes (as shown in Figure 6).

The human resources management department provides a complete management system for the entire enterprise. The system can easily obtain various static data about the enterprise, such as organizational structure, salary, personnel management, and so on, and can also easily obtain various change information for trend prediction. The system can realize enterprise-wide information sharing based on authority, and the daily work will be greatly improved under the operation of the system. Figure 7 shows the system use case diagram.

The human resource efficiency monitoring system has a bottom-up multilayer architecture, and the system application architecture is shown in Figure 8.

Organizational management is based on the management of organizational objects and their relationships. The basis of organizational management is the management of organizational structure objects and their relationships. In organizational management, according to the needs of the hospital, a total of eight basic organizational object types are designed: organizational structure unit (O), position (C), position (S), task (T), work center (A), qualification (Q), cost center (K), and employee (P). Each organizational structure needs to maintain its attributes in the information type. The relationship between each organization object is shown in Figure 9.

Time data can be obtained or recorded through a variety of channels, including, but not limited to, manual timetables, magnetic cards, and so on. The time management module can be grouped according to personnel scope, personnel subscope, employee group, and employee subgroup. The

![Figure 3: Competitive value architecture: efficiency standards.](image-url)
Information processing policy:
Reduce uncertainty through interaction

Information processing policy:
Maintain the existing behavior patterns

Information processing policy:
Choose the best practices used in the past

Contextual features:
Predictability, security

Contextual features:
Sense of belonging, interdependence

Contextual features:
Change, growth

Figure 4: Three value dimensions and efficiency standards.

Figure 5: Strategy and context of information processing.
basic information types of time records mainly include: 0001-organizational distribution, 0002-personal information, 0007-planned working time, 2011-attendance record, and so on. Time-recording business-related information includes: 2002-attendance (training, business trip, etc.), 2001-absence, 2005-overtime, 2003-work adjustment, 2010-time compensation wage, 2006-absence quota, 2007-attendance quota, and so on. The integration with other modules is shown in Figure 10.

After constructing the above model, the human resource efficiency monitoring effect of the model is evaluated, and the results are shown in Table 2 and Figure 11.

From the above research, it can be seen that the offline enterprise human resource efficiency monitoring system under the smart city management mode proposed in this paper has good practical effects.
Enterprise human resource efficiency testing system under the regulation of urban management mode

Employee self-service system

Personnel business system

Figure 8: The overall system architecture.

Figure 9: Diagram of the relationship between various organization objects.
In order to pursue sustainable operations, companies focus on organizational performance and gain profits through their competitive advantages to survive in the market. Moreover, many companies rely heavily on their human capital as a source of competitive advantage, and their market value gradually depends on their intangible assets. Through good human resource management practices, we can help organizations acquire outstanding talents and maintain their competitive advantages. In the dynamic competitive environment of rapid change and fierce competition, organizations need to effectively predict and manage risks to adapt to changes in the external market. This requires human resource managers to have higher acuity and reliability in decision-making. Therefore, this research starts from the human resource management under the smart city management model, focuses on the mechanism that affects the efficiency of the human resource management department under the smart city management model, and makes some supplements to previous related studies. This article researches the detection methods of corporate human resources efficiency under the smart city management mode and evaluates the performance of the system in this paper to improve the enterprise human resources monitoring effect under the smart city management mode.

5. Conclusion

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Table 2: Evaluation of the effectiveness of human resource efficiency monitoring.

Figure 10: Time management integration with other modules.

Figure 11: The monitoring effect of the human resource efficiency of the system.
Data Availability
The labeled data sets used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest
The author declares that there are no conflicts of interest.

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