Early Warning Management of Enterprise Human Resource Crisis Based on Computer Technology

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Abstract. This study proposes an innovative research approach centered on leveraging computer technology to effectively manage early warnings of human resource crises in enterprises. The article initiates an in-depth analysis of the importance of early warning management for human resource crises in businesses, emphasizing the need for specialized crisis and early warning mechanisms in the context of human resource management. It introduces the concept of tailoring crisis and early warning systems specifically for enterprise human resource management. Moreover, the article consolidates key points for implementing early warning management strategies for human resource crises in enterprises. Finally, to exemplify the practical implications of this approach, the article presents a case study of a financial enterprise. This particular company encountered a substantial decline in its profit share, dropping from 27.4% to around 4% in 2020, along with a mere 7% equity recovery rate, significantly impacting its production and operational development. Simultaneously, the human resource management of the enterprise confronted notable challenges. In summary, the study underscores the critical role of early warning management for human resource crises in contemporary human resource management practices. Its role is pivotal in constructing and rationally managing human resources within enterprises.

Keywords: Enterprise; Human resources; Early warning management.

1 Introduction

With the increasing frequency of commercial and economic activities, the crises faced by enterprises in their development process have become more diverse. At present, the academic community has not yet made a clear definition of human resource crisis, only categorizing it as a type of enterprise crisis. The human resource crisis is mainly due to the lack of innovation in the internal human resource management model of enterprises, which makes it difficult to adapt to the development strategy of enterprises in the new economic environment. Human resources crises within an enterprise arise from the combined impact of both internal and external environmental factors[1-2]. Once a crisis occurs, it will cause incalculable losses to the enterprise, and it is necessary to establish a reasonable crisis management mechanism. Human resource crisis management refers to the effective and sustainable approach to crisis control and management when a company encounters a crisis, in order to reduce or eliminate the impact of the crisis. According to the occurrence of crisis events, crisis management is generally divided into three stages: post crisis management, pre crisis management, and in process crisis management. In these three stages, pre crisis management mainly focuses on

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prevention, and establishing a reasonable and effective early warning mechanism can eliminate crises;In process crisis management refers to the specific management measures adopted during the process of crisis occurrence; Post crisis management is the response strategy adopted after the crisis is eliminated. This article mainly focuses on the pre management of human resource crises. By analyzing the current situation of enterprise human resources, a reasonable early warning management mechanism is constructed to minimize the probability of crisis occurrence. There are many types of human resource crises, but the fundamental reason for the emergence of crises is the deficiencies in internal management of enterprises[3]. Therefore, human resource crises are divided into five categories: organizational deficiencies in human resources; Talent management deficiencies; Deficiencies in incentive mechanisms; Corporate leadership issues and talent loss. As shown in Figure 1:

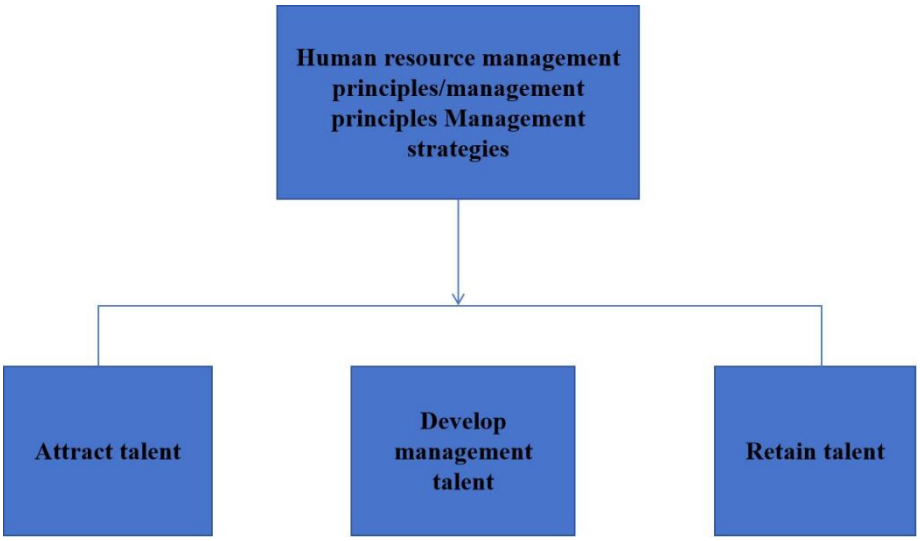

Fig.1. Early Warning Management of Enterprise Human Resource Crisis.

2. Enterprise Human Resource Crisis Warning

2.1Analysis of Enterprise Human Resource Crisis Management and Early Warning Mechanism

Creating mechanisms for managing and anticipating human resource crises is crucial for the efficient oversight of personnel within an organization. It is closely tied to the overall efficacy of human resource management. Primarily, crisis management addresses the existing human resource management challenges faced by enterprises. It involves the application of reasoned methods to control human resource crises, ensuring the more effective execution of human resource management practices and maximizing their impact. Throughout the crisis management process, enterprises must incorporate various aspects of crisis management theory, psychological theory, and relevant legal knowledge systems. This comprehensive approach ensures more effective human resource crisis management and enhances the overall effectiveness of human resource management. Secondly, the establishment of an early

warning mechanism is a crucial component in the implementation of human resource crisis management within enterprises. This mechanism significantly influences the execution of human resource crisis management initiatives. In crisis management work, establishing an early warning mechanism is mainly carried out at the front end of the crisis management work, completing the sending of crisis signals before the outbreak of the crisis, allowing managers to understand the current state of human resource management through the early warning signals, enabling them to have insight into the crisis, and manage the crisis, improving the effectiveness of enterprise crisis management[4-5].

2.2 Decision Tree Warning Method

In conducting research on specific issues, data collection and utilization often involve various classical procedures. These classical procedures may exhibit notable differences, and the interrelationships between these differences can be challenging to discern intuitively. However, several factors consistently play a crucial role in integrating classical algorithms. Therefore, it is essential to delve into the concealed connections and gain insights into the relationship matrix of the initial differences in classical algorithm data structures or the internal structure of the covariance matrix[6].

1.The central concept revolves around the composition of source materials.

2.The quantity of critical points is fewer than the number of original objects.

3.Each principal component predominantly retains a substantial portion of the information found in the initial variables;

4. Ensure the independence of the two priorities. Upon analysis, key insights can be gleaned from the distinctions in the initial factors, encapsulating fundamental characteristics. This approach enables numerical analysis when confronted with extensive data, facilitating a deeper exploration of the internal rules of product research and the subsequent examination of results, satisfying the following conditions:

$$y_1 = \mu_{11}x_1 + \mu_{12}x_2 + ... + \mu_{1p}x_p \tag{1}$$

$$y_2 = \mu_{21}x_1 + \mu_{22}x_2 + ... + \mu_{2p}x_p \tag{2}$$

$$y_p = \mu_{p1}x + \mu_{p2} + ... + \mu_{pp}x_p \tag{3}$$

When applying the described linear transformations to the original variables, the statistical properties of the resulting composite variable Y will change in accordance with the specific linear transformations applied. Therefore, in order to obtain better results, the variance of $\mathrm{y}_i = \mu_i^{'}x$ should be kept as large as possible, and each y_i should be independent, because

$$\mathrm{var}(Y_i) = \mathrm{var}\,\mu_i^{'}x = \mu_i^{'}\sum\mu_i \tag{4}$$

Given any constant C, you get

$$\mathrm{var}(c\mu_i^{'}x) = c\mu_i^{'}\sum\mu_i c = c^2\mu_i^{'}\sum\mu i \tag{5}$$

Linear transformation constraints should adhere to the following principles:

$$\mu_{\mathrm{i}}^{'}\mu_{i}=1 \tag{6}$$

Namely

$$\mu_{21}+\mu_{22}+\ldots+\mu_{2\mathrm{p}}=1(i=1,2\ldots,p); \tag{7}$$

The traditional ID3 (Iterative Dichotomiser 3) algorithm is a popular decision tree construction method used in machine learning for classification tasks. It operates by recursively partitioning the dataset based on the values of different attributes to create subsets, ultimately forming a decision tree. However, the original ID3 algorithm can face challenges when dealing with datasets containing numerous attribute values. These challenges include an increase in the number of leaf nodes, decision paths, and decision rules, which can potentially lead to a decline in the accuracy of the generated decision tree[7].

The proposed optimization in this context aims to address these challenges. The following steps outline the optimization approach:

1.Select a Training Set and Classification Attribute (AK): The optimization begins by choosing a training set to determine the classification attribute, denoted as AK.

2.Establish a Node (n): A node is established in the decision tree construction process.

3.Leaf Node Creation: If the data under consideration at the current node belong to the same category, then the node (n) becomes a leaf node, and the class of the data becomes the label of the leaf.

4.Handling No Remaining Properties: If there are no other properties left to analyze in the current dataset at the node, then the node (n) also becomes a leaf. The classification of the leaf is determined based on the principle of assigning the majority class label, with attention to minority instances.

5.Attribute Selection and Node Assignment: If there are remaining properties to analyze, the algorithm selects the attribute with the best expected value along the test node. The node (n) is then assigned the average value of that selected attribute.

It's important to note that this optimization builds upon the foundation of the original ID3 algorithm. By introducing steps to handle situations where data belong to the same category or when no properties remain for analysis, the optimization aims to streamline the decision tree construction process and mitigate issues related to the scalability of decision trees, particularly when dealing with datasets with a large number of attribute values.

3. Measures for Establishing Human Resource Crisis and Early Warning Mechanism in Enterprises

3.1 Analysis of a certain enterprise's situation

This enterprise is a financial enterprise. Although the financial market in China has gradually improved in recent years, there are still certain problems in the construction and application of the overall market in the process of carrying out financial work in China, which has caused the problem of poor internal business status of the enterprise[8]. In the recent stage of work, the profit share of the enterprise has decreased from 27.4% to around 4% in 2020, and the equity recovery rate is only around 7%, seriously affecting the production and operation development of the enterprise. At the same time, the human resource management status of the enterprise has also been affected. According to relevant data, from 2019 to 2022, more than 38 people in the company chose to switch jobs, and the annual turnover rate reached around 20%. Based on the current situation analysis, the enterprise is facing a serious human resource crisis. Therefore, in the process of human resource management work, relevant early warning mechanisms should be established to ensure that human resource management is more optimized. Figure 2 shows the statistical chart of the number of employees in the company from 2019 to 2022. Through the chart, it is found that the company is being affected by a decrease in human resources.

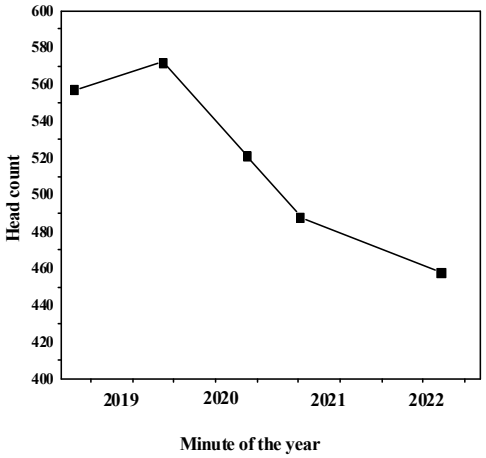

Fig.2. Statistics of the number of employees in this enterprise from 2019 to 2022.

4. System testing

4.1 Testing methods

In the realm of software testing, two predominant methodologies take center stage: white box testing and black box testing. White box testing, alternatively referred to as structure or logic-driven testing, is a methodology that delves into the internal workings of a program to assess

its adherence to predetermined instructions. Rather than focusing solely on the program's external behavior, white box testing scrutinizes the underlying code structure and logic to ensure it aligns with the intended design and specifications. Black box testing refers to the testing of functionality and data-driven functionality, which is a comprehensive test of the functionality of a previously recognized product to test whether it can operate stably. When this test is conducted, the program is viewed as a black box that cannot be opened and tested in a way that excludes internal structures and specialties, This can better verify whether the product's functions comply with the functions presented in the pre instruction manual, and test the program's performance in sending and receiving external data, to determine whether a program is interoperable with the outside world. This system testing method needs to be carried out after a system is fully developed, with a focus on using black box testing to test whether the main performance of the system is fully operational. Using the conventional method of functional testing, check each function one by one to ensure that customers can obtain the satisfactory program they need.

4.2 Test results

When we log in to the system using a bandwidth of 2M, 4M, or 8M, the number of logged in users refers to the number of users who can log in within a response time of 5s. If the response time is too long, it will have a serious impact on the efficiency of system usage. The test results are shown in Table 1:

Table 1. System Login Performance Test.

tape width	Processing of the number of logins per second	Number of users logged in	Processor usage	conclusion
2M	11	50	70%	Bandwidth is the bottleneck
4M	14	60	90%	Bandwidth and processor saturation almost simultaneously
8M	17	70	100%	The processor is the bottleneck

When we open a document using a bandwidth of 2M, 4M, or 8M, the number of people refers to downloading four documents within a response time of 5s, which can support simultaneous downloading. The document size is fixed at 150kb, and the test results are shown in Table 2

Table 2. Document Download Performance Test.

tape width	Number of downloads per second	number of people	Processor usage	conclusion
2M	4	30	6%	Bandwidth is the bottleneck
4M	11	60	8%	Bandwidth is the bottleneck
8M	24	130	5%	Bandwidth is the bottleneck

The design and application of the human resources crisis management warning system have played a significant role in improving human resources work. This system is an important part of the human resources management system, especially in achieving the function of personnel risk control. Measuring and controlling crises, warning crises, and handling crises have become a comprehensive management application that combines the work functions of various modules of human resources[9-10].

5Conclusion

Human resources are the core of enterprises, and only by improving their ability to handle human resource crisis warnings can enterprises correctly avoid crisis risks. This article provides an understanding of the types and manifestations of human resource crises, and then strengthens employee crisis awareness through the improvement of internal management systems and employee training, thereby reducing the probability of crises occurring. Only by coordinating and planning human capital, doing well in crisis management and prevention, can enterprises fundamentally solve business crises.

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