Reconstruction of Human Resource Management Under Big Data and Artificial Intelligence

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Abstract. In the big data and artificial intelligence (AI) era, enterprise human resource management can be carried out based on the management innovation of big data and AI management innovation to adapt to the new situations such as the increased diversification of labor relations, the decentralization and flattening of organizational management, and the individualized values of the new generation of employees, etc. Based on the maturity model of human resource management, the data demand of enterprise human resource management will present a development trend from individual, phenomenal, accurate and causal judgment to collective, regular, relevant and perceptual prediction, along with the transformation of human resource concept and management mindset. Compared with the “Small data”, big data and AI will drive the innovation of human resource management in enterprises from three aspects as follows: implementing the tagging of human resources to form “Digital portrait” of talents at the basic level, building the decision and feedback system of human resources at the implementation level, and facilitating the transformation of the management mindset from management and control to value empowerment at the strategic level.

Keywords: Big Data and Artificial Intelligence Era, Human Resource Management, Enterprise, Innovation

1. Introduction
Currently, we are in a fragmented era of knowledge economy, in the era of rapid development of information technology and economic globalization[1]. Big data and artificial intelligence (AI) have an inevitable impact on traditional business management mindset, mode, operation and many other aspects. The development of enterprises will be related to the practical analysis, mining and application of big data and AI is closely related. Meanwhile, as the “first resource” [2-3], human resource has become one of the leading social wealth and production factors, and the source of social and economic growth, and the competition between enterprises is to some extent the competition for
human resources. Compared with personnel management, the object and focus of modern human resource management have changed from “Things” to “People”, and the value of “People” has been promoted to a new height. More attention has been paid to the management and development of people, and all work functions are more strategic, futuristic and holistic\cite{4}. With the development of the times, the connotation of human resource management is continuously enriched and updated. Especially in the big data and AI era\cite{5,6}, what is the demand of human resource management for big data and AI? What is the impact of big data, AI and AI on human resource management? This paper further discusses the Enlightenment of the era of big data and AI on enterprise human resource management, and promotes enterprise people The combination of force resource management and big data and AI determines the actual efficiency and benefit of “human being is the first productivity” in enterprise management.

2. Demand analysis of enterprise human resource management for big data and AI

Currently, all walks of life are dealing with data. Especially in the wave of mobile Internet, social applications, big data and AI, the data generated and accumulated by the interconnection between people and organizations, people and people, people and things are growing in an inestimable scale. Through the establishment of the management mechanism of “speaking with data, making decision with data, managing with data and innovating with data”, the realization of scientific decisions based on data is becoming an urgent demand of all walks of life.

The basic idea of big data and AI algorithm is to map the input vector into the high-dimensional feature space H by nonlinear mapping, to construct the optimal decision function by using the principle of structural risk minimization, and to replace the point product operation in the high-dimensional feature space with the kernel function of the original space. The optimal regression function constructed by big data and AI algorithm in high dimensional space H is:

$$f(x) = w \cdot \varphi(x) + b$$ \hfill (1)$$

Currently, big data and AI algorithms for regression analysis transform regression analysis problems into the following optimization problems:

$$\min_{w,b,\xi^{-},\xi^{+}} \frac{1}{2} w^T w \left[ \begin{array}{c} \left( \sum_{i=1}^{L} \zeta_i^+ \right) \\
\sum_{i=1}^{L} \zeta_i^- 
\end{array} \right]$$

$$\text{s.t.} \begin{cases} y^i - f(x^i) \leq \xi^-_i \\
y^i - f(x^i) \geq \xi^+_i \\
\xi^-_i, \xi^+_i \geq 0 \ i = 1, L, l
\end{cases}$$ \hfill (2)$$

Where C represents the penalty factor to balance the maximum classification boundary and the minimum training error; V represents the number of control support vector machine regression algorithms; L = 1, 1, 1 represents the insensitive loss function.

When an enterprise has human resources with differentiated knowledge, skills, and capacities, and
can combine and mix personal knowledge, skills, and capacities through common mindset mode, to achieve better performance of work tasks than competitors, the enterprise creates the core competitiveness of the organization. In the environment of rapid changes in the external environment and increasingly fierce competition, enterprises need to respond in a shorter strategic cycle, which also puts forward higher requirements for human resource management. On the one hand, enterprises need to dynamically find out the relevant factors that affect the efficiency of human capital and make targeted improvements; on the other hand, enterprises need to explore the development direction of human resources and match the corresponding resources in line with the strategic objectives of enterprises. This paper points out a possible logic behind the creation of competitive advantage of enterprise human resource data management: Data management of human resources is conducive to reducing enterprise cost, improving HR service level and cutting transactional workload for the HR department so that it can focus on more valuable work such as strategy and business. On the role of big data and AI in human resource management, Chinese scholars also put forward some research points, such as: making decisions based on data, measuring the value of human capital management; realizing the Internet of human resource performance management; realizing the informatization construction of personnel files, realizing the accurate matching of personnel and posts, quantitative assessment, training, and incentive customization, human resource planning in line with the development trend and the stability of high-level talents.

In the big data and AI era, enterprises can collect, sort out, count and analyze more information resources in all aspects of human resource management, to achieve the comprehensive relevance of enterprises, departments, positions, personnel, and business, to make all human resource management decisions reliable and well documented. In particular, when the amount of data reaches the scale and characteristics of big data and AI, the relevance reflected by these data can provide effective decision support for enterprise human resource management.

Based on PCMM, human resource management includes five maturity levels: initial level, management level, definition level, prediction level, and optimization level (Figure 1). From simple and disorganized behaviors to repetitive behavior, potential development based behavior, quantification and authorization based behavior, and continuous improvement based behavior, human resource management also moves from chaotic human resource management to administrative affairs based human resource management, functional and professional human resource management, strategic human resource management and cross-border integration based human resource management.
3. Innovation analysis of human resource management in the big data and AI era

The development trend of human resource management does not correspond to the causality between big data and AI. That is, without big data and AI, the development of human resource management in enterprises cannot be promoted. However, the era of big data and AI will inevitably affect human resource management in enterprises significantly. The big data and AI can further reflect their quantification, relevance, and predictability. Therefore, enterprise human resource management can realize the innovation of human resource management under the traditional data based on the mindset and tools of big data and AI to adapt to the current increasingly diversified labor relations, decentralized and flat organizational management mode and new management mode Personal values of employees. Different from the traditional “small data” era, in the big data and AI era, according to the strategic level, the implementation level, and the basic level, this paper discusses the differences of enterprise human resource management (as shown in Table 1), to further promote the innovation of enterprise human resource management.

| Table 1. Comparison of human resource management between big data and AI |
|------------------|------------------|------------------|
|                   | Small data age   | Big data, AI and AI Era |
| Implementation    | Decision support center: Based on internal; oriented by accurate results; based on subjective intuition; from the perspective of human resources or organizational level to solve the problem of “people”. Statistical center: top-down; vertical historical comparison based on time dimension or horizontal statistical comparison based on business dimension within the enterprise; focusing on management and incentive; | Decision center: connected with the outside; oriented by the internal mechanism of relevance; based on knowledge discovery; standing at the organizational level to solve organizational problems. |
| Basic level       | Small data: privacy risk; individual data; static data. | Intelligence Center: bottom-up; trend prediction based on big data and AI dimensions; focusing on customer and employee experience. |
| Strategic level   | Big data and AI: no privacy risk or small risk; group data; dynamic data. |

In the big data and AI era, enterprises use human resource modeling to digitize and label the talents.
they need. This digitalization and labeling is not the only one but should be multi-dimensional. “Slash youth” has become the goal of organizations and individuals. Based on the “digital portrait” of big data and AI, a specific scale of “resource pool” for searching and linking has been formed. When these digital and labeled human resources reach a specific scale, enterprises can search and use them according to their needs when they are looking for suitable human resources, to promote the accurate matching between the supply and demand sides, prevent the problem of “human enterprise mismatch” that is easy to appear in traditional enterprise human resources, and promote the “human post matching” and “everyone” of enterprise human resources The coordination level of “matching” has been dramatically improved.

4. Conclusions

The application of big data and AI may bring massive value to human resource management and play a more significant role in improving the operational performance of enterprises. The information collected via open channels suggests that there have been some classic cases of enterprise human resource management innovation, which have also attracted extensive attention in theory and practice. However, it is undeniable that the evolution and upgrading of human resource management in enterprises is still in the subtle and silent transforming stage, and most possible changes that the big data and AI may bring about are still in the conjecture or preliminary exploration state at present. Many enterprises in China have yet to understand and fully leverage the most important and core resource “human” thoroughly and effectively. Currently, the transformation of management concepts and models in enterprises still has a significant path dependence. In addition, the foundation and environment of big data and AI are still not sound, the awareness of cross-border connections between enterprises or employees remains to be further enhanced, and the foundation of digital and large-scale data storage and sharing still requires further strengthening and promotion at the same time. Otherwise, decision support based on big data and AI will become merely idle talk.

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