Application of IoT and Big Data Technologies in Optimizing Human Resource Allocation

Lan Jiang

Corresponding author 's email: tg667788@xzcstudio.comn

Hainan Technology and Business College, Haikou, China

Abstract: With the development of the times, the market demand for human resource management is constantly improving. In recent years, with the emergence of Internet of Things (IoT) and big data technologies, human resource management has also entered a new development stage. These technologies can provide more accurate and comprehensive data support, giving managers a better understanding of the overall situation of the company's human resources and providing strong support for the company's development.

Keywords: Internet of Things; Big Data; Human Resource Allocation

1 Introduction

In today's era, it is not only the double pressure of work and job search, but also the era of exponential data growth. When the concept of physical web was still hot, the big data of IoT attracted the attention of many IT companies, with huge potential value hidden within. By utilizing IoT technology and using various information sensing devices to real-time collect any monitored, connected, interactive objects or processes needed by the human resources department, and connecting them with the Internet, a vast network can be established to connect things to things, things to people, and things to the network, facilitating identification, management and control. Meanwhile, by combining with big data technology, the massive data information owned can be professionally processed to "add value", enabling each company's human resources department to timely obtain accurate and effective information for various positions.

2 Application of IoT technology in human resource allocation

2.1 Smart recruitment

Through IoT technology, intelligent screening and matching of companies or talent networks can quickly find candidates that meet position requirements, greatly improving recruitment efficiency [1].

2.2 Employee management

By utilizing IoT technology, enterprises can monitor and manage employee attendance, work status, performance and other data in real-time, analyze these data, have a real-time

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understanding of employee situations, and provide strong support for employee training and development.

2.3 Intelligent training

By combining with IoT technology, enterprises can conduct online training to enhance training effectiveness. Meanwhile, intelligent training management can be conducted to analyze training status and provide more accurate training for employees.

3 The role of big data in human resource allocation

3.1 The role of big data in recruitment and selection

Recruitment and hiring of talent is a very important part of corporate human resource management. Traditional hiring methods often lead to waste of human resources and reduced work efficiency. With the help of big data, enterprises can more accurately evaluate applicants' abilities and potential. By analyzing a large amount of job information, companies can accurately determine the most suitable applicants and provide more efficient interviewing and evaluation methods for applicants.

3.2 The role of big data in performance management

Performance management is very important for improving employees' work level and enterprise benefits. Big data can collect and analyze employee work data to provide an objective basis for enterprise performance evaluation. With big data technology, enterprises can more precisely evaluate employee performance and make targeted improvements to existing problems. Talent cultivation is an important part of improving talent quality and enhancing enterprise core competitiveness. Traditional training methods have high costs and uncertain effects [2].

3.4 The role of big data in compensation management

In enterprises, compensation management has become an effective way to attract and motivate excellent talents. Through big data analysis, enterprises can more accurately formulate corresponding compensation standards and give differentiated incentives to employees' performance and contributions.

4 Methods for optimizing human resource allocation under new technologies such as IoT and big data

4.1 Data collection and data modeling

In addition to existing public data collection and daily algorithm development, in order to meet the needs of practical applications, data on real pages must be collected, preprocessed, and stored. There are currently two methods of online data collection, one is API and the other is web crawler method.

API, also known as application program interface, is a program interface written by network administrators for users. Because this type of interface technology can cover the bottom layer

of the network, complex systems can achieve the required functions with only simple calls. Now, social media such as Sina Weibo, Baidu Tieba, and Facebook have begun to provide API services, allowing users to download the DEMOs they want on their official websites. However, API services are still restricted by website developers. In order to reduce the burden on the website (platform), the number of daily connections is usually limited, which brings great inconvenience to users. Therefore, users usually choose the second method-web crawler [3].

A web crawler is a program or script that can automatically crawl information on the World Wide Web according to certain rules. Other less commonly used names include: ant, autosearch, simulator, worm. The most commonly used search engines are Baidu, 360 Search and other online search engines. This crawler system is called a normal crawler and can collect content on any website unconditionally. The specific implementation principle of the ordinary crawler is shown in Figure 1. Leverage IoT and big data technologies to collect various information about human resources, such as employees' skills, work experience, job performance, career development willingness, etc. This data can be obtained through various online platforms, social media, human resource management systems, etc. After giving the crawler the initial URL, the crawler will obtain and store all the network resources it needs to obtain from the network, and at the same time obtain all the URL links that appear on the homepage, and then make a request, receive the network response and re-analyze the network, and at the same time Obtain the required network resources and store them, and finally re-obtain the required network resources from the network. By analogy, the implementation process is not cumbersome, but you must be particularly careful about tampering with addresses and headers during the process to prevent the network administrator from discovering and banning the IP. Banning the IP means that the entire crawling work will be ineffective. In order to achieve more functions, multi-threaded crawlers, theme crawlers, etc. have also emerged.

4.2 Establish a personnel capability assessment model

In order to better evaluate personnel capabilities, on the basis of studying and researching the four elements of human resource management personnel capabilities, and from domestic research results and research situations, the evaluation dimensions suitable for corporate employees were screened. And a comprehensive screening of factors that may cause subjectivity in ability evaluation was conducted. Finally, we will evaluate employees in four dimensions: knowledge level, management ability, work skills, and personal quality, so as to evaluate and classify employees' abilities to a certain extent based on different standards and experience. First, we converted the capability dimensions of each link, converting the data into the most basic data units, and then refined the dimensions and quantified the standards to facilitate model calculations and core data conversion. The initial data for this model starts at the beginning of recruitment, where employees are evaluated based on their onboarding competency assessment and converted into initial data. Provide better data for future evaluation and calculation [4]. During the evaluation process, data is input into the evaluation stage and the data is continuously updated to achieve more accurate evaluation. In order to better evaluate a person's ability, it is necessary to evaluate his ability when he joins the company, get his preliminary ability based on his ability assessment, and then in daily human resources management, based on each job evaluation and Performance evaluation to conduct a dynamic assessment of his capabilities. It is combined with the individual's personal growth, job evaluation, and work performance to make a comprehensive inspection and level measurement of the employee's ability as a whole.

Model construction, as shown in Figure 2, uses the 4-dimensional structure to carry out corresponding basic construction, transform the four abilities as coordinate axes, and evaluate them through quantitative indicators.

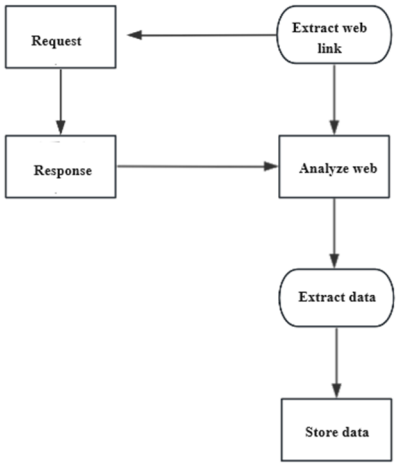

Fig. 1. Schematic diagram of crawler working mode.

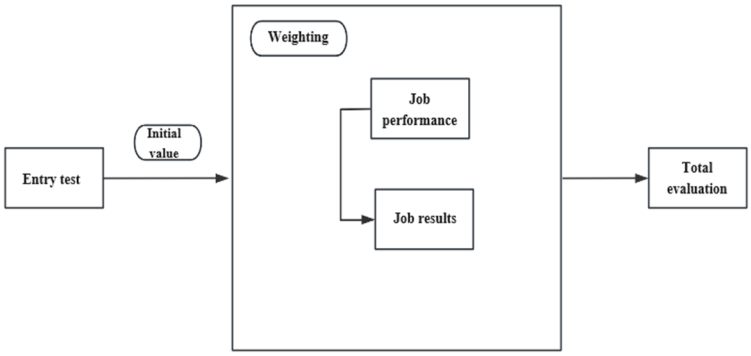

Fig. 2. Model execution steps.

According to different jobs, work performance is divided into four dimensions, using four aspects such as knowledge level, management ability, work skills, and personal quality, and assigns work tasks to staff based on the divided indicators. Dividing performance into four directions means using a weighted automaton on the computer to make a fixed weight measure for performance and level. As shown in Figure 3, the weighted automaton works as follows:

Fig. 3. Model execution process.

The weights are calculated using the average moving valuation method in statistics. The dimensions used to evaluate each performance are used to fuse the values into the main values, and each weight is estimated through the following formula.

$$A_{\mathrm{q}} = \frac{\sum_{0}^{\mathrm{i}} p}{\frac{(p_{\mathrm{i}-1}+p_{\mathrm{i}}+p_{\mathrm{i}+1})}{3}} \tag{1}$$

Among them, A_{q} represents the weight of the current performance, $\sum_{0}^{\mathrm{i}} p$ represents the sum of the ability evaluation values of all performance executions, $\frac{(p_{\mathrm{i}-1}+p_{\mathrm{i}}+p_{\mathrm{i}+1})}{3}$represents the evaluation of two adjacent the average performance is evaluated at the same time to prevent sudden changes in performance execution. Through certain explanations and expressions of databases, data visualization, and data regression calculations, it illustrates the scientific exploration and scientific data planning in human resource management.

5 Causes analysis

5. 1 Enterprise perspective

Currently, recruitment methods by employers are relatively simple, and examination methods have certain defects. Examination content is not comprehensive enough to reflect applicants' true abilities. Enterprise management pays insufficient attention to human resource management and lacks a scientific, reasonable recruitment system, leading to recruitment of unsuitable candidates. Trial periods by many enterprises have caused huge losses and damaged brand images. Companies generally emphasize personality and conduct adhering to corporate culture and team atmosphere. However, differences exist between value orientations of " 1990s generation" employees and traditional business owners [5]. New recruits also value corporate culture lacking in traditional enterprises. Urban demand for talent is growing. Governments drive enterprises to universities. Through interviews, this method used by some cities and regions leads to cross-regional attributes and low breach costs, failing to truly retain job-seekers. Governments cannot guarantee suitable quantities but provide platforms. Developing high-caliber talent teams and lowering human resource costs are pressing issues.

5.2 Job seeker perspective

Some job seekers consider resumes to be embellished showpieces, resulting in overstated profiles or falsified resumes. Excessive invalid resumes increase the workload of human resource departments, hindering efficient screening and missing suitably matched talents. Our surveys found job seekers prioritize compensation and benefits. Due to unmet psychological expectations and increased occupational options in an informatized mobile society, candidates frequently switch jobs, unfavorably impacting corporate long-term development and raising training costs as well as distrust towards candidates [6].

5.3 Recruitment platform perspective

Online recruitment relies on platforms providing false information such as outdated postings and unrealistic descriptions, inhibiting effective talent matching. Platforms lack strict qualification certification. This stems from profit-driven nature and lack of incentive for authentic information. Currently, no laws regulate platforms' verification of corporate veracity.

6 Exploring solutions for human resource management optimization based on new technologies

6. 1 Enterprise perspective

Enterprises should enhance their soft and hard environments through various measures including cultural development and employee benefits improvement to attract top talents. Specifically, enterprises can actively carry out career planning training to cultivate a learning atmosphere. Along with the enterprise development, it will attract more talents, forming a virtuous circle [7]. To improve work efficiency, enterprises can develop competency models and selection criteria tailored to each post based on its characteristics and requirements. Given different talent requirements of enterprises, human resource department needs to shift focus to recruiting, cultivating and managing high-caliber employees. Capital-intensive and technology-intensive industries call for enhanced talent management as they need more “human” resources [8].

6.2 Recruitment platform perspective

Recruitment platforms can leverage cloud-based data resources to examine the information provided by enterprises and jobseekers. Considering the initial heavy workload, platforms may adopt regular sampling reviews. By mapping out localized talent networks and landscapes, platforms help customers and jobseekers fully understand the industry landscape and promote their brand influence. Continuous innovation optimizes processes such as candidate assessment and predictive suitability analysis from jobseekers' perspectives. Platforms aim to maximize efficient intermediary roles and ensure procedural transparency and fairness.

6.3 Individual perspective

Jobseekers should exercise caution in verifying information authenticity while protecting privacy during online job search. Incomplete company profiles require extra prudence to prevent potential harms.

6.4 Government policy

As online recruitment grows rapidly, incidents of fraud also occur frequently. As a socialist market economy, China should strengthen governance of online recruitment activities through improved laws and regulations. Technologies such as IoT can enable online oversight. Regulatory bodies should be established in key areas to protect victims' rights, punish non-compliance, and establish discipline in online recruitment markets as shown in Figure 4 [9].

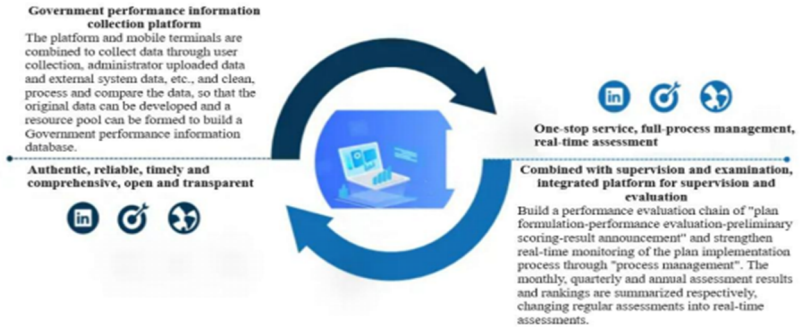

Fig. 4. Government performance information collection platform 6.4.2 develop databases and charge fees for services.

7 Conclusion

7.1 Results

Improved talent matching: Through big data analysis, enterprises can analyze employee skills, work styles, career preferences more accurately to achieve more precise talent matching and improve work efficiency and employee satisfaction.

Automation of work processes: IoT technology enables information exchange between devices, automating many traditional manual jobs that can now be handled by machines. For example, smart logistics systems and automated production lines significantly improve work efficiency.

Remote work enabled: With IoT and Internet technologies, people can work from home or elsewhere, expanding the recruiting pool and helping address talent shortages in some regions.

Enhanced training effectiveness: Big data helps enterprises understand employee learning needs and habits to develop more effective training plans. IoT technology also allows creation of simulated work environments for more hands-on training experiences.

7.2 Discussion

Data security and privacy protection: With widespread big data application, ensuring secure and legal collection and use of employee data has become an important issue. Enterprises need strict data management systems to prevent data leaks and misuse.

Technology updates and maintenance: To maintain technological advancement, enterprises need continued investment in equipment upgrades and maintenance as well as employee technology training, involving cost issues and financial planning.

Talent recruitment and management: As work processes automate and remote work expands, enterprises must reconsider talent recruitment and management approaches, such as building effective team culture and enhancing employee belonging.

Avoid over-reliance on technology: While technology brings benefits, over-reliance can increase human distance and weaken employee creativity and critical thinking. Enterprises should also consider human factors when using technology.

In summary, IoT, big data and other technologies provide powerful tools for optimizing human resource allocation but also new challenges. Enterprises need holistic consideration of technology pros and cons to develop appropriate HR strategies.

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