



Will Big Data Become a New Barrier to Talent Management: A Systematic Review Based on Domestic and International Studies

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Abstract. The research topic of this paper is whether big data will become a new barrier in talent management. To date, big data has brought benefits to talent management, but privacy leakage and algorithmic unfairness remain the main risks. Big data has a dual nature in talent management. On the one hand, it can significantly improve efficiency and help enterprises make efficient decisions. On the other hand, issues such as privacy and algorithmic bias may also become obstacles to the use of computers for precise decision-making based on big data. The problems identified in the research include the bias and lack of fairness in the black box of big data algorithms. Some companies face obstacles in technical capability and organizational adaptation due to the lack of equipment. The non-circulation of databases between regions makes cross-cultural and data governance difficult. Classifying the access rights to sensitive data, detailing and presenting the core variables of big data algorithms, and using channel-based media for cross-border transmission of large databases are several specific measures that may become important solutions to the current problems.

Keywords: Big Data, Privacy Barriers, Ethical Norms, Data Black Box, Algorithmic Bias, Cross-Cultural Data Transmission

1 Introduction

The integration of big data and human resource management has permeated various scenarios such as recruitment, performance, compensation, and training: in recruitment, machine learning is utilized to achieve intelligent resume screening and precise matching; in compensation management, market data and intelligent models are relied upon to formulate strategies, enhancing calculation efficiency and compliance; in the performance aspect, real-time data monitoring is employed for dynamic assessment, while in training, customized plans are developed based on skill gaps. Meanwhile, it can predict the risk of employee turnover and support strategic decision-making, but it is still in its infancy and faces challenges such as data security and privacy protection pressure, data

silos in multiple systems, insufficient digital literacy of HR personnel, and limited investment by small and medium-sized enterprises. These issues need to be addressed through technical protection, data governance, and talent cultivation. Therefore, this paper focuses on the core question of "whether big data will become a new barrier in talent management", systematically integrating core research both domestically and internationally, clarifying its empowerment logic and risk boundaries. Taking papers published in China National Knowledge Infra-structure (CNKI) and foreign English journals as the research objects, it covers diverse scenarios including enterprises, governments, vocational colleges, and public institutions. Using the literature review method, it is organized according to the logic of "value empowerment - risk barriers - coping paths", comparing the consensus and differences in research, and proposing solutions to problems and prospects.

2 The Empowering Effect of Big Data on Talent Management

Zhang Qinghong et al., by examining big data and practical cases of international human resource management, point out that big data is associated with obstacles such as cultural adaptation barriers, high turnover rates of expatriate employees, and insufficient cross-regional policy compliance in the global flow of talents [1]. Yao Kai has constructed a three-stage framework of "Human Analytics - HR Functions - Organization", which reveals the transformation path of HR functions from the traditional "function-oriented" model to a "strategy-oriented" one driven by big data, and emphasizes the supporting role of data insights in organizational strategic decision-making [2]. Wang Dinghong proposed a "Data - Evidence - Decision" circular reasoning model. Through a closed-loop process from data collection and evidence extraction to decision-making, this model enhances the scientificity and accuracy of human resource decisions and promotes the transformation of human resource management from an empiricism-based paradigm to a data-driven, rational decision-making paradigm [3].

McAfee et al. foresightedly put forward that big data represents a management revolution. They emphasized that relying on data as the foundation can accelerate enterprise decision-making speed by 5 times, highlighting the crucial position of big data in the process of enterprise innovation [4]. From the perspective of industrial and organizational psychology, Campion et al. constructed a "Six-Step Agenda for Talent Analytics", which covers six aspects: data collection, analysis, generation, decision-making, action implementation, and effect evaluation. This agenda provides enterprises with a systematic and scientific operational guide for conducting talent data analysis, and promotes the transformation of talent management from qualitative judgment to quantitative analysis [5]. To sum up, big data empowers talent management, enabling enterprises to improve the scientificity of decision-making, optimize talent allocation, reduce management risks, and drive the transformation of HR into a strategic partner.

3 Potential Risks of Big Data Becoming a New Barrier in Talent Management

3.1 Data Privacy and Ethical Challenges

The lack of data privacy protection and ethical norms has become the most prominent potential barrier to the application of big data in talent management. Domestic and international research has revealed the complexity of this issue from different scenarios and dimensions. Yao Kai, when constructing the theoretical framework of big data human resource management, clearly pointed out that privacy and ethics are the greatest challenges to the application of technology, especially in the data collection stage, where employees' personal information, behavior trajectories, and even social data are widely included in the analysis scope, which can easily trigger a sense of being monitored and a trust crisis [2]. Ye Gang's practical research further verified this contradiction. Talent management systems need to meet the dual requirements of model accuracy and privacy protection. Although its design has improved the satisfaction of talent services through technical means such as data desensitization and permission classification, it still faces the problem of blurred ethical boundaries in cross-departmental data sharing [6]. In addition, He Ningning et al. mentioned in their research on enterprise digital management that some enterprises, in pursuit of data completeness, excessively collect employees' non-work scene information (such as private social content), which violates privacy principles and leads to an increase in employees' resistance [7]. Shah et al. found through a systematic review that algorithm transparency and privacy ethics are two major blank areas in big data HR research. Due to enterprises often evading the explanation of the legality of data use under the pretext of "technical black box", employees' control over their personal data has been severely weakened [8]. Oswald et al.'s empirical research revealed a more hidden ethical risk: when employees know that their performance, resignation tendencies, etc., are predicted by algorithms, their psychological security will significantly decrease, thereby affecting work engagement [9]. This side effect of "algorithmic monitoring" is particularly prominent in European and American enterprises. Campion et al. supplemented from a psychological perspective that if the training data of machine learning models contains historical discriminatory information (such as gender and age-related data), even if the algorithm design is neutral, it may reproduce ethical problems through data association, exacerbating the dual predicament of privacy and fairness [5]. Overall, data privacy and ethical risks may reduce employee trust, affect psychological security, and restrict the wide application of big data in HR management.

3.2 Algorithmic Bias and Fairness Issues

When constructing the "Data → Insight → Action" closed loop, Wang Mengmeng clearly pointed out that algorithms are not absolutely objective, and their biases may stem from historical deviations in training data or improper selection of feature variables. For instance, if a recruitment algorithm over-relies on traditional indicators such

as "prestigious university background" and "work experience duration", it may overlook the potential of non-traditional talents, thereby undermining the fairness of selection [10]. Zhang Jihong's research further corroborates this view. Through the analysis of the "digital human input" indicator, he found that single-type talent evaluation models (e.g., those relying solely on performance data) tend to amplify group differences, while the value of compound digital talents is often underestimated by algorithms. This not only affects the comprehensiveness of talent identification but also risks solidifying structural unfairness within organizations [11]. In addition, Wei Jintong mentioned in his research that the talent systems of some enterprises, due to over-reliance on successful cases, suffer from systematic biases in identifying talents for new positions, which exerts a negative impact on the fairness of talent allocation [12].

Angrave et al., through interviews with multinational enterprises, found that HR departments generally lack statistical literacy and algorithm governance capabilities, making it difficult for them to identify implicit biases in algorithms. For example, the promotion prediction model of a certain enterprise used "overtime hours" as a core variable, which indirectly discriminated against female employees. This ultimately triggered a fairness dispute over big data-driven promotion decisions and led to a 15% decline in employee satisfaction [13]. Oswald et al.'s review study confirmed that even though algorithms improve the validity of talent selection, hidden biases can still reduce the acceptability of decisions [9]. For example, a salary recommendation algorithm trained on historical salary data may perpetuate past gender pay gaps and exacerbate fairness crises within organizations.

Shah et al. also pointed out that the "algorithmic black box" characteristic makes it difficult to trace and correct biases, further amplifying its negative impact on the fairness of talent management. In this paper, the "algorithmic black box" refers to the opacity of the algorithmic decision-making process, which makes it hard to trace the source of biases [8].

3.3 Barriers to Technological Capability and Organizational Adaptation

The actual effectiveness of big data technology in talent management is highly dependent on the compatibility of an organization's technological capabilities. Studies both domestically and internationally have shown that the disconnect between technology and organizations has become a significant barrier.

In their research on the informatization of human resources in higher vocational colleges, Chen Shifang et al. found that although evaluation models for skilled talents can improve the degree of job-person fit, grass-roots teaching units generally face insufficient data integration capabilities. Specifically, the data formats of academic management systems, practical training platforms, and personnel systems are incompatible. Research indicates that due to this lack of data integration capability, 40% of valid data cannot be included in analysis due to technical barriers [14]. Zhang Yu's research on small and medium-sized enterprises (SMEs) further points out that such enterprises are limited by financial and technological reserves: 70% of respondents stated that they are unable to build independent talent data analysis platforms. Even when basic tools are

introduced, 60% of recruitment and performance data remains idle due to a lack of professional data analysts [15]. This shows that technical barriers not only restrict the use of data but also affect job-person fit and decision-making efficiency. In the case study of geological exploration units, Xu Zhiping mentioned that under the traditional organizational structure, there are obvious collaboration barriers between HR departments and information technology (IT) departments. The "talent evaluation needs based on geological project data" proposed by HR departments are difficult to implement because IT departments lack industry-specific knowledge, which reflects the importance of cross-departmental capability collaboration. Additionally, research on state-owned enterprises (SOEs) has found that although some SOEs have invested heavily in introducing big data systems, these systems are disconnected from the actual management needs of SOEs because they are not aligned with the enterprises' strategic orientation. Ultimately, these systems become useless data repositories [16].

Interviews with multinational enterprises conducted by Angrave et al. revealed that the statistical shortcomings of HR departments are the core cause of big data failures: 83% of HR managers cannot understand the statistical significance of algorithm output results, leading to misinterpretation of data conclusions and subsequent misleading talent decisions. The empirical results of the "Big Data-Business Strategy Alignment" model constructed by Akter et al. show that for every 1 standard deviation decrease in the alignment between HR big data analysis capabilities and organizational strategy, enterprise performance decreases by 0.32 standard deviations [17].

A study published in the *Bulletin of Business and Economics* on emerging economies found that while SMEs can access talent big data through low-cost Software-as-a-Service (SaaS) models (achieving a 9.4% increase in sales per capita), 80% of these enterprises fall into the dilemma of secondary investment after SaaS platform updates and iterations due to a lack of long-term technological adaptation plans. This reflects the challenge of sustainable technological application under resource constraints [18].

3.4 Cross-Cultural Challenges and Data Governance Dilemmas

In their research on international human resource management, Zhang Qinghong et al. were the first to propose that inconsistent cross-cultural data standards constitute a core barrier restricting the application of big data. For instance, in the prediction of global talent mobility, there are significant differences in how "talent qualifications" are defined across countries (e.g., in academic credential authentication and work experience calculation methods) [1]. This makes direct data comparison and analysis difficult, undermining the accuracy of prediction models.

Additionally, in their research on enterprise digital management, He Ningning et al. mentioned that overseas branches of multinational enterprises in China often face a dilemma between "data collection compliance" and "analytical completeness" due to conflicts between Chinese and foreign data privacy regulations (such as China's Personal Information Protection Law and the EU's GDPR) [7]. If they strictly comply with local regulations to restrict cross-border data transmission, the global talent database will be fragmented; if they prioritize data completeness while ignoring regional regulations, they will face legal risks. This governance dilemma is particularly prominent

in scenarios such as cross-border team performance evaluation and cross-cultural training.

Through a literature review, Shah et al. found that there is a lack of a unified global governance framework for HR big data, making it difficult for multinational enterprises to achieve synergy in data sharing and algorithm standards [8]. For example, an "employee engagement algorithm" used by a multinational group in the Asian region incorporates variables related to "collectivist culture" (e.g., frequency of team collaboration). When applied in European branches, this algorithm overlooks the emphasis on individual contributions in "individualist culture," resulting in a disconnect between evaluation results and local realities. In their research on sustainable human resource management, Gravili et al. supplemented that the gap in data infra-structure (e.g., data storage security standards and the popularity of analytical technologies) between developing and developed countries further exacerbates the imbalance in cross-cultural data application. Enterprises in developed countries can rely on well-established technical architectures to achieve real-time analysis of global talent data, while enterprises in developing countries often struggle to participate in global talent data collaboration due to low data quality and insufficient technical capabilities. This forms a management barrier under the "data divide" [19].

Furthermore, the issue of insufficient statistical literacy in HR departments mentioned by Angrave et al. is amplified in cross-cultural contexts. Due to a lack of ability to identify data biases under different cultural back-grounds, some enterprises mistakenly use region-specific data as globally applicable indicators, leading to systematic errors in talent decisions [19].

4 Institutional Construction: Data Governance and Ethical Norms

In the practical work of the Human Resources and Social Security Bureau of Jingdezhen City, Ye Gang (2024) addressed the core contradictions in government scenarios through a modular design and data security governance plan [6]. He classified talent data into three modules based on sensitivity levels: "Basic Information", "Performance Data", and "Privacy Information". Different modules were assigned differentiated access permissions and data desensitization rules (e.g., pseudonymization for privacy information). This approach not only met the demand for data integrity in talent service models but also avoided the risk of privacy leakage through technical means, ultimately increasing talent service satisfaction by 22%.

He Ningning et al. proposed that it is necessary to establish a full-process institutional norm covering "data collection, storage, and usage", and clarify the boundary of the right to use employee data. For example, in the recruitment process, candidates must be informed in advance of the scope of data collection, and compliance must be ensured by having them sign an informed consent form [7].

From a psychological perspective, Campion et al. advocated that in talent decision-making, data teams should be required to provide an "algorithm specification document", which clarifies the core variables, weight logic, and potential sources of bias of

the model [5]. For instance, the promotion algorithm of a certain enterprise needs to explain why "project contribution" (rather than "overtime hours") is used as a core indicator. This enables HR personnel and employees to understand the basis for decisions and reduces doubts about "black-box operations".

A review study by Shah et al. also mentioned that it is necessary to promote the unification of ethical standards at the industry level [8]. For example, the European Union (EU) has provided a compliance framework for cross-border data transmission for multinational enterprises through the GDPR. Emerging economies can draw on this approach and formulate regional data governance rules in combination with local cultures to alleviate cross-cultural compliance conflicts. Zhao Xiaoling pointed out that in order to cope with the challenge of rapid technological iteration, enterprises need to establish targeted cooperation with universities and research institutions, introduce cutting-edge course resources to update the knowledge structure of employees, and at the same time set up special research funds to encourage employees to participate in technological innovation projects, thus forming an endogenous driving force for continuous learning [20].

5 Conclusions

There is a consensus among domestic and international studies on the empowering value of big data, with privacy ethics and algorithmic bias identified as core risks. The differences lie in the following aspects: domestic research focuses on the implementation of practical scenarios, while international research emphasizes theoretical frameworks and global adaptability; domestic studies pay more attention to quantitative results of efficiency improvement, whereas international studies place greater emphasis on in-depth discussions of ethics and fairness. Big data exerts a "double-edged sword" effect on talent management: its empowering role in improving efficiency and enabling precise decision-making is significant, but issues such as privacy ethics, algorithmic bias, and capability compatibility have become potential barriers. Whether these barriers emerge depends on the standardization of technology application and the compatibility of organizational capabilities. The research limitations include: the concentration of research objects on enterprises, with insufficient cases from public sectors and emerging industries; and the lack of cross-cultural comparisons regarding the sources of algorithmic bias and corresponding intervention measures. Future research trends will focus on three areas: exploring the dynamic balance mechanism between "technological empowerment and barrier elimination"; strengthening comparative studies on cross-cultural data governance and ethical norms; and examining the long-term impact of the integration of artificial intelligence (AI) and big data on talent management.

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