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Exploring the Integrated Transformation of Intelligence and Efficiency in Public Sector Human Resource Management from a Big Data Perspective

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Abstract: ***With the rapid development of big data and artificial intelligence, both our working methods and ways of thinking are undergoing profound transformations. The swift advancement of technology also brings continuous changes and challenges to the public sector. In the current social context, fully leveraging digital resources and intelligent technologies to enhance the efficiency of the public sector requires a comprehensive reflection on organizational strategy, technology, and human resources, thereby facilitating an orderly digital transformation. This article starts by addressing the dilemmas faced by traditional public sector human resource management and proposes corresponding countermeasure models at three levels, covering multiple dimensions such as talent, business operations, performance, and compensation. The research focuses on four key aspects: transforming goal-oriented performance management, conducting comprehensive talent inventories, enabling forward-looking business insights, and achieving precise talent identification. Through innovations in management mechanisms, the study aims to promote and support the overall objectives of the public sector, emphasizing the effective integration and deep alignment of organizational goals with talent development. On this basis, the article proposes an "intelligence-efficiency integration" approach, which seeks to achieve precise digital matching between the business attributes and talent attributes of the public sector.***

Keywords: Big Data Era; Intelligence-Efficiency Integration; Public Sector; Talent Attributes.

1. INTRODUCTION

In the context of the big data era, the public sector, as the core of national governance, faces both new development opportunities and emerging challenges. The increasing complexity of human resource operations in the public sector and the rising demands for operational efficiency require flexible and effective approaches to adapt to the rapidly changing environment. Big data refers to the ability of the public sector to collect, process, and analyze vast amounts of information, providing enhanced support for policy formulation, implementation, and evaluation. This enables the public sector to develop a more comprehensive understanding of social conditions, public needs, and policy impacts. Through big data analytics, public institutions can better predict social development trends and provide a solid empirical basis for policy-making.

The rapid advancement of big data technologies has profoundly influenced various aspects of social life, particularly in information acquisition, processing, and analysis. This technological evolution presents an unprecedented opportunity for the public sector to integrate artificial intelligence into human resource management, enabling intelligent decision-making and efficient operations—a concept referred to as "intelligence-efficiency integration." This integration extends beyond technical consolidation to encompass collaborative changes in management models and organizational culture. By employing intelligent technologies, public institutions can facilitate interdepartmental collaboration and improve overall operational efficiency.

Based on this foundation, the present study conducts an in-depth exploration of the public sector from both theoretical and practical perspectives. In this transformation process, it is essential not only to leverage big data but also to integrate it with talent management, thereby enabling intelligent data analysis and enhancing managerial efficiency. This research investigates the "intelligence-efficiency integration transformation" of public sector human resources in the big data era from multiple dimensions, including technological applications, management models, and organizational culture. Considering the current realities of human resource management in public institutions, the study conducts a comprehensive analysis of the core functional modules. From a theoretical perspective, a three-tiered theoretical model of public sector human resource management in the big data era is constructed, encompassing the individual, team, and macroeconomic levels. The study aims to provide

scientifically sound and practical policy recommendations for China's public sector, fostering the integration of human resource management with big data technology and equipping public institutions to better address emerging challenges.

2. THE DILEMMA OF TRADITIONAL PUBLIC SECTOR HUMAN RESOURCE MANAGEMENT

2.1 Insufficient Technological Application and Mismatch Between Talent and Positions

The public sector is facing substantial and pressing technological challenges, among which the shortage of technical talent is particularly prominent. This deficiency directly affects the widespread adoption of big data technologies. In the context of rapid scientific and technological advancements, public institutions frequently find their technical teams lacking the necessary expertise in big data. This challenge stems from the high level of specialization required in the big data domain, while traditional recruitment and training approaches have failed to keep pace with the rapid evolution of technology, resulting in a significant shortage of technical professionals.

Additionally, many public institutions continue to rely on outdated information technology (IT) infrastructures, which directly impedes the effective application of big data technologies. These obsolete systems often lack the capacity to process large datasets efficiently, and the absence of advanced technological infrastructure constrains the public sector's ability to harness the potential value of data. This limitation hinders the realization of data-driven decision-making and innovation in the era of big data. Furthermore, job descriptions in public institutions are sometimes vague or overly broad, and conventional recruitment methods—such as written tests and interviews—may fail to comprehensively assess candidates' actual skills and potential. This misalignment between the evaluation process and the required competencies often leads to a mismatch between employees and the actual demands of their roles.

2.2 Outdated Management Concepts and the Absence of a Data-Driven Decision-Making Culture

A major issue in traditional public sector human resource management lies in the outdated management concepts and the lack of a data-driven decision-making culture. The backwardness in management thinking refers to the continued reliance on conventional operational methods, which results in a lack of responsiveness to contemporary management trends, leading to rigid decision-making processes and low operational efficiency.

Another significant concern is the persistence of traditional decision-making cultures in some public institutions, where decisions are still primarily based on experience and established practices rather than informed by big data analytics. Such a culture inhibits the public sector from fully exploring and utilizing the wealth of data resources available, thereby constraining the capacity to incorporate data-driven insights into decision-making processes. Although big data offers comprehensive, real-time information to support the formulation of more scientific and precise policies and strategies, the entrenched traditional decision-making environment prevents these advantages from being effectively realized.

2.3 Insufficient Human Resource Information Systems and Training Challenges

In the public sector, the current state of human resource information systems (HRIS) reveals significant delays and deficiencies, leading to a range of challenges in data management and employee information maintenance. The primary causes of this underdevelopment include outdated technical infrastructure, limited system functionality, and slow adoption of emerging technologies. These issues hinder the efficient management of human resource data and create obstacles to the timely updating and maintenance of employee records.

Institutional shortcomings further exacerbate the problem, resulting in incomplete and fragmented employee data. The absence of accurate and comprehensive employee information makes human resource planning and management particularly challenging. The lack of critical data—such as employee skills, training histories, and career development trajectories—restricts the human resources department's ability to gain a holistic understanding of internal talent. Without adequate information technology support, it becomes difficult for human resource managers to accurately assess employee training needs or to design and monitor effective training programs. Furthermore, the management and allocation of training resources become more cumbersome, leading to reduced employee interest and participation in professional development. This deficiency also hampers the rational allocation and optimal utilization of talent within the organization.

2.4 Deficiencies in Management Systems and the Need for Welfare Optimization

The absence of a clear and comprehensive management system results in several operational inefficiencies, including unclear decision-making processes, delayed responses, ineffective internal and external communication, and the failure to deliver critical information to relevant personnel in a timely manner. These systemic deficiencies contribute to disorganized decision-making, inefficient communication, and perceived inequities in performance evaluations.

Optimizing the compensation system is a crucial means of enhancing employee motivation and job satisfaction. However, the existing social welfare system often fails to accommodate the diverse needs of employees. Deficiencies in the management framework, coupled with the lack of flexibility and personalization in the welfare system, impede the effective functioning of public institutions. These issues are key factors that hinder organizational efficiency and employee satisfaction, negatively affecting employee morale and diminishing their loyalty to the organization.

3. THE TRIPLE ANALYTICAL FRAMEWORK FOR PUBLIC SECTOR HUMAN RESOURCES IN THE BIG DATA ERA: INDIVIDUAL, HIERARCHICAL (TEAM), AND MACROECONOMIC LEVELS

3.1 Individual-Level Analysis

As the public sector gradually adapts to emerging intelligent technologies, the industry as a whole is undergoing corresponding adjustments to respond to environmental changes. In the context of big data, an institution's ability to effectively manage the changes brought by artificial intelligence (AI) depends largely on the attitudes of government personnel and their acceptance of these changes.

This study, grounded in Self-Determination Theory (SDT), focuses on individual motivation and behavior, emphasizing the critical role of intrinsic motivation. Autonomy is a central tenet of SDT, reflecting an individual's perception of control and choice over their actions. This concept suggests that people are more likely to engage in activities aligned with their intrinsic values and interests while resisting external pressures. In the big data environment, individuals are more willing to adopt AI technologies when they perceive these technologies as useful and easy to use, or when they believe such innovations can have a positive societal impact.

A key component of this framework is the notion of perceived competence, which refers to an individual's desire to engage in meaningful and effective actions. AI technologies, by enhancing individual strengths and competencies, can increase personal satisfaction and well-being.

Additionally, drawing on Hippocrates' temperament theory, the study links individual temperament traits to the four humors of the human body:

Choleric individuals are characterized by optimism, decisiveness, and strong leadership abilities.

Sanguine individuals are sociable, energetic, and cheerful.

Phlegmatic individuals exhibit calmness, emotional stability, and resistance to emotional fluctuations.

Melancholic individuals tend to be sensitive, reflective, and prone to anxiety or sadness.

In the modern workplace, technological advancements significantly shape employee experiences, particularly in terms of accelerated work processes, enhanced operational convenience, and increased work demands. Personality traits play a crucial role in this process: choleric and sanguine individuals demonstrate higher levels of AI acceptance and usage. Employees who are responsible and humble are more likely to benefit from technology and proactively engage with new innovations. Conversely, emotionally sensitive individuals may experience anxiety due to technological changes, leading to resistance and reluctance to adopt AI.

Based on these insights, this study proposes a novel research perspective: individual attitudes toward technology significantly influence the adoption of technological applications, which, in turn, affects individual performance.

Understanding and respecting employee feedback and providing appropriate support and guidance are critical for facilitating adaptation to new environments, promoting technological adoption, and driving organizational growth.

3.2 Team-Level Analysis

At the team level, this study examines how work characteristics influence the adoption and application of AI technologies within collaborative environments. Within a team, various tasks involve specific skill requirements and job characteristics, including skill variety, task identity, task significance, task autonomy, and task feedback. Both the technical capabilities of team members and the nature of their work shape their attitudes toward AI technology adoption, which ultimately impacts the overall effectiveness of technological implementation.

Leadership plays a pivotal role in the successful integration of AI technologies. Different leadership styles directly influence employees' attitudes toward AI and their willingness to engage with new technologies:

Transformational leadership facilitates rapid adaptation to technological changes, fosters innovation, and creates a supportive team environment. Empowering leadership promotes an open organizational culture and encourages employees to take ownership of AI adoption, enhancing their autonomy. Servant leadership tends to support the use of AI technologies to improve service efficiency and streamline operational processes. The degree to which team members can effectively utilize AI to complete tasks, along with the quality of internal collaboration, determines the team's overall productivity and performance.

Accordingly, this study investigates the mechanisms through which teamwork characteristics and leadership influence the adoption of AI technologies and their subsequent impact on organizational performance. By exploring these relationships, the research highlights the critical role that work characteristics and leadership styles play in facilitating the successful implementation of AI and improving overall team effectiveness.

3.3 Macroeconomic-Level Analysis

The level of local economic development significantly influences an organization’s adoption of big data and intelligent technologies, often directly affecting the public sector’s capacity to implement such innovations. Regions with lower levels of economic development may face financial constraints that limit their ability to invest in and adopt AI technologies. In contrast, economically developed regions are better positioned to support and promote the widespread application of emerging technologies. Furthermore, areas with higher economic levels tend to exhibit a more open attitude toward innovation, which increases the demand for advanced AI solutions.

External pressures on public organizations also play a crucial role in shaping decisions regarding the adoption of big data technologies. These external pressures can be categorized into vertical administrative pressure, peer competition pressure, and public service demand pressure: Vertical administrative pressure originates from the directives and policy mandates issued by higher-level governmental bodies. When upper-level governments prioritize and promote AI technology adoption, lower-level governments are compelled to follow suit, thereby influencing their technological choices. Peer competition pressure arises from the competitive dynamics between governmental agencies. This type of pressure incentivizes public sector organizations to pursue excellence in the application of intelligent technologies, driving innovation and technological adoption. Public service demand pressure reflects the increasing demand for more efficient and higher-quality public services. This pressure encourages government agencies to adopt AI technologies to improve operational efficiency and enhance the quality of public service delivery.

In sum, both economic capacity and external institutional pressures significantly shape the public sector’s ability and willingness to adopt and integrate big data and AI technologies into their operational frameworks.

4. RESPONSE MEASURES FOR ARTIFICIAL INTELLIGENCE IN PUBLIC SECTOR HUMAN RESOURCE MANAGEMENT IN THE BIG DATA ERA

4.1 Building a Digitally Integrated Business Model and Reshaping the Human Resource Management System (Individual Level)

The key to organizational development is to promote and support public sector goals through innovations in management mechanisms, which manifest as a deep integration of departmental objectives and talent. Utilizing big

data, public sectors can accurately identify and automatically match employees' skill sets with departmental operational needs, thereby harmonizing the attributes of both the public sector and its personnel. This integration ensures that the right people, doing the right work, in the right way, achieve a better alignment between talent and business, enhancing strategic execution and achieving organizational goals.

At the same time, IBM's Watson Recruitment software can be used to build a digitally integrated business model and reconstruct the recruitment process. By utilizing cognitive tools, demand priorities, matching scores, and success indicators, a large talent database can be created before written exams in the public sector. This database enables classification and evaluation of various talents, preparing for accurate employee-job matching during subsequent interviews. Real-time feedback on supply and demand for human resources can also be provided. This digital transformation creates a comprehensive description of applicants, utilizing intelligent algorithms to optimize the match between candidates and roles, thus enhancing the efficiency and intelligence of the recruitment process. This innovative talent management system offers a reliable way to select talent, supporting the public sector's strategic goals.

In particular, during the interview process, technologies such as voice, facial, and touch recognition can simulate real-life scenarios, examining applicants' emotions, motivations, and preferences comprehensively. Chatbots can also serve as interview assistants, collecting candidate data using machine learning and natural language processing technologies, constructing a detailed profile, and better understanding candidates' values. Additionally, the system can tailor subsequent job assignments according to individual circumstances and preferences, further optimizing the entire employee selection process.

4.2 Leading the Upgrade of Human Resource Management through Digitalization (Team Level)

Digitalization drives the evolution of human resource management toward human resource operations, marking a profound shift in management paradigms. Traditional digital management focuses mainly on basic data handling, such as business and payroll processing. In contrast, modern closed-loop talent management is more comprehensive, emphasizing the construction of an information network. The transformation in technical support is reflected in data empowerment and the embedding of intelligence, with an increased focus on not just analyzing current data but also on forward-looking insights and future designs, enabling public departments to adapt more flexibly to changes.

Digital transformation has also redefined key roles, transforming HR managers into connectors and controllers, aiming to build a social talent supply chain and realize comprehensive talent management. Under this new operational model, human resource operations emphasize data analysis and intelligent applications, promoting the development of employees, user talent, and the overall organization. This transformation shifts the core focus of HR operations from merely functional management to a greater emphasis on creating business value, enhancing talent development, and improving organizational effectiveness. Ultimately, digital transformation provides organizations with a more intelligent, efficient, and sustainable human resource management and operational model, improving their ability to adapt to an ever-changing market and business environment.

However, for public sector human resource management, a significant challenge lies in how to effectively bridge the gaps between individuals. To address this challenge, digital training and development methods must be employed, utilizing technologies like augmented reality (AR) and virtual reality (VR) to establish virtual spaces that replicate realistic work scenarios.

Additionally, big data can be used to identify each individual's strengths that match their job roles. Introducing a job rotation system is an effective strategy to boost employees' participation in training and prevent the occurrence of the Peter Principle. Digital training systems enable HR managers to assess employees' current skill levels through internal information systems. Using artificial intelligence technologies, personalized training and development plans can be tailored to employees based on historical data and experiences of similar employees. Supported by network technologies, innovative training methods such as micro-courses and online live sessions cater to the learning needs of the new generation of public sector employees, maximizing learning outcomes during fragmented time periods. Simulation technologies also allow employees to engage in interactive learning with colleagues and human-machine interactions, significantly improving training effectiveness.

According to the theoretical framework, the team level should promote collaboration by designing tasks and workflows, emphasizing skill diversity and task autonomy, and enhancing the team's adaptability to artificial

intelligence technology. Furthermore, AI systems equipped with learning management systems and training modules can develop crisis management awareness, facilitating the comprehensive enhancement of team capabilities. These transformations support the shift from traditional human resource management to a more advanced public sector development.

4.3 Driving Business Objectives and Talent Motivation Achievement through Goal Performance Innovation (Team Level)

Utilizing digital technology enables a win-win scenario for both departmental performance and individual value, achieving a dual win for organizational and individual performance. On the basis of emphasizing flexibility, efficiency, and controllability, digital performance management within organizations can foster synergy between the organization, teams, and individuals, forming an organic link of "three-party collaboration." With the help of digital technology, there has been a deep integration and alignment between public sector performance and employee performance, leading to the realization of multi-level goals for public departments. Digital technology has solved the cumbersome tasks of goal decoding, decomposition, and setting, ensuring seamless connections and cascading processes for objectives. Furthermore, digital technology makes the performance of public departments a precursor to individual performance, thereby ensuring the alignment of both individual and public sector goals. Through strategic decoding—i.e., goal setting and decomposition—public sector strategic goals are broken down and effectively linked to individual objectives. By leveraging digital technology, public sector strategic goals can be organically aligned with team goals and individual behavior, thereby achieving goal consistency and tracking individual actions.

Additionally, the impact of big data is a significant influencing factor. For instance, how to incorporate big data technology in the evaluation and reward-punishment mechanisms for civil servants, the timing of big data skills training, and the effects of big data collection, storage, and application are crucial issues. In particular, when evaluating grassroots civil servants, it is essential to focus on their ability to collect primary data, especially their consistency in using software and the alignment of their understanding of indicators. During performance evaluations, big data can also be used to enhance the effectiveness and timeliness of performance assessments, rewards, penalties, and compensation.

In promotion decisions, individual capabilities are often the determining factors. The gap between big data analysis techniques and operational skills will represent a substantial competitive edge. Highly qualified, multi-disciplinary talents—who are not only familiar with business operations but also possess rich professional knowledge and experience, coupled with strong data collection and analytical skills—will have a higher chance of being promoted to key positions. During the implementation of "inter-provincial processing," "immediate response to complaints," and the "15-minute government service circle," public sector employees can use digital technologies to accept tasks at the front end, approve them at the back end, and directly submit permissions online, offering efficient, one-stop services to the public. Additionally, digital platforms play an HR role, assisting technical personnel in fully utilizing their expertise. In a digital governance context, professionals who manage work in relevant fields, equipped with "data-driven thinking," "technical adaptability," and "collaborative decision-making" skills, tend to excel in addressing challenges arising from a digital society. The establishment and improvement of digital human resource management systems ensure the effective interaction of talent and information across subsystems within the public sector, facilitating cross-national collaboration.

4.4 Optimizing the Public Sector’s Compensation and Benefits System through Intelligent Big Data (Economic Level)

The compensation and benefits management in the public sector plays a crucial and sensitive role in the overall human resource system. In China, issues such as wage discrepancies between same-level positions within the same city and between different cities are primarily due to the lack of coordination between the national-level compensation system and inconsistent regional wage structures. Moreover, compared to the private sector, the public sector's wage and benefits systems are relatively rigid, making it difficult to adjust them promptly and accurately using market mechanisms.

The application of big data provides effective solutions to many of these challenges. For regions with lower economic development levels, funding and training resources should be provided to assist them in adopting and adapting to artificial intelligence technologies. At the same time, policies should be formulated to emphasize the importance of artificial intelligence in improving service efficiency and addressing public issues, influencing the

technology choices of government departments. On this basis, intelligent algorithms should be developed to integrate compensation and benefits for public sector employees nationwide, considering various economic indicators, thus providing a basis for coordinating and adjusting wages and benefits at national and regional levels. Establishing a nationwide compensation and benefits system that incorporates artificial intelligence technologies will not only help unify public sector wage designs across different regions but also maximize national fiscal efficiency. By leveraging artificial intelligence, it is possible to create a channel for aligning public and private sector wages, establishing a dynamic adjustment mechanism for compensation across industries, and promoting relative fairness in compensation and benefits among employees from different sectors.

Within departments, big data can be used to analyze market trends and survey salary levels for similar and adjacent positions. Public management departments should establish a flexible salary adjustment mechanism to align compensation with the market. Building on this foundation, big data analysis methods should be employed to conduct in-depth research on the needs and expectations of department personnel. Based on these findings, a rational salary system for the public sector should be developed, enhancing employee satisfaction, improving organizational performance, and reducing employee turnover. Furthermore, big data analysis can predict trends in public sector salary development and talent mobility across regions, providing valuable insights for future work in relevant departments. By integrating data from various departments, "information silos" within the public sector can be eliminated, providing a comprehensive understanding of overall compensation management. This helps public departments gain a more complete understanding of the overall salary situation, ensuring salary consistency and fairness, and contributing to the establishment of a more equitable and reasonable compensation system, reducing human intervention, and truly reflecting organizational fairness. On this basis, by utilizing artificial intelligence technology, in-depth measurement of the compensation and benefits management system in China's public sector can be conducted, clarifying the role of material and psychological incentives, and providing a theoretical basis for improving employee motivation mechanisms in the public sector.

5. CONCLUSION

In the new era, digital technology has brought a once-in-a-lifetime development opportunity to public management departments, particularly in the area of talent management. Based on a digitalized government management model, a more innovative human resource development model for departments is proposed. This model can better meet the demands of modern society for talent. By deeply analyzing and revitalizing existing human resources and integrating them with organizational competitiveness, it can better support the strategic objectives of public departments. In the new era, to fully leverage the advantages of digital technology, restructuring the digital talent supply chain is an important strategy that public departments must adopt.

Information technology has driven the return of human resource management in public management departments, focusing on improving individual capabilities and efficiency. Additionally, it has led to the precise development of human resources. Through the reform of management and operational models, the development of public departments has been promoted, emphasizing the high integration of departmental business objectives and talent. On this basis, by using the intelligence of big data, it is possible to effectively integrate organizational operations with employee characteristics, making the accurate alignment of public department operations and talent possible. Therefore, talent management reform based on information technology is key to enhancing the in-depth integration of government efficiency, cloud computing, and service levels. By utilizing digital technology, public departments can better integrate with employee capabilities, thus providing better service to people and achieving the goal of "intelligence, efficiency, and integration." It can also effectively support public departments in maintaining their competitiveness in a rapidly changing society.

REFERENCES

[1] Qiu, Q., & Li, S. (2021). Human resource management in public departments in the digital age: Opportunities, challenges, and response strategies. *China Administrative Management, 12*, 44-51.
[2] Chen, D., & Liu, B. (2022). Public sector human resource management in the age of artificial intelligence: Practical applications and theoretical research. *Public Administration and Policy Review, 11*(04), 38-51.
[3] Li, S. (2023). A brief discussion on human resource management in public departments in the digital era. *Shandong Human Resources and Social Security, 10*, 28-29.
[4] Luo, Y. (2023). The application of big data technology in human resource management in public sectors. *Cooperative Economy and Technology, 22*, 129-131.

[5] Liu, B., & Song, Y. (2023). Research on the cultivation strategy of composite talents in human resource management in public departments in the era of digital intelligence—Taking public service management as an example. *Science and Education Journal, 06*, 59-62.
[6] Liu, X. (2020). The importance of human resource management in public management departments. *Small and Medium Public Sector Management and Technology (Mid-month Edition), 12*, 3-4.