

Article

Research on digital transformation strategy of human resource management in colleges and universities

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Abstract: This paper presents a systematic investigation into the core proposition of digital transformation in human resource management (HRM) within colleges and universities. By conducting an in-depth analysis of how digital technologies reshape core functions such as human resource planning, recruitment, training, performance management, and compensation management, and by combining this with lessons learned from typical cases, this systematic research provides theoretical support and a practical pathway for universities undertaking this transformation. Building on this analysis, the paper proposes a set of forward-looking and practical implementation strategies, along with a supporting mechanism, to offer theoretical guidance and practical pathways for institutions undertaking digital transformation initiatives. It further elaborates on the application of digital technologies across key HR functions, including planning, recruitment, training, performance management, and compensation, and draws on practical cases to summarize lessons learned. The findings aim to support higher education institutions in successfully navigating digital transformation, thereby enhancing operational efficiency, strengthening competitiveness, and adapting more effectively to the demands of the digital era.

Keywords: university human resource management; digital transformation; human resource information system

1. Introduction

Since around 2010, emerging technology clusters represented by big data, artificial intelligence and cloud computing have been penetrating into all areas of social production with unprecedented breadth and depth. Technology has become one of the key variables driving the development of universities, reshaping their core business processes through data-driven decision-making, process automation and intelligent services, profoundly changing traditional operation and management models, and promoting educational institutions to evolve towards intelligence, precision and personalization. As one of the core functional areas of universities, human resource management urgently needs digital transformation. This transformation can not only optimize the processes of human resource management, improve the scientificity and accuracy of decision-making, but also enhance the satisfaction and experience of employees, and fully tap the potential of talents (Purwanto, A, 2023). Digital transformation, in simple terms, refers to the use of digital technologies (such as cloud computing, big data, artificial intelligence, the Internet of Things, etc.) to reshape the business model, processes, culture and customer experience of an organization (be it a company, government or insti).

Based on this, this article aims to systematically explore the following core issues:
(1) What are the internal and external driving factors for the digital transformation of

university human resource management? (2) At which stage is the current transformation? What key challenges are faced? (3) How can a forward-looking yet practical implementation strategy and guarantee mechanism be constructed? By building an integrated analysis framework and combining theoretical exploration with case studies, this article intends to fill the aforementioned research gaps and provide systematic theoretical support and practical guidance for the digital transformation of university human resource management.

2. Drivers of digital transformation

2.1. External environmental pressure

Under the impetus of the global economic integration trend, external environmental pressures are constantly increasing. Higher education institutions are now facing increasingly fierce cross-border and cross-regional competition—not only do they have to compete with domestic and foreign traditional counterparts for students and teachers, but also have to deal with challenges from multinational education groups and online education platforms (such as Coursera and edX, which offer degree programs and micro-certificates). The continuous emergence of new competitors, along with policy adjustments, technological iterations and economic fluctuations, has made the external environment highly unstable. In this context, the university decision-making chain operating in the traditional mode is lengthy, resource allocation is rigid, and it often responds slowly and inefficiently to market changes, making it difficult to adapt to the rapid changes in social needs and the pace of the talent market. At the same time, some changes have taken place in the educational concepts of parents and students, and personalization, diversification and professionalization have become the mainstream trend. They expect universities to accurately meet their unique needs and provide customized products and services (Saifudin, M., & Rindaningsih, I. 2024). This is specifically manifested in the following aspects: Firstly, the trend of personalized learning is becoming increasingly evident. Students are no longer satisfied with a “one-size-fits-all” training plan. Instead, they expect universities to provide customized course options, flexible learning schedules, and diverse evaluation methods based on their interests, abilities, and career plans. Secondly, the demand for online and blended learning has significantly increased. Especially after experiencing large-scale online teaching practices, learners have increasingly recognized the value of technology empowering education and expect to break the limitations of time and space through high-quality online resources to achieve efficient learning anytime and anywhere. Thirdly, the emphasis on professional skills and practical abilities has reached an unprecedented level. Students and parents hope that universities can precisely align with industry needs and provide more practical projects and ability certification opportunities that are in line with the industry’s cutting-edge level. In other words, they expect universities to precisely identify and meet their individualized, diversified, and specialized needs, and provide truly “learner-centered” customized products and services.

2.2. Technological innovation

Technological innovation is reshaping the development trajectory of various fields with unprecedented breadth and depth, particularly driving exponential growth in iteration speed in the field of technology. Taking the rise of big data technology as an example, it is fundamentally changing the management paradigm of human resources in universities: through semantic analysis and pattern recognition of massive recruitment information, multidimensional evaluation of dynamically updated employee performance files, and deep learning of systematic training records, universities can accurately extract key information reflecting talent supply and demand, ability structure, and development path from these heterogeneous data sources. These data, which have undergone intelligent cleaning and structured processing, are ultimately integrated into a unified data warehouse, forming traceable, analyzable, and predictable human resources digital assets, providing continuous data support for strategic decision-making, promoting the transformation of human resources management from experience oriented to data-driven, and achieving more scientific talent introduction, more accurate performance evaluation, and more personalized career development planning. By using professional algorithms for in-depth analysis, colleges and universities can provide valuable information, such as employees' potential advantages and career development trends. The outstanding performance of artificial intelligence technology is reflected in many aspects, such as rapid screening of several resumes in the recruitment process and accurate matching of candidates suitable for positions. The intelligent customer service system can answer the common employee questions at any time. It can also establish a model based on historical data to accurately predict employees' performance trend (Tiwow, 2023). The popularity of cloud computing has reduced the cost of hardware acquisition, operation and maintenance. Colleges and universities can easily access the human resources system anytime and anywhere through the cloud platform, obtain data and process business, and realize the flexibility and efficiency of management. The comprehensive maturity and application of these technologies have laid a solid foundation for the digital transformation of human resources (D íz-Garcia, V, 2023).

2.3. The digital age is coming

In the context of digital transformation, the definition of digital talents has undergone a fundamental change. Digital talents are those who possess digital thinking, can utilize digital tools and technologies, create new value, solve complex problems in specific business scenarios, and drive organizational change.

The traditional human resources management model focuses on transactional tasks. It has limited recruitment channels, outdated training content, and narrow career development paths, which are unable to meet the current expectations and demands for talent. At the same time, it is also necessary to open up digital career promotion channels, provide personalized training resources, display diversified career development opportunities, so as to attract, cultivate and retain digital talents in an all-round way, enrich the talent team of colleges and universities, and accumulate strength for the long-term development of colleges and universities (Nguyen, T. H.2023).

3. Current situation of digital transformation

3.1. Human resource information system

Some colleges and universities have achieved preliminary results(Yin, X., Liu, H., & Kong, C. 2024). Driven by the wave of digitalization, some large-scale colleges and universities with scale and strength have keenly grasped the opportunity of change and taken the lead in introducing a fully functional human resource information system (HRIS). Through this system, colleges and universities have successfully integrated employee information scattered in various departments and levels, and established a unified and efficient data management platform (Sikira, R., & Mishael, A. 2024). The previous cumbersome leave approval process has been optimized. Employees only need to submit an application online, and the system can automatically flow to the corresponding person in charge and provide feedback on the approval results in real time. The reimbursement process has also been simplified. Employees can upload vouchers online with one click to quickly complete the verification and payment process, and the salary payment has also become accurate and punctual, effectively avoiding human errors. Some leading-edge Internet universities also make full use of the advantages of big data to collect a large amount of data, such as employees' daily work output and project completion for in-depth analysis, so as to accurately grasp the performance trend and accurately identify the performance weakness, which provides a key basis for subsequent targeted improvement and the selection of high-potential talents(Hu, L. & Zhang, Y. 2023). In addition, some colleges and universities have also boldly adopted AI technology to carry out virtual training by simulating real training scenarios, enabling employees to start learning anytime and anywhere without time and space constraints, which has greatly broadened the channels of learning and knowledge acquisition (Meijerink, J, 2021).

3.2. Limitations of transformation

The overall level of transformation is uneven. Public colleges and private colleges are facing many challenges on the road to digital transformation of human resource management, limited by their own development conditions(Anonymous. 2023). In terms of funds, the purchase of advanced digital equipment and software systems and subsequent operation and maintenance upgrades require high budgets, which is a great burden for colleges and universities with tight budgets. In terms of technology, due to the lack of a professional IT team, some colleges and universities find it difficult to independently develop systems suitable for their needs. At the same time, it is also difficult to digest and absorb the technology introduced from outside. In addition, talent reserve is also an important issue. Interdisciplinary talents who understand human resources and are proficient in digital technology are very scarce in all kinds of colleges and universities. These factors lead to all kinds of colleges and universities still relying on manual records and semi-automatic office means to handle personnel business. Although some traditional colleges and universities purchased HR software, they did not fully utilize it, and fell into the dilemma of "buying but not using, using but not deep". These colleges and universities only complete the entry of basic data, rarely use functions such as report generation, and cannot tap the deep potential

of the system and realize refined management. Even in the universities with leading digital transformation, there are significant differences in the transformation progress of each human resource segmentation module. For example, the recruitment module may have been highly intelligent, but the training and performance management module is relatively lagging, presenting a complex situation of “partial optimization and overall imbalance” (Anonymous.2023) .

3.3. Security and privacy challenges

Facing the challenges of data security and privacy with the rapid development of human resource management in Colleges and universities to digitalization, a large amount of employee personal information, salary data, career development records and other data are frequently transmitted and stored between systems and in all links, and the hidden dangers of data security also increase significantly(Qiu, E., Liu, M., Zhang, H., et al. 2024). If it encounters hacker attacks or internal mismanagement, the risk of data leakage and malicious tampering will rise sharply. This not only directly infringes upon the personal information rights and privacy of employees but may also trigger a crisis of trust among teachers, students, and staff in the management capabilities of universities, weakening the cohesion and stability within the organization. Once such incidents occur, they can quickly ferment through media and social networks, causing widespread and lasting negative impacts on the public image and social reputation of universities, ultimately affecting their enrollment quality, research cooperation, and external resource acquisition. However, many universities still have obvious shortcomings in data security protection. On the one hand, the overall security awareness is relatively weak, and data security has not been truly incorporated into the core of campus governance. On the other hand, the management system is loose and lacks a systematic data classification and grading mechanism, as well as permission control processes. At the technical level, many systems are still in the basic protection stage and have not widely applied mature and effective security measures such as strong encryption algorithms, multi-factor authentication, data anonymization, and terminal behavior auditing, resulting in a large amount of sensitive information being exposed to potential risks. At the same time, the management of access rights is chaotic, which makes it easy for irrelevant personnel to obtain sensitive data. In addition, the privacy protection policy has not been effectively implemented, and the employees’ data collection has not been fully informed and agreed upon, which has buried hidden dangers for subsequent legal disputes and brought many potential risks to the smooth operation of colleges and universities.

4. Key strategies for transformation

4.1. HRIS system

In the critical period of digital transformation, the construction of an integrated human resource information system (HRIS) in colleges and universities has become the primary task (Strohmeier, S. 2020). Strong colleges and universities need to choose systems with comprehensive functions and strong expansibility due to their diversified business and large number of employees, while small and medium-sized colleges and

universities pay more attention to cost performance and convenient operation, and tend to choose standardized products. After selecting the system, it should ensure that it fully covers key modules, such as recruitment management, training resource allocation and effect evaluation, performance tracking, and salary accounting and distribution. At the same time, universities should focus on optimizing the user interface and interactive experience of their human resources systems, following the principles of intuitive and concise design, and integrating and simplifying previously scattered and complex operational processes. By providing clear and illustrated operation guides, as well as adding intelligent guidance and common question answering functions, the learning and usage barriers for all employees, especially new hires, can be significantly reduced. This enables new employees to quickly and autonomously complete routine personnel processes such as leave applications and expense reimbursements without relying heavily on verbal guidance, effectively shortening their adaptation period and improving overall work efficiency and employee satisfaction.

4.2. Big data is an important resource

Using big data to accurately empower human resource management is an important resource for the digital transformation of colleges and universities (Theres, C., & Strohmeier, S. 2023). Colleges and universities should collect internal and external data at the same time. The internal data includes employee files, attendance and performance, while the external data covers the industry salary level and the supply and demand dynamics of the talent market, to establish a dynamic talent database. Through data analysis, colleges and universities can accurately describe the required talent portraits, and lock in the talent distribution areas and recruitment channels with specific skills and experience. A systematic analysis should be conducted on the dynamic correlation and fluctuation patterns between the performance of faculty and staff during their tenure and the turnover rate, accurately identifying the “high-risk positions” and “high-risk stages” of turnover, as well as the key driving factors behind them (such as career development bottlenecks, salary and benefits, team atmosphere, or workload, etc.). Based on these deep insights, managers can transform passive responses into proactive interventions, develop and implement personalized retention strategies and management plans for different groups, thereby improving talent retention rates and organizational stability.

4.3. The introduction of AI improves efficiency

The introduction of AI technology to improve management efficiency and quality provides a new way to improve the efficiency and quality of human resource management (Shouraki, M. K, 2024). In the recruitment process, an AI algorithm can quickly screen a large number of resumes and select candidates with matching majors and experience according to job requirements. This will significantly shorten the screening cycle. In the training scenario, AI intelligent tutors can answer the learning problems of employees in real time, monitor the learning progress, and timely remind employees with lagging progress or weak knowledge. In the performance evaluation system, the introduction of artificial intelligence is first reflected in assisting managers

in building a set of quantitative and objective evaluation indicators, effectively eliminating the bias and inconsistency caused by subjective judgments in traditional methods. Through deep mining and multidimensional analysis of massive performance data, AI can accurately identify employees' key contributions and development shortcomings, thereby outputting highly fair and transparent evaluation results. This not only greatly enhances the reliability and validity of the evaluation process, but also provides a solid and reliable data basis for subsequent salary incentives, talent cultivation, and promotion decisions.

4.4. Digital learning platform

To build a digital learning and development platform, colleges and universities should integrate online and offline high-quality learning resources and build a digital learning platform (cloud classroom)(Bresciani, S. 2021). Online platforms gather videos of industry-leading online courses and academic lectures, while offline experts are invited to give lectures and organize practical workshops. The course library covers many fields, such as professional skills upgrading, application of digital tools and leadership training. In order to stimulate employees' enthusiasm for learning, colleges and universities can introduce game-based mechanisms, such as exchanging points for prizes, displaying learning achievements with badges, and displaying learning progress in real time with leaderboards. At the same time, AI technology is used to track the learning trajectory of employees, accurately locate their knowledge mastery, and push consolidation exercises and advanced courses to promote continuous and in-depth learning of employees.

4.5. Process automation

The tedious daily human resource task of promoting human resource management process automation consumes a lot of manpower, so promoting process automation is very important (Priyashantha, K. G. 2022). Colleges and universities should first sort out the whole process and identify repetitive and mechanical tasks such as attendance statistics, wage accounting and social security handling(Sobczak, A. 2019). Then the workflow engine is used to automatically flow applications such as leave and reimbursement, and the robot process automation (RPA) technology is used to capture attendance data regularly every month, calculate wages efficiently and generate a social security payment list with one click. After the automation transformation, the staff of the personnel department can free themselves from basic affairs and devote more energy to strategic planning, talent reserve planning, incentive mechanism design and high value-added work, so as to help the long-term development of colleges and universities.

5. Case study

5.1. Huawei

Digital talent management drives global business development as a leading science and Technology University in the world. Huawei deeply understands the importance of digital transformation of human resource management to support its

huge business system (Strohmeier, S. 2020), so it took the lead in establishing a globally unified human resource information system (HRIS) (Zhou, Y. 2020). This system fully covers the information of nearly 190,000 Huawei employees around the world, including basic personal information, education background, work experience, skills and expertise, project experience and performance evaluation results. Through this system, Huawei can grasp the latest developments of global human resources in real time and accurately. During the implementation of the project, Huawei makes use of its big data analysis capability to deeply analyze the professional skills, project experience and geographical distribution of employees, to accurately select the talent advantages of different regions. When the overseas 5G base station construction project is launched, Huawei can quickly deploy professionals in communication technology and engineering implementation across regions to efficiently meet the employment needs of the project. Huawei's AI interview system plays an important role in the recruitment of fresh students (Meijerink, J, 2021). Through the preset post-matching model, the system can quickly scan and analyze a large number of resumes, and accurately screen out candidates with professional counterparts and excellent comprehensive quality, which significantly shortens the recruitment cycle and improves the accuracy of recruitment. In addition, Huawei has also carefully built the digital learning platform I-learning, which provides a wealth of cutting-edge technology courses and practical projects. The average annual learning time of employees is more than 80 h, which has continuously cultivated interdisciplinary talents in communication, cloud computing and other fields for colleges and universities, and effectively promoted the rapid development of Huawei's business worldwide (Li, M., & Zheng, M. 2021).

5.2. Tencent

In the process of promoting the digital transformation of human resources, Tencent has always integrated user-centered design thinking into management practice. With its deep accumulation of Internet technology, Tencent took the lead in gaining insight into the excellent employee experience, which is the key to improving the efficiency of modern human resources management. Based on this strategic insight, Tencent has creatively built a comprehensive platform integrating communication, learning and development—"Tencent enjoy". The platform is not only a tool, but also represents its people-oriented, forward-looking management mode committed to improving employee engagement and organizational vitality, setting a benchmark for the industry. The platform integrates knowledge sharing, training courses, employee activities and other functions. Employees can share technical experience and project experience here, and can also easily obtain professional skills improvement courses. In addition, the organizational information of online and offline employee activities is displayed on the platform, successfully creating an open and interactive digital working atmosphere. Tencent uses big data technology to deeply mine the daily work data and social interaction information of employees, and accurately grasp the interests and needs of employees. Based on this in-depth understanding, the welfare department can accurately push the medical examination packages and holiday gifts that meet the preferences of employees. The planning team can also customize more attractive team

development activities according to the needs of employees, effectively improving employee satisfaction. In terms of performance evaluation, Tencent introduced a 360-degree feedback mechanism and combined it with AI data analysis. The multi-dimensional evaluation of colleagues, superiors and subordinates, together with AI's in-depth analysis of work results and business data, can comprehensively and objectively present the performance of employees, reduce subjective bias and miscalculation, fully stimulate the creativity of employees, and provide a strong driving force for diversified business innovation(Jie Huang 2022).

6. Transformation safeguard measures

6.1. Strengthening organizational leadership and formulating strategic planning

Strengthening organizational leadership and formulating strategic planning play a vital role in the important transformation of digital human resource management in colleges and universities(Bondarouk, T. 2016). The top management of colleges and universities needs to deeply understand the urgency and importance of digital transformation from the strategic level, regard it as the core issue of the development of colleges and universities, set an example and provide comprehensive support. Therefore, colleges and universities should set up a special leading group headed by senior leaders and participated by the core heads of various departments to break the barriers between departments, effectively plan and allocate key resources such as financial, technical and human resources, and ensure that the resources required in the transformation process are adequately guaranteed. When formulating the digital transformation strategy, colleges and universities should clearly set phased goals based on their own scale, industry characteristics, development vision and other factors. In the short term, we should focus on the digitalization of basic personnel processes. In the medium term, we should strengthen the application of big data analysis and AI technology. In the long run, it is necessary to build an intelligent decision-making system. At the same time, it is necessary to refine the implementation path, clarify the main tasks, key nodes, and responsible persons at each stage, and ensure that responsibilities and tasks are assigned to individuals and positions. In addition, colleges and universities should regularly review and evaluate the progress of transformation, collect internal and external feedback, and adjust strategies in time in combination with market dynamics and technological innovation. For example, when new technologies promote more efficient recruitment algorithms, colleges and universities should timely adjust the planning of the recruitment sector to ensure that the transformation can move steadily in the right direction.

6.2. Intellectual support for talents

The promotion of digital transformation of cultivating and introducing digital professionals is inseparable from the intellectual support of professionals (van Rossenberg, 2022). Therefore, colleges and universities need to take a two-pronged approach to enrich their talent team. On the one hand, colleges and universities should tap the internal potential and carry out customized training for the existing personnel

department staff. By inviting industry experts and technical backbones to carry out special training, such as data analysis and AI practice, their theoretical foundation will be consolidated. At the same time, the personnel department staff have the opportunity to go deep into the technical and business departments through job rotation communication. This can deepen the understanding of the application scenarios and processes of digital tools in practice. On the other hand, colleges and universities should actively broaden the channels of external talent introduction and vigorously introduce scarce talents, such as data analysts and AI engineers. Therefore, colleges and universities need to develop attractive salary and welfare programs in combination with their own actual situation in order to attract elite talent in the industry. At the same time, colleges and universities also need to build a cross-domain communication platform to promote in-depth integration between new talents and the personnel department team, so that they can share cutting-edge technical concepts and industry trends.

6.3. Data security and compliance management system

With the massive aggregation and frequent circulation of human resource data (Mazurchenko, A., & Maršíková, K. 2019), the establishment of a data security and compliance management system has become a top priority. Colleges and universities should have a forward-looking vision and invest sufficient funds for technology upgrading and the purchase of protective equipment. Specifically, advanced encryption technology should be introduced to ensure that sensitive data is encrypted throughout the transmission and storage process, and deploy an efficient firewall system to resist external illegal network intrusion. The intrusion detection system is installed to monitor the abnormal traffic and attack behavior in the network in real time, strengthening the data security defense line in an all-around way. In addition, colleges and universities should formulate strict data management norms. This includes further clarifying and defining the specific scope and boundaries of data collection to ensure that the employee data obtained not only strictly follows the principles of “legality, legitimacy, and necessity” but also clearly informs the data subject and obtains their consent before collection, and prohibits any data collection behavior beyond the scope and without authorization. At the same time, it is necessary to systematically regulate various scenarios of data usage, clarify authorization mechanisms and permission levels, and strictly prohibit any data abuse beyond the original purpose, unauthorized internal calls, or illegal external provision. In the data storage process, storage media, storage period, and storage security requirements should be refined, and effective technical measures should be taken to ensure the integrity, confidentiality, and availability of data during storage, in order to prevent data leakage, damage, or loss. In addition, a clear and executable data destruction process must be established to promptly and thoroughly delete or anonymize redundant data that has exceeded its retention period or is no longer of use, in order to reduce the risk of data retention. Based on fully complying with relevant national laws, regulations, and industry standards, universities should also establish and improve a normalized data security management mechanism, regularly hire qualified data security professional institutions to conduct systematic audits and penetration testing,

comprehensively investigate and identify potential risks and compliance gaps in the entire data processing process, and develop targeted rectification plans, timely implement repair and optimization measures, in order to continuously improve the level of data governance and security capabilities.

6.4. Digital university culture

Building a digital university culture is an important support for digital transformation (Pu, R., Dong, R. K., & Jiang, S. 2025). Colleges and universities should take a variety of measures to create a strong digital atmosphere (Marsh, E., Vallejos, E. P., & Spence, A. 2022). In terms of internal publicity, make full use of the university's official website, internal publications, bulletin boards and other channels to comprehensively explain the concept and value of digitalization, popularize the application results of new technologies and successful cases of transformation, so that employees can intuitively feel the charm of digitalization. Colleges and universities should regularly organize digital skills competitions and set up rich awards to stimulate employees' learning enthusiasm and competitive awareness. At the same time, regularly carry out training activities, invite technical experts to share practical experience and industry trends, and improve the digital operation level and knowledge reserve of employees (Rohayati, T. 2024).

7. Conclusion

This study systematically presents the overall picture of the digital transformation of human resource management in higher education institutions, and at the theoretical level, reveals the multi-dimensional driving mechanisms of this transformation. It clarifies the interaction among external technological infiltration, competitive pressure, internal efficiency improvement, and the release of talent value. This provides an integrated analytical framework for understanding the formation logic of the digital transformation of human resource management in universities.

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