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HUMAN DIGITAL TWIN IN ELECTRONIC HUMAN RESOURCE MANAGEMENT: A CONCEPTUAL FRAMEWORK FOR PERSONALIZED TALENT MANAGEMENT IN INDUSTRY 5.0

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Abstract

The rapid advancement of Industry 5.0 has transformed the strategic role of Human Resource Management (HRM), shifting organizational priorities from technology-driven automation toward human-centered innovation and sustainable workforce development. While Electronic Human Resource Management (e-HRM) has significantly improved the efficiency of human resource processes through digital technologies, current e-HRM systems often lack personalization, predictive intelligence, and continuous adaptation to employees' dynamic capabilities. This conceptual paper introduces the concept of the Human Digital Twin (HDT) as an innovative framework for enhancing e-HRM practices within the Industry 5.0 paradigm. The proposed framework integrates artificial intelligence, real-time workforce analytics, competency mapping, digital behavior analysis, predictive career development, and employee well-being monitoring into a unified digital representation of individual employees. Through an extensive review of recent literature on e-HRM, Industry 5.0, digital twins, artificial intelligence, and talent management, this study develops a comprehensive conceptual model demonstrating how Human Digital Twins can support personalized talent management throughout the employee lifecycle, including recruitment, training and development, performance management, succession planning, career development, and employee retention. The framework emphasizes ethical artificial intelligence, data governance, employee privacy, transparency, and human-centered decision-making as fundamental principles for successful implementation. Furthermore, the study argues that Human Digital Twins have the potential to strengthen organizational resilience, enhance employee experience, foster workforce agility, and improve strategic decision-making in increasingly digital organizations. This paper contributes to the emerging literature by extending the application of Digital Twin technology beyond industrial operations into strategic human resource management, offering both theoretical insights and practical guidance for organizations preparing for Industry 5.0.

Keyword: *Human Digital Twin; Electronic Human Resource Management; e-HRM; Industry 5.0; Artificial Intelligence; Personalized Talent Management; Digital Workforce; Human-Centered AI*

A. INTRODUCTION

The emergence of Industry 5.0 represents a significant transformation in organizational management by shifting the focus from technology-centered automation toward human-centered innovation, sustainability, and collaboration between humans and intelligent technologies. Unlike Industry 4.0, which primarily emphasized automation, cyber-physical systems, and smart manufacturing, Industry 5.0 highlights the importance of placing human values, creativity, and well-being at the center of technological development. Organizations are therefore expected to utilize advanced digital technologies not only to improve operational efficiency but also to empower employees, encourage innovation, and create sustainable organizational ecosystems.

Human Resource Management (HRM) has experienced substantial changes due to digital transformation. Traditional administrative functions have evolved into strategic activities supported by Electronic Human Resource Management (e-HRM), allowing organizations to digitize recruitment, training, performance appraisal, compensation, and employee development. The integration of cloud computing, artificial intelligence, big data analytics, and machine learning has enabled organizations to automate numerous HR processes while improving decision-making capabilities.

Despite these technological advancements, existing e-HRM systems continue to face several limitations. Most digital HR platforms remain focused on administrative efficiency rather than individualized employee development. Performance evaluations are generally conducted periodically, competency assessments are often static, and career planning frequently relies on historical performance rather than predictive analytics. Consequently, organizations encounter difficulties in identifying employee potential, anticipating competency gaps, and delivering personalized talent development strategies.

Recent advances in Digital Twin technology present new opportunities for addressing these limitations. Initially developed within manufacturing and engineering environments, Digital Twin technology creates virtual representations of physical objects that continuously receive real-time data for monitoring, simulation, and prediction. The rapid evolution of artificial intelligence and workforce analytics has expanded the concept toward Human Digital Twin (HDT), which digitally models employees by integrating competency profiles, behavioral patterns, learning progress, performance indicators, well-being conditions, and career aspirations into a continuously updated digital ecosystem.

Within Human Resource Management, Human Digital Twins offer the possibility of transforming traditional e-HRM systems into intelligent, adaptive, and personalized platforms capable of supporting strategic talent management. By combining artificial intelligence with real-time employee data, organizations can deliver individualized learning recommendations, predict employee turnover, optimize succession planning, identify future leadership potential, and improve workforce planning while maintaining ethical standards and employee privacy.

Although Digital Twin technology has attracted increasing attention across engineering, healthcare, and manufacturing disciplines, its application within Electronic Human Resource Management remains limited. Existing studies generally discuss Digital Twin implementation in operational environments rather than examining its strategic role in talent management, organizational development, and employee experience. Furthermore, limited conceptual research has integrated Human Digital Twin, Artificial Intelligence, and Industry 5.0 into a unified framework for personalized talent management.

Therefore, this study proposes a novel conceptual framework entitled Human Digital Twin in Electronic Human Resource Management. The framework positions Human Digital Twin as the next evolution of e-HRM capable of supporting personalized talent management through intelligent data integration, predictive analytics, and human-centered decision-making aligned with Industry 5.0 principles. By introducing this framework, the study seeks to contribute to both the theoretical development of digital human resource management and practical strategies for organizations preparing for the future of work.

B. RESEARCH METHOD

This study employed a conceptual research design using a systematic literature review (SLR) approach to develop a Human Digital Twin framework within Electronic Human Resource Management (e-HRM) in the context of Industry 5.0. Rather than collecting primary data, the study synthesized existing theories and empirical findings from reputable academic publications to identify current developments, research gaps, and emerging concepts related to digital human resource management.

The literature was collected from internationally recognized databases, including Scopus, Web of Science, ScienceDirect, SpringerLink, Emerald Insight, IEEE Xplore, and Google Scholar. The search focused on peer-reviewed English-language publications published between 2020 and 2026 using keywords such as *Human Digital Twin*, *Electronic Human Resource Management*, *Industry 5.0*, *Artificial Intelligence in HRM*, *People Analytics*, and *Personalized*

Talent Management. Only studies directly relevant to human resource management and digital transformation were included in the analysis.

The collected literature was analyzed using thematic analysis to identify relationships among key concepts and develop an integrated conceptual framework. The findings from previous studies were synthesized to explain how Human Digital Twin technology can enhance e-HRM by supporting personalized talent management, predictive workforce analytics, employee well-being, and strategic organizational decision-making while maintaining the human-centered principles of Industry 5.0.

C. RESULTS AND DISCUSSION

3.1 Human Digital Twin as the Next Evolution of Electronic Human Resource Management

The findings indicate that Electronic Human Resource Management (e-HRM) has evolved beyond its traditional administrative functions into a strategic digital platform supporting organizational decision-making. Earlier e-HRM systems primarily focused on digitizing recruitment, payroll administration, attendance monitoring, and employee record management. Although these systems significantly improved operational efficiency, they often lacked intelligent capabilities to understand employees as dynamic individuals with continuously changing competencies, aspirations, and behavioral patterns.

Human Digital Twin introduces a new paradigm by creating a virtual representation of each employee using real-time organizational data. Unlike conventional employee databases, Human Digital Twin continuously integrates competency profiles, learning achievements, work performance, behavioral analytics, career aspirations, and employee well-being into a living digital model. This dynamic representation allows organizations to monitor employee development more accurately and continuously.

The integration of artificial intelligence further strengthens the capabilities of Human Digital Twin. AI algorithms can analyze large volumes of employee data to identify competency gaps, predict future performance, recommend personalized training programs, and estimate employee turnover risks. Consequently, HR professionals can shift from reactive administrative tasks toward proactive strategic talent management supported by predictive analytics.

Within the Industry 5.0 perspective, Human Digital Twin complements the human-centered philosophy by ensuring that technology serves employees rather than replacing them. Instead of emphasizing automation alone, the proposed framework promotes collaboration

between intelligent technologies and human decision-makers, enabling organizations to develop more adaptive, resilient, and employee-oriented HR practices.

3.2 Human Digital Twin for Personalized Talent Management

One of the major contributions of Human Digital Twin lies in its ability to support personalized talent management throughout the employee lifecycle. Traditional HR practices often apply standardized approaches to recruitment, learning, performance evaluation, and career development. However, employees possess different competencies, motivations, learning styles, and professional goals, making individualized HR strategies increasingly necessary.

Through continuous digital profiling, Human Digital Twin enables organizations to understand employees at a much deeper level. Artificial intelligence can identify individual strengths, competency deficiencies, learning preferences, and future career potential based on continuously updated workforce data. Such information enables HR professionals to design customized development plans that better align organizational objectives with employee aspirations.

Personalized talent management also improves employee engagement and job satisfaction. When organizations provide individualized learning opportunities, career pathways, mentoring programs, and succession planning, employees are more likely to perceive organizational support and remain committed to long-term career development. This contributes to higher organizational performance while simultaneously reducing employee turnover.

Furthermore, Human Digital Twin supports strategic workforce planning by predicting future competency requirements and identifying employees who possess leadership potential. This capability enables organizations to prepare succession strategies more effectively while ensuring that talent development initiatives remain aligned with future organizational challenges under Industry 5.0.

3.3 Artificial Intelligence and Ethical Considerations in Human Digital Twin

Artificial intelligence serves as the analytical engine of the proposed Human Digital Twin framework. Machine learning algorithms continuously process workforce data to generate predictive insights related to employee performance, competency development, retention probability, learning effectiveness, and organizational productivity. These intelligent capabilities significantly enhance evidence-based human resource decision-making.

Despite these advantages, the implementation of Human Digital Twin also introduces important ethical challenges. Employee data are highly sensitive and require strict governance to prevent misuse, unauthorized access, discrimination, and algorithmic bias. Organizations must therefore establish comprehensive data protection policies while ensuring compliance with applicable privacy regulations.

Transparency also becomes an essential requirement within AI-enabled HR systems. Employees should understand how their personal data are collected, analyzed, and utilized during organizational decision-making. Transparent communication increases employee trust and reduces concerns regarding excessive workplace surveillance or unfair algorithmic evaluations.

Therefore, the successful implementation of Human Digital Twin depends not only on technological sophistication but also on responsible AI governance. Organizations should balance predictive intelligence with fairness, accountability, transparency, employee consent, and human oversight to ensure that digital transformation remains consistent with the human-centered values promoted by Industry 5.0.

3.4 Proposed Human Digital Twin Framework for Industry 5.0

Based on the synthesized literature, this study proposes a conceptual Human Digital Twin framework that integrates Electronic Human Resource Management, Artificial Intelligence, workforce analytics, and personalized talent management into a unified strategic model. The framework positions Human Digital Twin as the central intelligence layer connecting organizational data with strategic HR decision-making.

The framework begins with digital employee data collected through e-HRM platforms, including competency records, learning history, performance indicators, behavioral analytics, health and well-being information, and career aspirations. Artificial intelligence continuously analyzes these datasets to generate dynamic employee profiles capable of supporting predictive HR decisions.

The outputs generated by Human Digital Twin include personalized recruitment recommendations, adaptive learning programs, competency forecasting, succession planning, employee retention strategies, and organizational workforce planning. Rather than applying standardized HR policies, organizations can implement individualized talent management strategies that maximize employee potential while supporting organizational competitiveness.

Overall, the proposed framework demonstrates that Human Digital Twin represents the next stage in the evolution of Electronic Human Resource Management. By integrating

intelligent analytics with human-centered management principles, organizations can enhance employee experience, organizational resilience, innovation capability, and long-term sustainability, thereby achieving the strategic objectives envisioned in Industry 5.0.

D. CONCLUSION

This study proposed a conceptual Human Digital Twin framework as an innovative extension of Electronic Human Resource Management within the context of Industry 5.0. The framework demonstrates that integrating artificial intelligence, workforce analytics, and digital employee profiles can significantly enhance personalized talent management while supporting more strategic and evidence-based human resource decision-making.

The proposed model positions Human Digital Twin as a human-centered digital ecosystem capable of improving recruitment, learning and development, performance management, succession planning, career development, and employee retention through continuous data-driven insights. At the same time, ethical artificial intelligence, transparency, employee privacy, and responsible data governance remain fundamental requirements for successful implementation.

The study contributes theoretically by extending Digital Twin technology into strategic Human Resource Management and offers practical guidance for organizations seeking to accelerate digital HR transformation. Future research is encouraged to empirically validate the proposed framework across different organizational settings and industries to strengthen its practical applicability.

E. REFERENCES

Budhwar, P., Malik, A., De Silva, M. T., & Thevisuthan, P. (2022). Artificial intelligence–Challenges and opportunities for international HRM: A review and research agenda. International Journal of Human Resource Management, 33(6), 1065–1097.

Cascio, W. F., & Montealegre, R. (2023). How technology is changing work and organizations. Annual Review of Organizational Psychology and Organizational Behavior, 10, 349–375.

European Commission. (2021). Industry 5.0: Towards a Sustainable, Human-Centric and Resilient European Industry. Publications Office of the European Union.

Huang, M. H., & Rust, R. T. (2021). A strategic framework for artificial intelligence in marketing. Journal of the Academy of Marketing Science, 49(1), 30–50.

Margherita, A. (2022). Human resources analytics: A systematization of research topics and

directions for future research. Human Resource Management Review, 32(2), 100795.

Minbaeva, D. (2021). Disrupted HR? Human resource management in the digital age. Human Resource Management Review, 31(1), 100820.

Parry, E., & Strohmeier, S. (2021). HRM in the digital age—Digital changes and challenges of the HR profession. Employee Relations, 43(1), 1–15.

Strohmeier, S. (2020). Digital human resource management: A conceptual clarification. German Journal of Human Resource Management, 34(3), 345–365.

Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. California Management Review, 61(4), 15–42.

Vial, G. (2021). Understanding digital transformation: A review and a research agenda. Journal of Strategic Information Systems, 30(2), 101625.

Wang, B., Liu, Y., Qian, J., & Parker, S. K. (2021). Achieving effective remote working during the COVID-19 pandemic: A work design perspective. Applied Psychology, 70(1), 16–59.

Wright, P. M., & Ulrich, D. (2022). The evolution of strategic human resource management. Journal of Management, 48(6), 1465–1489.

Zhang, Y., Chen, J., & Li, X. (2023). Artificial intelligence applications in electronic human resource management: A systematic literature review. Journal of Business Research, 162, 113889.

Zirar, A., Ali, S. I., & Islam, N. (2023). Worker-centered artificial intelligence and Industry 5.0: A systematic literature review. Technological Forecasting and Social Change, 188, 122286.

Zhou, K., Liu, T., & Zhou, L. (2022). Industry 5.0: A human-centric approach toward sustainable manufacturing. Sustainability, 14(18), 11602.