“Role of artificial intelligence for strengthening human resource system via mediation of technology competence”

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Abstract

This study aims to investigate the relationships between artificial intelligence in human resources (HR), technology competence, and HR system strength within organizations. Employing a cross-sectional methodology, survey data were collected from 272 employees working in HR departments in the private sector of Saudi Arabia. Partial least squares structural equation modeling was utilized for analysis to evaluate these relationships. The results indicate a significant positive relationship between artificial intelligence in HR and both technology competence ($\beta = 0.444, p < 0.001$) and HR system strength ($\beta = 0.539, p < 0.001$). Additionally, there is a positive impact of technology competence on HR system strength ($\beta = 0.272, p = 0.021$). These findings underscore the importance of investing in AI technologies and enhancing employees’ technological skills to improve HR system effectiveness. Furthermore, the study emphasizes the necessity for organizations to prioritize agility and adaptability in HR strategies while addressing ethical and social considerations surrounding AI in HR practices. Moreover, the study elucidates the role of artificial intelligence in fostering innovation and sustainability within HR practices, contributing to organizational resilience and competitiveness.

INTRODUCTION

In the swiftly changing digital realm, organizations are increasingly relying on artificial intelligence (AI) technologies to elevate different facets of their operations, such as human resource management (HRM) (Pan et al., 2022). The proliferation of strategic IT applications in HRM has experienced a notable surge. Emerging digital technologies have presented a myriad of challenges to conventional HRM practices. However, compared to other technologies, AI stands out for its unmatched potential and widespread concern regarding its utilization. AI, defined as systems or algorithms endowed with learning capabilities and cognitive functions capable of executing tasks traditionally reliant on human intelligence (Oh et al., 2017), has garnered significant attention. Despite being in its nascent stages of development and integration, industry experts anticipate a remarkable surge in AI adoption over the next decade, projecting a 14% global GDP increase by 2030, with China expected to experience the most substantial boost, reaching 26% (Rao & Verweij, 2017). AI holds tremendous promise in reshaping HRM landscapes. Unsurprisingly, there is a major scholarly interest in AI’s application in HRM. Early research suggests that AI
can significantly enhance HRM performance for organizations (Faliagka et al., 2014), while others argue that companies may not be adequately prepared for AI integration in HRM due to a lack of expertise (Tambe et al., 2019).

AI has the potential to revolutionize HR practices via the automation of daily tasks in organizations. As organizations embrace AI in HR, it becomes essential to understand its implications for HR system strength – the overall effectiveness and efficiency of HR processes and practices within an organization. The realm of HR recruitment is increasingly shaped by technology (Lee, 2011). However, despite this extensive exploration, there appears to be a gap in the literature concerning companies’ adoption behaviors toward AI recruitment.

1. LITERATURE REVIEW AND HYPOTHESES

The HR system encompasses the structures, processes, and mechanisms through which HRM practices are developed, implemented, and aligned with organizational goals. It refers to the overarching framework within which HRM practices operate, emphasizing coherence, integration, and alignment across various HRM practices to achieve strategic objectives. HR system has predominantly centered on the content perspective, examining how individual HRM practices or cohesive bundles of HRM practices influence HRM outcomes (Jackson et al., 2014). Building upon the work of Bowen and Ostroff (2004, p. 207), HRM system strength is often conceptualized as a situation where “unambiguous messages are communicated to employees about what is appropriate behavior.” It is generally anticipated that HRM systems exert more substantial effects on outcome variables, as they convey clear signals to employees regarding organizational desired results (Sanders et al., 2014). HR system strength encompasses the overall effectiveness, efficiency, and resilience of an organization’s HR systems. This includes the ability of HR processes, practices, policies, and technologies to achieve their intended goals while utilizing resources optimally (Sanders et al., 2014). Effectiveness entails achieving positive outcomes for both employees and the organization through HR initiatives (Katou et al., 2014). Efficiency refers to achieving these outcomes with minimal resources, time, and effort, thereby maximizing productivity and minimizing costs. Resilience pertains to the adaptability and robustness of HR systems in responding to challenges, changes, and disruptions, ensuring stability and continuity in HR operations. Enhancing HR system strength involves optimizing HR processes, leveraging appropriate technologies, fostering a supportive organizational culture, and investing in employees’ skills and capabilities to meet the evolving needs and challenges of the organization and its workforce. Bowen and Ostroff (2004) emphasize the critical inquiry into how HRM systems can be effectively managed. Hence, HRM system strength is undeniably a pivotal concept. However, existing empirical inquiries have primarily focused on specific aspects, with no comprehensive examination of whether and how HRM system strength contributes to the achievement of HRM targets. This aspect holds critical importance for strategic HRM, as HRM targets are interconnected with diverse HRM strategies (Jackson et al., 2014).

Artificial intelligence in HR refers to the integration and application of AI technologies within the field of HRM. AI in HR entails the incorporation of AI technologies across various dimensions of HRM practices within organizational settings (Rodgers et al., 2023). This integration encompasses the utilization of AI algorithms, machine learning, natural language processing, and data analytics to automate and optimize HR processes, including recruitment, talent management, performance evaluation, employee engagement, and workforce planning (Chowdhury et al., 2023; Hogg, 2019; Charlwood & Guenole, 2022). By leveraging artificial intelligence in HR, organizations aim to enhance decision-making, improve operational efficiency, and drive strategic HRM outcomes. Artificial intelligence systems analyze extensive volumes of HR data to extract actionable insights, predict future trends, and support evidence-based HR decision-making (Kalia & Mishra, 2023). This enables HR professionals to prioritize strategic initiatives while artificial intelligence in HR han-
Technology competence in HRM refers to the proficiency and capability of individuals or organizations to effectively utilize and adapt to technological tools and platforms within HR practices and processes (Cohen & Levinthal, 1990). It encompasses the knowledge, skills, and abilities required to leverage technology to enhance HR functions (Ransbotham et al., 2017). Individuals with high technology competence in HRM possess a deep understanding of HR technology systems, software applications, and digital platforms relevant to their roles. They can efficiently navigate HR software interfaces, utilize advanced features for data analysis and reporting, and troubleshoot technical issues as they arise. Moreover, they are adept at leveraging technology to streamline HR processes, improve productivity, and enhance employee experience. Consequently, technology competence empowers companies to effectively implement new technologies. Scholars have identified technology competence as a pivotal factor within the Technology-Organization-Environment (TOE) framework that facilitates technology adoption (Zhu et al., 2006). Therefore, technology competence may positively influence the adoption and utilization of AI.

The purpose of this study is to examine the relationships between artificial intelligence in human resources, technology competence, and HR system strength in organizations. Figure 1 depicts the research model. Consequently, the following hypotheses are proposed:

H1: Artificial intelligence in HR influences technology competence.

H2: Artificial intelligence in HR influences HR system strength.

H3: Technology competence influences HR system strength.

H4: Technology competence mediates the relationship between artificial intelligence in HR and HR system strength.

2. METHODOLOGY

In March 2024, a survey was undertaken involving 272 managerial-level employees employed in the HR departments of private sector firms in Saudi Arabia. The survey aimed to explore perspectives and practices concerning artificial intelligence in HR. Emphasizing managerial roles provides insights into organizational decision-making and influence, particularly in fostering innovation and implementing sustainability measures. By
encompassing employees from various industries within the private sector, the sample's inclusivity enhances its representativeness and facilitates a comprehensive understanding of AI in HR across diverse organizational settings. Participants expressed their views using a five-point Likert scale, ranging from strongly disagree to strongly agree. The questionnaire items were translated into Arabic to ensure clarity. The survey commenced with an introductory segment with clear instructions. Subsequently, participants were directed to furnish personal details. Following this, the subsequent segment meticulously assessed distinct constructs. This included 10 items gauging artificial intelligence in HR, adapted from Kambur and Akar (2022), three items appraising technology competence sourced from Wang et al. (2010) and Pan et al. (2022), and seven items evaluating HR system strength adapted from Hauff et al. (2017). The analysis employed partial least squares structural equation modeling (PLS-SEM) with SmartPLS 4, a well-regarded tool recognized for its reliability in both management and IT research, as indicated by Avkiran and Ringle (2018). PLS-SEM was selected due to its efficacy in capturing the variance in latent dimensions and seamlessly integrating theories with empirical data, thus facilitating theoretical validation and exploration of relationships between variables (Henseler et al., 2009). The comprehensive approach, combined with the utilization of PLS-SEM, ensures the validity and robustness of the research findings, as underscored by Heuer and Liñán (2013).

3. RESULTS

The sample comprised 57% males, while 43% identified as females. Age-wise, the largest proportion fell below 25 years (41%), followed by those aged between 26 and 30 (29%). Regarding education, the majority held bachelor’s degrees (73%), followed by master’s degrees (15%). Notably, a small percentage possessed Ph.D. degrees (1%). In terms of professional experience, a significant portion had less than three years of experience (44%), with smaller percentages having three to five years (27%), six to 10 years (14%), and over 10 years (16%) of experience. Geographically, the majority of participants worked in the central region (65%), while smaller percentages were distributed across the southern (5%), northern (8%), western (12%), and eastern (9%) regions. Furthermore, the job titles varied, with 13% being project managers, 21% program officers, and the majority (67%) occupying other management roles.

Table 1 presents the reliability and validity metrics for the constructs under study. The loadings for all the items above 0.7 met the threshold. The artificial intelligence in HR construct demonstrates strong internal consistency, as indicated by a Cronbach’s Alpha coefficient of 0.816, along with a Composite Reliability of 0.857, ensuring reliability in measurement. However, its average variance extracted (AVE) value of 0.583 suggests a moderate level of variance explained by its items relative to measurement error. The HR system strength construct exhibits even higher internal consistency with a Cronbach’s Alpha of 0.870 and a Composite Reliability of 0.900, suggesting robust reliability. However, its AVE of 0.563 indicates a relatively lower proportion of variance explained by its items. Conversely, the technology competence construct displays good reliability with a Cronbach’s Alpha of 0.761 and a Composite Reliability of 0.862. Notably, it achieves the highest AVE value among the constructs at 0.677, indicating a strong convergent validity. This criterion is essential for confirming the distinctiveness and differentiation among the constructs, which is crucial for a thorough understanding of their interrelationships.

Table 3 reveals significant relationships between the variables under examination, accompanied by specific numerical values. Firstly, a notable positive relationship is observed between artificial intelligence in HR and technology competence (H1: $\beta = 0.444$, $p < 0.001$), indicating that enhancements in artificial intelligence in HR correspond to increased technology competence. Similarly, artificial intelligence in HR exhibits a positive and statistically significant impact on HR system strength (H2: $\beta = 0.539$, $p < 0.001$), signifying that improvements in artificial intelligence in HR are associated with a stronger HR system. Furthermore, technology competence demonstrates a positive effect on HR system strength (H3: $\beta = 0.272$, $p = 0.021$), suggesting that higher
levels of technology competence lead to improved HR system strength. Additionally, the combined influence of artificial intelligence in HR, technology competence, and HR system strength (H4: β = 0.214, p < 0.001) underscores a positive relationship, indicating that advancements in artificial intelligence in HR result in increased technology competence, subsequently contributing to improved HR system strength.

The R-square values mentioned in Figure 2 for HR system strength and technology competence are 0.446 and 0.198, respectively. This indicates that 44.6% of the variance in HR system strength can be explained by the independent variables, while 19.8% of the variance in technology competence can be explained by the independent variables.
4. DISCUSSION

The findings provide valuable insights into the relationships between artificial intelligence in HR, technology competence, and HR system strength. Firstly, the positive and significant relationship between artificial intelligence in HR and technology competence supports the notion that advancements in artificial intelligence in HR correspond to increased levels of technology competence within organizations. This suggests that as companies invest in and adopt more sophisticated artificial intelligence technologies for HRM, employees are likely to develop greater competency in utilizing these technologies (Charlwood & Guenole, 2022).

Similarly, the positive association between artificial intelligence in HR and HR system strength indicates that improvements in artificial intelligence in HR are linked to stronger HR systems within organizations. This implies that as organizations integrate artificial intelligence tools and processes into their HR functions, they are better equipped to handle HR-related tasks efficiently and effectively, leading to overall improvements in HR system effectiveness and robustness (Rodgers et al., 2023).

Furthermore, the positive impact of technology competence on HR system strength highlights the importance of employees’ proficiency
in utilizing technology to enhance HR system capabilities. Organizations that prioritize the development of employees’ technological skills are likely to experience improvements in the strength and effectiveness of their HR systems, enabling them to better meet the needs of employees and the organization as a whole (Huang et al., 2023). The combined effect of artificial intelligence in HR, technology competence, and HR system strength further underscores the interconnectedness of these variables. The findings suggest that advancements in artificial intelligence in HR not only directly influence technology competence but also indirectly contribute to improvements in HR system strength through their impact on employees’ technological skills (Ransbotham et al., 2017).

The study findings offer significant implications in the realms of HRM and organizational development. Firstly, organizations can leverage the insights gained to strategically invest in artificial intelligence in HR tools and technologies, thereby bolstering their overall HR system strength. This strategic approach not only streamlines HR processes but also enhances decision-making capabilities and improves employee experiences (Alateeg & Alhammadi, 2023). Additionally, the study underscores the significance of prioritizing employee training and development initiatives that enhance technological competencies. By equipping employees with the necessary skills to effectively utilize AI tools and systems in HR functions, organizations can further strengthen their HR systems. Continuous monitoring and evaluation of AI implementations and technology training programs are crucial to identify areas for improvement and ensure alignment with organizational objectives and employee needs (Alateeg & Alhammadi, 2024).

Moreover, organizations must prioritize agility and adaptability in their HR strategies to navigate the rapidly evolving digital landscape (Alateeg et al., 2024). Finally, ethical and social considerations surrounding AI in HR practices must be carefully addressed, encompassing issues such as data privacy and the broader impact on job roles and employment opportunities. By embracing these implications and integrating AI technologies and technological competence into their HR strategies, organizations can enhance HR system strength, drive organizational performance, and maintain competitiveness in today’s dynamic business environment.

**CONCLUSION**

This study sheds light on the intricate relationships between artificial intelligence in HR, technology competence, and HR system strength, offering valuable insights for both academic research and practical applications in the field of HRM. The findings highlight the significant positive associations between artificial intelligence in HR and both technology competence and HR system strength, as well as the positive impact of technology competence on HR system strength. Moreover, the combined influence of these variables underscores the interconnectedness and importance of investing in both AI technologies and employees’ technological skills to enhance HR system effectiveness. These findings carry several implications for organizational practice, emphasizing the strategic importance of investing in AI-powered HR tools and technologies, prioritizing employee training and development initiatives, and carefully integrating AI into HR practices to complement human capabilities. Additionally, the study underscores the importance of organizational agility and adaptability in navigating the rapidly evolving digital landscape, as well as the need to address ethical and social considerations surrounding AI in HR practices. Future research could explore additional factors influencing HR system strength and further investigate the temporal effects of AI on employee well-being. Overall, by embracing the implications of this study and integrating AI technologies and technological competence into their HR strategies, organizations can enhance their HR system strength, drive organizational performance, and maintain competitiveness in today’s digital age.
AUTHOR CONTRIBUTIONS

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Funding acquisition: Sura Al-Ayed.
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