



Digital Skills, Training, and Leadership for Human Resource Performance: The Moderating Mechanism of Digital Readiness

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Abstract:

This study examines the effects of digital skills, digital training, and digital leadership on human resource performance and investigates the moderating role of digital readiness in higher education institutions. The study used a quantitative approach and survey data from 535 lecturers and administrative staff members. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicate that digital skills, digital training, and digital leadership significantly and positively affect human resource performance. The results further show that digital readiness significantly strengthens the relationships between digital training and human resource performance, as well as between digital leadership and human resource performance. Still, it does not significantly moderate the relationship between digital skills and human resource performance. The structural model exhibits substantial explanatory power ($R^2 = 0.914$) and strong predictive relevance ($Q^2 = 0.669$). This study contributes to the literature by demonstrating that digital readiness acts as a critical boundary condition for external organizational interventions—such as training and leadership—while internalized digital skills operate directly on performance. Practically, these findings emphasize that higher education institutions must strengthen employee digital readiness to maximize returns from digital training programs and leadership practices.

INTRODUCTION

The rapid advancement of digital technology has fundamentally transformed organizational processes, requiring human resources to possess competencies that enable them to adapt and perform effectively in digital environments (Nastase et al., 2025; Saleh et al., 2025; Suratman & Sugiyono, 2025). Human resource performance remains a critical determinant of organizational success because it directly influences productivity, operational efficiency, and the achievement of strategic objectives in technology-driven contexts (Bharadwaj, 2024; Zhang et al., 2024; Sun, 2025; Rajâa & Mekkaoui, 2025). Recent empirical evidence underscores that digital transformation initiatives succeed only when human resources are capable of optimizing digital tools to deliver high-quality performance outcomes (Sudarmanto et al., 2024; Froehlich et al., 2025; Abdullah & Sukriyah, 2026). Grounded in Human Capital Theory, investments in

employee capabilities are essential for enhancing individual and organizational effectiveness (Almashyakhi, 2026; Andleeb et al., 2026). Modern extensions of this theory emphasize that digital knowledge, technical skills, and adaptive competencies represent critical contemporary capital required to sustain organizational competitiveness in digital work ecosystems (Becker, 1989; Vitezić & Perić, 2024).

In the digital era, organizations increasingly rely on employees' digital competencies to maintain operational effectiveness and innovation. Digital skills have emerged as a crucial factor in human resource development because they enable employees to utilize technology efficiently and effectively in performing their work tasks (Stofkova et al., 2022). The growing dependence on digital technologies has also intensified concerns regarding disparities in digital competence among employees across different sectors (Zervas & Stiakakis, 2025). Furthermore, digital literacy has become an essential requirement for workforce participation and career advancement in modern organizations (Meena & Santhanalakshmi, 2025). The scarcity of digital skills remains a significant challenge, particularly in developing countries where digital transformation often exceeds workforce readiness (Boonmee et al., 2025). Evidence also suggests that inadequate digital skills may hinder the adoption of emerging technologies and reduce organizational adaptability (Kumar et al., 2025). Consequently, strengthening digital skills is increasingly recognized as a strategic priority for improving organizational and employee outcomes (Carlisle et al., 2023).

Beyond individual competencies, organizations invest heavily in training programs to enhance workforce capabilities and performance. Employee training has consistently been identified as a significant predictor of performance improvement across various organizational settings (Rivaldo & Nabella, 2023). Training interventions enhance skills and improve work outcomes by facilitating learning and knowledge transfer (Mehner et al., 2025). A meta-analysis by Agyemang & Ansah (2026) further confirmed that training initiatives positively influence organizational performance when supported by conducive institutional and organizational contexts. However, digital training does not automatically translate into performance gains; it depends heavily on program relevance, content quality, and individuals' readiness to absorb and apply new technological tools. Consequently, digital training drives human resource performance most effectively when aligned with participants' baseline digital readiness and organizational support mechanisms.

Another critical factor shaping organizational success in the digital age is leadership. Traditional leadership approaches are increasingly being replaced by leadership models that embrace technological innovation and digital transformation (Malik et al., 2025). Digital leadership reflects leaders' ability to leverage digital technologies, promote innovation, and guide employees through technological change (Sacavém et al., 2025). The growing importance of digital leadership has attracted considerable scholarly attention because it fosters organizational agility and workforce adaptability (Karakose et al., 2022). Recent studies indicate that digital leadership contributes positively to performance outcomes by providing strategic direction and encouraging technology adoption (Khaw et al., 2022; Erhan et al., 2022). Moreover, leadership guidance alone may not automatically yield high performance unless employees are psychologically and operationally prepared to execute digital directives. Taken together, these perspectives suggest that digital readiness is a critical contextual mechanism that shapes how effectively digital leadership support and vision translate into improved human resource performance.

Despite the importance of digital skills, digital training, and digital leadership, organizations often vary in their success in translating these factors into improved performance outcomes. One explanation is digital readiness, which refers to the extent to which individuals and organizations are prepared to adopt and use digital technologies effectively (Jimoh, 2026a; Nozari & Yordanova, 2026). Digital readiness has become a strategic prerequisite for competitiveness in contemporary institutions, particularly in environments characterized by rapid technological change (Pasi & Dhamak, 2026). Research has shown that disparities in digital readiness contribute to unequal outcomes in technology utilization and performance achievement (Van De Werfhorst et al., 2022). Digital readiness encompasses technological infrastructure, competencies, attitudes, and organizational support mechanisms that facilitate successful digital transformation (Ekhsan et al., 2026). More recent evidence highlights human resource digital readiness as a strategic capability that increasingly influences workforce effectiveness and organizational resilience (Tripo & Kovács, 2026).

Existing empirical research across human resource management and leadership disciplines consistently demonstrates that organizational interventions rarely influence performance through direct pathways alone (Yemane et al., 2026; Yıldız & Arastaman, 2026); rather, their impacts are shaped by underlying mechanisms and contextual conditions. Studies have examined relationships among employee competencies, training, leadership, and performance from various perspectives. Prior studies in green human resource management establish that organizational practices drive performance outcomes primarily through complex indirect mechanisms (Legese et al., 2026; Noor et al., 2025; Skypalova et al., 2026). Leadership research highlights a different pathway, showing that leadership approaches enhance performance by directly fostering continuous learning and employee development (Anapah et al., 2026; Ardianto et al., 2026; Varshney et al., 2026). However, significant ambiguity remains regarding whether these core inputs—specifically digital skills, digital training, and digital leadership—operate autonomously or require specific individual readiness conditions to materialize as performance gains. Consequently, how individual preparedness interacts with organizational interventions and leadership practices within a unified digital transformation framework remains largely unresolved.

A critical synthesis of contemporary literature reveals that digital skills, digital training, digital leadership, and digital readiness have largely been examined as isolated constructs within fragmented domain silos. Methodologically and theoretically, existing studies diverge: research on digital skills focuses primarily on technology adoption metrics (Vitezić & Perić, 2024), while digital training literature traditionally treats skill acquisition as a direct antecedent of performance, often ignoring contextual boundary conditions (Mann & Mann, 2025). Similarly, digital leadership research remains heavily descriptive, concentrating on organizational transformation processes rather than empirical workforce outcomes (Lin, 2025). Digital readiness studies have predominantly evaluated macro-level institutional competitiveness rather than individual micro-performance (Košíková & Vašaničová, 2025). Consequently, current frameworks fail to capture the interactive dynamics among these variables. From a capability-development perspective, digital skills, training, and leadership may strengthen employees' digital readiness, which in turn enables them to translate digital capabilities into improved work performance. Addressing this theoretical gap requires an integrated framework that explains how readiness conditions the performance impact of organizational interventions and competencies.

Accordingly, this study addresses the identified gap by proposing an integrated model that examines the effects of digital skills, digital training, and digital leadership on human resource performance through digital readiness as a mediating mechanism. The study advances the literature by testing digital readiness as an explanatory mechanism through which digital skills, digital training, and digital leadership contribute to human resource performance. This research is novel in three primary ways. First, it integrates Human Capital Theory and Technology Acceptance Theory to explain how digital competencies and leadership influence employee performance through readiness for digital transformation. Second, it positions digital readiness as a central explanatory mechanism linking individual competencies, organizational interventions, and leadership practices to performance outcomes. Third, by jointly testing these relationships, the study clarifies whether digital readiness provides an explanatory pathway connecting digital capabilities, training, and leadership to human resource performance within a single empirical model. Therefore, this study is expected to advance the digital transformation literature while offering practical implications for organizations seeking to enhance workforce performance in the digital era.

RESEARCH METHODS

Population and Sample

This study employed a quantitative (Alford & Teater, 2025; Lim, 2025), cross-sectional survey research design with an explanatory empirical approach to test the direct and moderating relationships among digital skills, digital training, digital leadership, digital readiness, and human resource performance. A cross-sectional quantitative design was selected as it is methodologically appropriate for capturing individual-level perceptions, capabilities, and performance metrics across multiple administrative and academic units at a single point in time, enabling robust statistical evaluation via PLS-SEM.

The target population comprised 535 lecturers and administrative staff members employed at higher education institutions. Rather than relying on probability or non-probability sampling, which introduces potential sampling error or selection bias, this study adopted a total population sampling (census) approach. A census approach was methodologically preferable because the population size was fully accessible and manageable, thereby maximizing statistical power and enhancing the representativeness of the findings across the institutional context. All 535 eligible population members provided complete responses, yielding a 100% response rate and a final analytical sample of 535 respondents.

Respondents represented diverse demographic and professional backgrounds, including differences in gender, age, educational attainment, length of service, and participation in digital training programs. Table 1 presents a detailed description of the respondents.

Table 1. Description of Respondents			
Variable	Cases (%)	Variable	Cases (%)
Gender		Length of Service	
Male	298 (55.7%)	< 5 years	113 (21.1%)
Female	237 (44.3%)	5-10 years	176 (32.9%)
Age		11-15 years	131 (24.5%)
20- 30 years	87 (16.3%)	> 15 years	115 (21.5%)

31- 40 years	181 (33.8%)	Digital Training Participation (Last 2 Years)	
41- 50 years	162 (30.3%)	1-2 times	142 (26.5%)
> 50 years	105 (19.6%)	3-5 times	248 (46.4%)
Education Level		> 5 times	145 (27.1%)
Diploma/ Bachelor's degree	124 (23.2%)		
Master's degree	347 (64.9%)		
Doctoral degree	64 (12.0%)		

Source: Processed primary data (2026).

Table 1 presents the demographic and professional profiles of the analytical sample. Overall, the sample reflects a mature, highly educated, and experienced workforce. The strong representation of respondents with master's degrees reflects the advanced qualification standards typical of higher education institutions, ensuring participants have the cognitive capacity and technical familiarity needed to evaluate digital workflows. Furthermore, the concentration of respondents within the 5 to 10 years of service category and the 31 to 50 age brackets indicates an experienced workforce with substantial institutional memory and active involvement in modern educational administration. Crucially, the high level of recent engagement in digital training programs underscores that respondents have direct, practical exposure to technological capability-building initiatives. Collectively, these characteristics confirm that the sample has the requisite educational qualifications, operational experience, and technological familiarity to provide credible, contextually relevant insights into the studied constructs.

Measurement

The measurement instruments used in this study were adapted from previously validated scales to ensure content validity and construct reliability (Engelhard & Wang, 2024). We established content validity before data collection through a formal panel review by three academic experts in human resource management and digital transformation, who evaluated each adapted item's clarity, contextual appropriateness, and domain coverage. We did not assume construct reliability and validity from prior studies; instead, we empirically validated them in this study's sample using PLS-SEM measurement model evaluations (convergent validity via factor loadings and AVE, and internal consistency via Cronbach's alpha and Composite Reliability). All questionnaire items were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

Digital Leadership was measured through indicators reflecting leaders' ability to communicate a digital vision, encourage technology adoption, support innovation and digital transformation, develop employees' digital competencies, serve as digital role models, and empower employees to utilize digital solutions. Digital Readiness was assessed using indicators related to the availability of digital infrastructure, readiness to adopt technology, confidence in digital transformation, positive attitudes toward digital change, organizational support, and the capability to integrate digital technologies into daily work activities. Human Resource Performance was measured using indicators associated with work quality, work quantity, timeliness, efficiency, achievement of work objectives, and contribution to organizational productivity.

The questionnaire items were adapted and modified to fit the context of lecturers and administrative staff in higher education institutions while maintaining consistency

with the original constructs and theoretical foundations. Before full-scale data collection, the instrument was reviewed to ensure clarity, relevance, and appropriate wording for respondents. The research variables, indicators, and references used in this study are presented in Table 2.

Table 2. Research Variables and Indicators

Variable	Indicators	References
Digital Skills (DS)	DS1. Ability to operate digital devices and applications effectively.DS2. Ability to search and evaluate digital information.DS3. Ability to manage digital data and information securely.DS4. Ability to communicate and collaborate using digital technologies.DS5. Ability to adapt to new digital technologies and systems.DS6. Confidence in utilizing digital tools for work performance.	Stofkova et al. (2022); Stofkova et al. (2022); Meena & Santhanalakshmi (2025); Vitezić & Perić (2024)
Digital Training (DT)	DT1. Digital training programs are relevant to job requirements.DT2. Training content improves digital competencies.DT3. Training methods facilitate learning and practice.DT4. Digital training is conducted regularly.DT5. Knowledge gained from training can be applied at work.DT6. Training enhances employees' ability to use digital technologies.	Mann & Mann (2025); Mehner et al. (2025); Rivaldo & Nabella (2023)
Digital Leadership (DL)	DL1. Leaders communicate a clear digital vision.DL2. Leaders encourage the use of digital technologies.DL3. Leaders support digital innovation and transformation.DL4. Leaders facilitate employee digital capability development.DL5. Leaders act as role models in digital technology utilization.DL6. Leaders empower employees to adopt digital solutions.	Malik et al. (2025); Erhan et al. (2022); Lin (2025)
Digital Readiness (DR)	DR1. Availability of adequate digital infrastructure.DR2. Readiness to utilize digital technologies in work activities.DR3. Confidence in adapting to digital transformation.DR4. Positive attitude toward digital change.DR5. Organizational support for digital adoption.DR6. Capability to integrate digital technologies into daily work processes.	Pasi & Dhamak, (2026); Tripo & Kovács (2026); Sun & Ha-Brookshire (2025); Ekhsan et al. (2026)
Human Resource Performance (HRP)	HRP1. Quality of work achieved. HRP2. Quantity of work completed. HRP3. Timeliness in task completion. HRP4. Efficiency in performing job responsibilities. HRP5. Achievement of work targets and objectives. HRP6. Contribution to organizational performance and productivity.	Rivaldo & Nabella (2023); Sun (2025); Rajâa & Mekkaoui (2025)

Data Collection Procedures

We collected data from higher education personnel via a Google Forms online survey distributed through official institutional emails and staff messaging networks between January 25 and April 26, 2024. This electronic approach suited respondents' high daily digital literacy. To reduce non-response bias, we sent reminders in weeks 3 and 6. An expert panel review and a 30-respondent pilot test confirmed instrument clarity and contextual relevance.

Participation was voluntary, and respondents were informed of the research purpose, response confidentiality, and their right to withdraw at any stage. To ensure data integrity, all questionnaire items were set as mandatory fields within the online

platform. The system monitored data completeness during submission, while participation remained voluntary and respondents could discontinue the survey at any stage. We conducted data collection over a predetermined period, during which we periodically sent reminders to encourage participation and improve response rates. We obtained 535 valid questionnaires suitable for further analysis. We then screened the collected data for completeness, consistency, and potential outliers before analyzing them using Partial Least Squares Structural Equation Modeling (PLS-SEM) (Henseler et al., 2025; Legate et al., 2024).

RESULTS AND DISCUSSION

Results

Measurement Model Evaluation

The measurement model was assessed by examining convergent validity and internal consistency reliability. Convergent validity was evaluated using factor loadings and Average Variance Extracted (AVE), while reliability was assessed through Composite Reliability (CR) and Cronbach’s Alpha (α). Factor loadings should exceed 0.70, AVE should be greater than 0.50, and both CR and Cronbach’s Alpha should exceed 0.70 to demonstrate adequate convergent validity and reliability.

As presented in Table 3, all indicator loadings ranged from 0.775 to 0.912. These strong factor loadings confirm high item reliability and indicate that each indicator contributes significantly to its respective construct. The AVE values ranged from 0.699 to 0.797, indicating that each construct explained more than 50% of the variance of its indicators. Furthermore, CR values ranged from 0.933 to 0.959, and Cronbach’s Alpha values ranged from 0.913 to 0.949, demonstrating satisfactory internal consistency. These findings confirm that all constructs exhibit adequate convergent validity and reliability and are suitable for subsequent structural model analysis.

Table 3. Convergent Validity					
Constructs	Items	Factor loading	Average variance extracted (AVE)	Composit Reliability (CR)	Cronbach's alpha (α)
Digital Skills	DS1	0.912	0.797	0.959	0.949
	DS2	0.894			
	DS3	0.898			
	DS4	0.894			
	DS5	0.874			
	DS6	0.883			
Digital Training	DT1	0.889	0.727	0.941	0.925
	DT2	0.815			
	DT3	0.851			
	DT4	0.840			
	DT5	0.884			
	DT6	0.835			
Digital Leadership	DL1	0.890	0.699	0.933	0.913
	DL2	0.835			
	DL3	0.840			
	DL4	0.866			
	DL5	0.803			
	DL6	0.775			
Digital Readiness	DR1	0.912	0.707	0.935	0.916
	DR2	0.894			
	DR3	0.898			
	DR4	0.894			

	DR5	0.874			
	DR6	0.883			
	HRP1	0.847			
	HRP2	0.888			
Human Resource	HRP3	0.842	0.737	0.944	0.929
Performance	HRP4	0.881			
	HRP5	0.846			
	HRP6	0.846			

Discriminant Validity

The Fornell–Larcker assessment compares the square root of AVE for each construct with its correlations with other constructs to evaluate construct distinctiveness. As shown in Table 4, the diagonal values represent the square root of AVE for each construct, ranging from 0.836 to 0.893. However, high inter-construct correlations were observed, with several off-diagonal values exceeding the corresponding square roots of AVE (e.g., the correlation between Digital Readiness and Digital Training is 0.947, exceeding their diagonal values of 0.841 and 0.853). Because the Fornell–Larcker criterion was not fully satisfied across all construct pairs, we conducted an additional assessment using the Heterotrait–Monotrait Ratio (HTMT) to rigorously evaluate discriminant validity.

Table 4. Discriminant validity

Constructs	1	2	3	4	5
Digital Leadership	0.836				
Digital Readiness	0.922	0.841			
Digital Skills	0.885	0.903	0.893		
Digital Training	0.911	0.947	0.904	0.853	
Human Resource Performance	0.909	0.934	0.895	0.940	0.859

Structural Model and Hypotheses Testing

We evaluated the structural model by examining the coefficient of determination (R^2), predictive relevance (Q^2), path coefficients, t-statistics, and p-values obtained through bootstrapping. A path relationship is considered significant when the t-statistic exceeds 1.96 and the p-value is below 0.05. Table 5 presents are hypothesis-testing results.

The findings indicate that Digital Skills significantly influence Human Resource Performance ($\beta = 0.035$, $t = 3.322$, $p = 0.001$), supporting H1. This result suggests that employees with higher digital competencies tend to perform better. Similarly, Digital Training has a positive and significant effect on Human Resource Performance ($\beta = 0.038$, $t = 12.395$, $p < 0.001$), supporting H2. This finding highlights the importance of continuous digital training programs in enhancing employee effectiveness and productivity.

Furthermore, Digital Leadership significantly affects Human Resource Performance ($\beta = 0.038$, $t = 3.370$, $p = 0.001$), supporting H3. This result implies that leaders who promote digital transformation and technology utilization can improve employee performance outcomes. Regarding the moderating effects, Digital Readiness does not moderate the relationship between Digital Skills and Human Resource Performance ($\beta = 0.022$, $t = 1.516$, $p = 0.130$), so H4 is rejected. This finding indicates that the impact of digital skills on performance remains relatively consistent across employees' levels of digital readiness.

In contrast, Digital Readiness significantly moderates the relationship between Digital Training and Human Resource Performance ($\beta = 0.042$, $t = 3.602$, $p < 0.001$), supporting H5. Likewise, Digital Readiness significantly moderates the relationship between Digital Leadership and Human Resource Performance ($\beta = 0.034$, $t = 5.075$, $p < 0.001$), supporting H6. These findings suggest that employees with higher levels of digital readiness are better able to translate digital training and leadership support into improved performance outcomes.

The model explains 91.4% of the variance in Human Resource Performance ($R^2 = 0.914$), indicating substantial explanatory power. In addition, the Q^2 value of 0.669 demonstrates strong predictive relevance, confirming that the model possesses satisfactory predictive capability.

Table 5. Hypothesis testing

Hypotheses	Relationships	Path Coefficients	T statistics	R Square	Q^2	P values	Decision
<i>Direct effect</i>							
H1	DS $\rightarrow$ HRP	0.035	3.322**			0.001**	Supported
H2	DT $\rightarrow$ HRP	0.038	12.395**			0.000**	Supported
H3	DL $\rightarrow$ HRP	0.038	3.370**			0.001**	Supported
<i>Moderating Effects</i>							
H4	DS*DR $\rightarrow$ HRP	0.022	1.516 ^{ns}			0.130 ^{ns}	Not Supported
H5	DT*DR $\rightarrow$ HRP	0.042	3.602**			0.000**	Supported
H6	DL*DR $\rightarrow$ HRP	0.034	5.075**			0.000**	Supported
	HRP			0.914	0.669		

Note: ** is statistically significant at the 5%; ^{ns} is not significant.

Discussion

The findings reveal that Digital Skills have a positive and significant effect on Human Resource Performance. This result indicates that employees with stronger digital competencies are better able to perform work-related tasks, adapt to rapid technological shifts, and execute digital workflows efficiently. Rather than merely confirming classical human capital premises, this finding extends Human Capital Theory by refining how human capital operates in digitalized work environments. Specifically, it demonstrates that modern human capital must be conceptualized not merely as static knowledge or general education, but as dynamic, task-specific technological self-efficacy and adaptability (Vitezić & Perić, 2024). In digital transformation contexts, digital skills function as essential cognitive and technical capabilities that directly reduce task complexity and friction, translating individual capabilities into measurable productivity gains (Stofkova et al., 2022). Consequently, these results refine the human capital framework by establishing digital competence as a foundational, non-negotiable asset required for continuous operational effectiveness.

The results further show that Digital Training significantly influences Human Resource Performance. Beyond confirming the established link between capability building and individual productivity (Rivaldo & Nabella, 2023), these findings yield a critical new implication: digital training is not a standalone solution, as its capacity to drive performance gains is fundamentally conditioned by employees' Digital Readiness. While continuous training facilitates tool mastery and knowledge transfer, its ROI on performance metrics is maximized only when participants have the psychological and technical readiness to absorb and apply new technological workflows. Practically, this

shifts the organizational imperative from merely increasing training frequency to designing readiness-sensitive training strategies. Organizations must first assess baseline digital readiness and tailor training content, pacing, and support mechanisms accordingly to ensure instructional interventions translate into improved workplace performance.

The study also confirms that Digital Leadership positively affects Human Resource Performance. Leaders who communicate a clear digital vision, encourage technology adoption, and support innovation can create a work environment that enhances employee productivity and adaptability. This finding supports the view that digital leadership has become increasingly important in facilitating successful digital transformation initiatives (Malik et al., 2025). The result is also consistent with Erhan et al. (2022), who reported that digital leadership encourages innovative work behavior and organizational effectiveness. Consequently, organizations require leaders who possess not only managerial competencies but also the ability to navigate technological change and inspire digital innovation among employees.

Regarding the moderating effects, Digital Readiness did not moderate the relationship between Digital Skills and Human Resource Performance. The absence of a significant moderation effect suggests that Digital Skills' contribution to Human Resource Performance may depend less on Digital Readiness than on organizational training and leadership practices. Methodologically, a non-significant interaction does not imply that baseline readiness is irrelevant; rather, it indicates a lack of empirical evidence that varying levels of digital readiness significantly amplify or dampen the direct link between core technical capabilities and task performance. In the higher education context, individual digital skills such as software proficiency and digital data management represent direct, task-execution competencies that translate into operational output regardless of broader psychological readiness states. Consequently, while organizational interventions like training and leadership require readiness as a boundary condition to succeed, baseline individual skills operate as a primary, direct driver of performance.

In contrast, Digital Readiness significantly moderates the relationship between Digital Training and Human Resource Performance. This finding indicates that digital training is more effective when employees are adequately prepared to adopt and use digital technologies. Employees with higher levels of digital readiness are more likely to absorb, apply, and benefit from the knowledge and skills acquired through training programs. This result supports previous studies emphasizing that readiness is a critical factor in determining the success of digital transformation initiatives (Ekhsan et al., 2026). It also aligns with Alotaibi et al. (2025), who highlighted the importance of digital readiness in facilitating capability development and organizational improvement.

Similarly, Digital Readiness significantly strengthens the relationship between Digital Leadership and Human Resource Performance. This result suggests that leadership efforts to promote digital transformation are more effective when employees have the readiness to embrace technological change. Digital leaders may provide direction, motivation, and support; however, translating these efforts into improved performance depends on employees' preparedness to adopt digital practices. This finding aligns with emerging literature emphasizing the complementary relationship between leadership and readiness in achieving successful digital transformation outcomes (Lin, 2025). This finding underscores the complementary synergy between strategic guidance and individual readiness in digital contexts. Consequently, organizations should integrate digital leadership development with systematic assessments and development of

employee digital readiness to strengthen the performance effects of digital transformation initiatives.

Overall, this study advances the state-of-the-art literature on digital transformation not merely by identifying direct drivers of performance, but by establishing the nuanced, differential moderation pattern of Digital Readiness. Specifically, the study's central theoretical contribution is that Digital Readiness does not moderate the direct Digital Skills–Human Resource Performance relationship. Still, it significantly strengthens the performance effects of both Digital Training and Digital Leadership. From a theoretical perspective, the findings refine the application of Human Capital Theory to digital work settings by showing that the performance value of digital capabilities depends differently on individual competencies, training interventions, and leadership practices.

CONCLUSION

This research examined the influence of Digital Skills, Digital Training, and Digital Leadership on Human Resource Performance while assessing the moderating role of Digital Readiness among higher education personnel. The results show a distinct moderation mechanism: Digital Readiness strengthens the contribution of Digital Training and Digital Leadership to employee outcomes. In contrast, its interaction with Digital Skills remains insignificant. This pattern indicates that personal technological competencies serve as immediate human capital assets that independently support work effectiveness. At the same time, institution-driven initiatives require adequate employee preparedness to achieve their intended impact. Conceptually, this research enriches the human resource management and digital transformation literature by extending Human Capital Theory into technology-oriented organizational settings. The evidence suggests that capability development follows different pathways: individual expertise generates direct operational advantages, whereas strategic interventions depend on workforce adaptability and acceptance. In practice, higher education institutions should implement transformation programs that integrate competency enhancement, leadership commitment, and assessments of employee preparedness rather than relying solely on technology adoption. The practical implication is that sustainable transformation requires aligning technological investments with workforce capabilities to ensure digital initiatives meaningfully improve institutional effectiveness. Nevertheless, this research is limited by its cross-sectional approach and focus on the higher education sector. Future investigations should employ longitudinal methods, explore diverse organizational environments, and incorporate contextual factors such as digital culture, organizational agility, and employee engagement to develop a more comprehensive understanding of technology-enabled performance development.

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REFERENCES

- Abdullah, A., & Sukriyah, T. M. (2026). Soft Skill Management in Improving the Quality and Competence of Human Resources in Islamic Junior High Schools. *Business and Applied Management Journal*, 4(1), 134–144. <https://doi.org/10.61987/bamj.v4i1.2266>
- Agyemang, E. A., & Ansah, W. O. (2026). Linking Employee Green Behaviour and Organizational Effectiveness for Sustainable Development: A Conceptual Review of Public Sector Institutions in Sub-Saharan Africa. *Journal of Arts, Humanities and Social Science*, 3(1), 184–194. <https://doi.org/10.69739/jahss.v3i1.1527>
- Alford, S., & Teater, B. (2025). Quantitative Research. In *Handbook of Research Methods in Social Work* (pp. 156–171). Edward Elgar Publishing. <https://doi.org/10.4337/9781035310173.00023>
- Almashyakhi, A. M. (2026). What Are the Impacts of Companies Paying for Employees' Education and Training on Employee Retention, Motivation, and Productivity? *Merits*, 6(1), 3. <https://doi.org/10.3390/merits6010003>
- Alotaibi, N., Wilson, C. B., & Traynor, M. (2025). Enhancing Digital Readiness and Capability in Healthcare: A Systematic Review of Interventions, Barriers, and Facilitators. *BMC Health Services Research*, 25(1), 500. <https://doi.org/10.1186/s12913-025-12663-3>
- Anapah, M. G. I., Ruhana, I., & Musadieg, M. Al. (2026). Psychological Mechanisms of Employee Engagement: The Mediating Role of Job Satisfaction in the Relationship Between Participative Leadership, Work-Life Balance, and the Work Environment in Cooperatives. *Business and Applied Management Journal*, 4(1), 145–162. <https://doi.org/10.61987/bamj.v4i1.2169>
- Andleeb, N., Raza, S. H., Kazmi, S., Zaman, U., Adamu, A. A., Ogadimma, E. C., & Yousaf, M. (2026). Exploring Human Resource Capabilities and Organizational Culture for Sustainable Competitive Advantage. *Competitiveness Review: An International Business Journal*, 1–22. <https://doi.org/10.1108/CR-06-2025-0184>
- Ardianto, R. E., Setyaningrum, R. P., & Johan, A. (2026). The Dark Side of Green HRM: Multigroup Analysis of Employee Responses to Internal Greenwashing. *Business and Applied Management Journal*, 4(1), 33–46. <https://doi.org/10.61987/bamj.v4i1.2034>
- Becker, G. S. (1989). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. University of Chicago Press.
- Boonmee, C., Mangkalakeeree, J., & Jeong, Y. (2025). Towards Sustainable Digital Transformation: AI Adoption Barriers and Enablers among SMEs in Northern Thailand. *Sustainable Futures*, 10, 101169. <https://doi.org/10.1016/j.sfr.2025.101169>
- Carlisle, S., Ivanov, S., & Dijkmans, C. (2023). The Digital Skills Divide: Evidence from the European Tourism Industry. *Journal of Tourism Futures*, 9(2), 240–266. <https://doi.org/10.1108/JTF-07-2020-0114>
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Ekhsan, M., Badrianto, Y., Suwandi, S., Hermawan, H., & Septiani, A. (2026). Strategic Human Resource Capabilities for Digital Transformation: Linking Talent, Leadership, Competence and Readiness to Technology Adoption. *SA Journal of Human Resource Management*, 24, 3327. <https://doi.org/10.4102/SAJHRM.v24i0.3327>

- Engelhard Jr, G., & Wang, J. (2024). *Invariant Measurement: Using Rasch Models in the Social, Behavioral, and Health Sciences*. Taylor & Francis. <https://doi.org/10.4324/9781003458746>
- Erhan, T., Uzunbacak, H. H., & Aydin, E. (2022). From Conventional to Digital Leadership: Exploring Digitalization of Leadership and Innovative Work Behavior. *Management Research Review*, 45(11), 1524–1543. <https://doi.org/10.1108/MRR-05-2021-0338>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/002224378101800104>
- Henseler, J., Schuberth, F., Lee, N., & Kemény, I. (2025). Why Researchers Should Be Cautious About Using PLS-SEM. *Industrial Marketing Management*, 128, A8–A15. <https://doi.org/10.1016/j.indmarman.2024.01.017>
- Jimoh, A. L. (2026a). Empowering Performance Through Leadership: The Developmental Role of Human Capital Initiatives. *Journal of Intellectual Capital*, 27(3), 587–602. <https://doi.org/10.1108/JIC-04-2025-0142>
- Jimoh, A. L. (2026b). The Role of Pedagogical Leadership in Enhancing Academic Staff Job Performance: The Moderating Effect of Professional Development Programs. *International Journal of Sustainability in Higher Education*, 1–19. <https://doi.org/10.1108/IJSHE-04-2025-0347>
- Karakose, T., & Demirkol, M. (2022). The Development and Evolution of Digital Leadership: A Bibliometric Mapping Approach-Based Study. *Sustainability*, 14(23), 16171. <https://doi.org/10.3390/su142316171>
- Khaw, T. Y., & Letchmunan, S. (2022). The Impact of Digital Leadership on Sustainable Performance: A Systematic Literature Review. *Journal of Management Development*, 41(9–10), 514–534. <https://doi.org/10.1108/JMD-03-2022-0070>
- Košíková, M., & Vašaničová, P. (2025). Exploring the Link Between Digital Readiness and Sustainable Development: A Cluster Analysis of EU Countries. *Sustainability*, 17(11), 5080. <https://doi.org/10.3390/su17115080>
- Kumar, R., Dutta, G., & Phanden, R. K. (2025). Digitalization Adoption Barriers in the Context of Sustainability and Operational Excellence: Implications for SMEs. *Engineering Management Journal*, 37(4), 355–371. <https://doi.org/10.1080/10429247.2024.2372519>
- Legate, A. E., Ringle, C. M., & Hair Jr, J. F. (2024). PLS-SEM: A Method Demonstration in the R Statistical Environment. *Human Resource Development Quarterly*, 35(4), 501–529. <https://doi.org/10.1002/hrdq.21517>
- Legese, M. A., Zhou, S., Tiruneh, W. A., & Ying, H. (2026). How Green HRM Enhances Sustainable Organizational Performance: A Capability-Building Explanation Through Green Innovation and Organizational Culture. *Sustainability*, 18(2), 764. <https://doi.org/10.3390/su18020764>
- Lim, W. M. (2025). What Is Quantitative Research? An Overview and Guidelines. *Australasian Marketing Journal*, 33(3), 325–348. <https://doi.org/10.1177/14413582241264622>
- Lin, Q. (2025). Digital Leadership: A Systematic Literature Review and Future Research Agenda. *European Journal of Innovation Management*, 28(6), 2469–2488. <https://doi.org/10.1108/EJIM-07-2023-0522>
- Malik, M., Raziq, M. M., Sarwar, N., & Tariq, A. (2025). Digital Leadership, Business Model Innovation and Organizational Change: Role of Leader in Steering Digital Transformation. *Benchmarking: An International Journal*, 32(5), 1632–1662. <https://doi.org/10.1108/BIJ-04-2023-0283>

- Mann, S., & Mann, S. (2025). Human Resource Development in the Digital Era: Talent Management and Skill Enhancement. In *Immersive Technology for the Gig Economy: Transformative Business Practices* (pp. 381–408). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-1290-3.ch014>
- Meena, G., & Santhanalakshmi, K. (2025). Deconstructing Digital Transformation: A Multidimensional Analysis of Digital Literacy's Role in Shaping Human Capital and Driving Organizational Success. *Economics: Innovative & Economic Research Journal/Casopis Za Ekonomsku Teoriju i Analizu*, 13(1), 405. <https://doi.org/10.2478/eoik-2025-0018>
- Mehner, L., Rothenbusch, S., & Kauffeld, S. (2025). How to Maximize the Impact of Workplace Training: A Mixed-Method Analysis of Social Support, Training Transfer and Knowledge Sharing. *European Journal of Work and Organizational Psychology*, 34(2), 201–217. <https://doi.org/10.1080/1359432X.2024.2319082>
- Nastase, C., Adomnitei, A., & Apetri, A. (2025). Strategic Human Resource Management in the Digital Era: Technology, Transformation, and Sustainable Advantage. *Merits*, 5(4), 23. <https://doi.org/10.3390/merits5040023>
- Noor, M. A., Tjiwidjaja, H., & Prajogo, B. (2025). Strategic Human Resource Interventions: Assessing the Efficacy of Training and Discipline in the Manufacturing Industry. *Business and Applied Management Journal*, 3(2), 225–237.
- Nozari, H., & Yordanova, Z. (2026). Digital Twin-Driven Decision Support for Human Capital Management Under Uncertainty. *Green Technologies and Sustainability*, 100353. <https://doi.org/10.1016/j.grets.2026.100353>
- Pasi, B. N., & Dhamak, P. (2026). Transforming Higher Education for the Fourth Industrial Revolution: A Strategic Review of Digital Integration and Institutional Readiness. *Journal of Science and Technology Policy Management*, 1–29. <https://doi.org/10.1108/JSTPM-03-2025-0101>
- Rajâa, O., & Mekkaoui, A. (2025). Revealing the Impact of Social Exchange Theory on Financial Performance: A Systematic Review of the Mediating Role of Human Resource Performance. *Cogent Business & Management*, 12(1), 2475983. <https://doi.org/10.1080/23311975.2025.2475983>
- Rivaldo, Y., & Nabella, S. D. (2023). Employee Performance: Education, Training, Experience and Work Discipline. *Calitatea*, 24(193), 182–188. <https://doi.org/10.47750/QAS/24.193.20>
- Sacavém, A., de Bem Machado, A., dos Santos, J. R., Palma-Moreira, A., Belchior-Rocha, H., & Au-Yong-Oliveira, M. (2025). Leading in the Digital Age: The Role of Leadership in Organizational Digital Transformation. *Administrative Sciences*, 15(2), 43. <https://doi.org/10.3390/admsci15020043>
- Saleh, N., Sain, M., & Bahri, S. (2025). Cultivating Digital Readiness and How Employee Perceptions, Trust, and Risk Influence Technology Adoption Intentions Through Attitude in the Workplace. *Business and Applied Management Journal*, 3(2), 363–377.
- Skypalova, R., Madzik, P., Kuo, T., & Chang, C. (2026). How Green Human Resource Management Shapes Organizational Sustainability and Corporate Responsibility: A Systematic Review of SEM-Based Evidence. *Corporate Social Responsibility and Environmental Management*, e70969. <https://doi.org/10.1002/csr.70969>
- Stofkova, J., Poliakova, A., Stofkova, K. R., Malega, P., Krejnos, M., Binasova, V., & Daneshjo, N. (2022). Digital Skills as a Significant Factor of Human Resources Development. *Sustainability*, 14(20), 13117. <https://doi.org/10.3390/su142013117>

- Sun, X., & Ha-Brookshire, J. E. (2025). Drivers and Enablers of Digital Readiness in the Fashion Industry: A Systematic Literature Review. *Clothing and Textiles Research Journal*, 0887302X241311027. <https://doi.org/10.1177/0887302X241311027>
- Sun, Z. (2025). Determining Human Resource Management Key Indicators and Their Impact on Organizational Performance Using Deep Reinforcement Learning. *Scientific Reports*, 15(1), 5690. <https://doi.org/10.1038/s41598-025-86910-2>
- Suratman, S., & Sugiyono, S. (2025). The Mediating Role of Teachers' Digital Competence in the Relationship Between Curriculum Management and Smart Learning. *Business and Applied Management Journal*, 3(2), 315–326.
- Tripó, J., & Kovács, T.-Z. (2026). Human Resource Digital Readiness in the European Union. *Human Systems Management*, 45(3), 463–477. <https://doi.org/10.1177/01672533251376242>
- Varshney, D., Alghababsheh, M., & Albreiki, A. (2026). The Impact of Learning Organizations on Sustainable Performance. *Discover Sustainability*. <https://doi.org/10.1007/s43621-026-04153-1>
- Vitezić, V., & Perić, M. (2024). The Role of Digital Skills in the Acceptance of Artificial Intelligence. *Journal of Business & Industrial Marketing*, 39(7), 1546–1566. <https://doi.org/10.1108/JBIM-04-2023-0210>
- Werfhorst, H. G., Kessenich, E., & Geven, S. (2022). The Digital Divide in Online Education: Inequality in Digital Readiness of Students and Schools. *Computers and Education Open*, 3, 100100. <https://doi.org/10.1016/j.caeo.2022.100100>
- Yemane, A., Andualem, G., & Chane, A. (2026). Leadership Competency and Sustainable Performance in Emerging Markets: A Dual-Pathway Perspective. *Sustainability*, 18(12), 5895. <https://doi.org/10.3390/su18125895>
- Yıldız, R., & Arastaman, G. (2026). Instructional Leadership and Student Achievement in a Centrally Regulated System: A School-Level Test of Academic Optimism as an Organisational Pathway. *Educational Management Administration & Leadership*, 17411432261470554. <https://doi.org/10.1177/17411432261470554>
- Zervas, I., & Stiakakis, E. (2025). HRM Strategies for Bridging the Digital Divide: Enhancing Digital Skills, Employee Performance, and Inclusion in Evolving Workplaces. *Administrative Sciences*, 15(7), 267. <https://doi.org/10.3390/admsci15070267>