




# “The impact of digital human resource management on employee innovation behavior: The mediating role of organizational learning in the ICT sector in the Middle East”

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# THE IMPACT OF DIGITAL HUMAN RESOURCE MANAGEMENT ON EMPLOYEE INNOVATION BEHAVIOR: THE MEDIATING ROLE OF ORGANIZATIONAL LEARNING IN THE ICT SECTOR IN THE MIDDLE EAST

## Abstract

The paper examines how digital human resource management (D-HRM) practice affects employee innovation behavior in the ICT sector in several Middle Eastern countries, especially regarding how organizational learning acts as a mediating variable. The analysis was quantitative, involving an online survey sent to 15 ICT organizations in Jordan, the UAE, Saudi Arabia, Egypt, and Qatar. A total of 658 valid responses were collected from HR specialists, innovation team members, supervisors, and managers between February and May 2025. Partial least squares structural equation modeling (PLS-SEM) was used to analyze the data. These findings showed that D-HRM (beta = 0.28,  $p < 0.001$ ) affects employees' innovation directly and significantly. In addition, D-HRM is found to have a significant impact on organizational learning (beta = 0.39,  $p < 0.001$ ), which has a significant effect on innovation behavior (beta = 0.33,  $p < 0.001$ ). The mediation effect was also justified (0.13,  $p < 0.001$ ), and it is established that learning processes act as one of the significant mechanisms of HRM transforming digital into innovative ones. The findings highlight the significance of digital capability and organizational learning in supporting innovation in ICT companies. The study provides meaningful suggestions to HR leaders and policymakers to promote innovation with digital systems, learning culture, and human-centered strategy. These findings provide actionable insights for HR leaders and policymakers in the Middle East ICT sector, helping them design digital HR strategies that strengthen organizational learning and enhance employee innovation capacity.

## Keywords

digital HRM, organizational learning, employee innovation, ICT, Middle East

## JEL Classification

M15, G21, O33, L86

## INTRODUCTION

Innovation is an organization's key to success and sustainability, especially in today's fast-paced technology development. Innovations are a competitive advantage and the only survival strategy, particularly in the information and communications technology (ICT) industry (Budiarto et al., 2024). As organizations attempt to develop innovation on all levels, human resource management (HRM) has been re-designed using digital tools and new practices meant to boost employee engagement, performance, and innovativeness. Digital human resource management (D-HRM), which combines e-recruitment, online training platforms, performance analytics, and cloud-based HR systems, is becoming an organizational agility and innovation driver (Budiarto et al., 2024).



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Past studies have discussed the positive impact of digital HR practices in enhancing operational efficiency and employee satisfaction (Parikh & Pirani, 2025). Still, little focus has been placed on how digital HR practices affect employee innovation behavior, especially in developing and emerging economies. Besides, the operationalization of the role of D-HRM on new work behavior is incomplete. The concept of organizational learning as the organizational capacity to learn, share, and utilize knowledge may become a crucial mediating variable in this relationship (Lin & Kuo, 2007). The learning culture can transform digitally-enabled HR practices into valuable outcomes by providing workers with the intellectual resources and knowledge-exchange environment needed to innovate.

Although digital HRM and innovation have been studied in different contexts, minimal empirical research has investigated this relationship in the Middle Eastern ICT sector. In particular, prior studies have not sufficiently examined how organizational learning functions as a mediating mechanism between digital HRM and employee innovation behavior. This creates a knowledge gap, especially in emerging economies where digital transformation is rapidly accelerating, but innovation outcomes remain inconsistent.

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## 1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Digital human resource management (D-HRM) describes the strategic use of digital technologies to perform human capital functions, including human capital recruitment, training, performance management, and employee engagement (Bondarouk & Brewster, 2016). Contrary to what was the case in traditional HRM, D-HRM exploits technologies such as cloud-based HR systems, talent analytics enabled by artificial intelligence, e-learning systems, and mobile apps to make processes leaner and more responsive (Deepa et al., 2024). Modern organizations, especially those in rapidly growing sectors such as ICT, are highly dependent on these digital solutions since the agility and innovation of the workforce are crucial in such companies.

D-HRM systems enable real-time feedback, a self-service portal, and individual career development plans, which can increase employee engagement and flexibility (Khatib & Alshawabkeh, 2022). Strategically, D-HRM not only enhances administration efficiency but also helps create a digital culture, which favors innovation. With HR systems incorporated into the organizational strategy and energized in digital infrastructure, transparency, empowerment, and collaboration, which are the core drivers of innovation, emerge (Phakamach et al., 2023).

Rising digitization programs and government development in ICT infrastructure in the Middle Eastern region have encouraged most organizations to implement D-HRM solutions. However, the literature is sparse on the translation of these tools into innovation output at the employee level, particularly indirectly through mechanisms such as learning and culture.

Organizational learning is a process through which organizations learn, share, and utilize knowledge to become adaptive and enhance their performance over time (Soomro et al., 2021). It is done at both a personal level (skills training, experience) and a group level (best practice sharing, knowledge called systems). The need to learn in the fast-changing world that ICT is does not come as an option; it is a strategy that helps a firm stay in the game and become a person of constant innovation.

According to Tu and Wu (2021), a learning organization's most important building blocks are the supportive learning environments, the concrete learning processes, and leadership that supports learning. Learning in this perspective is not a single episode but something integrated into the organization. It helps companies identify alterations in the external environment, respond to interruptions, and embrace the latest opportunities. The feedback loops, the openness to experiments, and psychological safety define learning organizations, and these three aspects lead to the increased matching of employee innovation behavior (Oh, 2019).

In the literature on HRM, organizational learning is becoming an issue where HR practices influence outcomes at the firm level (Kokkaew et al., 2022). Once digital HR tools enable learning by supporting continuous training, sharing knowledge online, and AI-based curation of sources, they will produce an environment that supports and promotes reflection, experimentation, and proactive employment.

Employee innovation behavior is an action by employees to generate, market, and make practical new ideas to improve individual, team, or organizational performance (Önhon, 2019). Contrary to the orthodox measures of innovation, centered on outputs (e.g., patents), this measure centers on bottom-up innovation behavior.

Innovation behavior is reported to be dependent on both individual level (e.g., psychological empowerment, intrinsic motivation) and contextual factors (leadership style, job design, and organizational culture) (Liu et al., 2019). HR practices are influential in creating this environment. In particular, the systems that foster learning, collaboration, and autonomy will likely encourage innovative behavior among the employees (Jiang et al., 2023).

Digitally mature organizations can enable employees to take action based on insights, create personalized platforms to take initiative, and get creative in their solutions by utilizing HR analytics, performance dashboards, and personalized learning platforms. Nonetheless, the way digital tools are treated and promoted in the organization will determine the level of their impact on innovation behavior.

Recent studies show that digital HR practices may directly influence innovation behavior. Using comfortable digital tools that support access to learning opportunities, provide performance feedback, and help determine whether an employee is ready to explore other opportunities in the company, helps them feel confident and in control when sharing new ideas (Kutieshat & Farmanesh, 2022; Purwanto et al., 2023). In addition, the cross-functional cooperation and real-time knowledge dissemination are the two important determinants of innovation in ICT companies, which can be achieved through digital systems.

Employees in highly D-HRM-prolific organizations can carry out proactive actions devoid of any protocol bogs and bottlenecks of any hierarchy. This sensitivity promotes an experimental and innovative culture.

The D-HRM can influence the learning process within organizations; through this, it is also involved in enhancing knowledge within the organization. Employees are perpetually channeled to new information and best practices using digital onboarding, learning management systems (LMS), and AI-guided learning tracks (Ahmić & Ćosić, 2025). These technologies contribute to the learning culture, making information available, personalized, and integrated into daily practices.

In addition, D-HRM boosts teamwork and internal communication on social platforms, discussion boards, and collective knowledge repositories, which also promotes organizational learning (Waheed et al., 2019). D-HRM can make a significant contribution to institutionalizing learning in the Middle Eastern ICT sector, where digital maturity is highly uneven.

The immediate effect of organizational learning on innovation is to establish a standard base of knowledge, minimize the fear of failure, and provide constructive feedback (Rhaïem & Amara, 2021). Workers in learning-based organizations are also less afraid to participate in idea generation and experimentation since they are psychologically safe and more knowledgeable.

According to several empirical research findings, learning mediates the connection between the HR practices and outcomes of innovation in dynamic industries such as ICT (Kokkaew et al., 2022; Martínez-Sánchez et al., 2020). Hence, the probability of innovative behavior among staff members can be significantly enhanced by generating a healthy learning culture.

Organizational learning is significant in connecting digital human resource management (D-HRM) to employee behavior of innovation. Although D-HRM tools (e-recruitment, digital training, performance analytics) make information more available to everyone and streamline HR activities, their success lies in the effectiveness of the em-

ployee learning to use them. Organizational learning prepares the staff to encode digital information, change behavior, and utilize novel methods to start innovating within the position (Kokkaew et al., 2022; Pourrshidi, 2021).

More importantly, an employee demonstrates the possibility to change digital capabilities into creative acts with the assistance of a learning culture, which is facilitated by a set of digital platforms and knowledge-sharing practices (Huang et al., 2023). Without such learning mechanisms, the possibilities of making D-HRM an innovation driver are low. Therefore, organizational learning serves as an important phase that fills the gap between the digital tools and employee innovation (Alzadjali et al., 2023).

This study aims to explain the effect of D-HRM on employee innovation behavior and give insight into the mediating role of organizational learning across the Middle East region countries.

The hypotheses are as follows:

- H1: Digital human resource management has a significant positive effect on employee innovation behavior.*
- H2: Digital human resource management has a significant positive effect on organizational learning.*
- H3: Organizational learning has a significant positive effect on employee innovation behavior.*
- H4: Organizational learning mediates the relationship between digital human resource management and employee innovation behavior.*

## 2. METHODOLOGY

The quantitative mode is used to carry out the study in a bid to test the research hypotheses. It used the cross-sectional survey scheme to gather information about workers in the ICT industry in predetermined countries within the Middle East. The convenience sampling technique justified the over-

all challenge of reaching all the target samples of interested respondents in multinational and local ICT organizations in the UAE, Saudi Arabia, Qatar, Jordan, and Egypt. According to this approach, we gathered the required data and guaranteed reasonable representativeness of the greater population of 15 ICT organizations (Sekaran & Bougie, 2016). Subsequently, the data were obtained based on an online questionnaire created in Google Forms and distributed electronically following the required approvals. Respondents were approached by email and professional sites like LinkedIn. These organizations included local ICT firms, multinational subsidiaries, telecom providers, software development companies, and cloud service providers. The full list of the 15 participating organizations is provided in Appendix A.

The number of questionnaires distributed was 754, and 658 valid responses were obtained, resulting in a response rate of 87.3 percent. It has been established that the sample size of between 380 and 500 people is adequate when the population is above 10,000, according to Krejcie and Morgan (1970). The high amount of effective feedback expands the representativeness and confidence of the study findings.

A structured questionnaire, with five main sections and 26 questions, was designed to test the study's hypotheses. The initial part consisted of five broad questions concerning respondent demographics. The rest of the 21 items encompassed the measures of the independent, mediating, and dependent variables, namely digital human resource management, organizational learning, and employee innovation behavior. In particular, seven items were used to determine the D-HRM practices (e.g., e-recruitment, digital training, HR analytics), seven items to determine organizational learning (e.g., knowledge sharing, continuous improvement), and seven items to determine innovation behavior (e.g., idea generation, implementation, risk-taking). A five-point Likert scale (strongly disagree – 5, strongly agree – 1) was utilized to denote all the items.

A pre-test (25 respondents) and a pilot test (30 respondents) were conducted to check the clarity and reliability of the questionnaire before final distribution. The modifications in the ques-

tionnaire came out as the pre-test and pilot test were carried out as a form of feedback on the questionnaires to finally have a final copy of the questionnaire, which would be distributed officially (Alrifae, 2025).

Partial least squares structural equation modeling (PLS-SEM) was presented to analyze the collected data. This method was chosen because it is applicable to modeling applications with latent variables, as well as addressing the problems of small sample size and non-normal distribution (Hair et al., 2014). It was done through SmartPLS 4.0.7.8. PLS-SEM was chosen because it can estimate both measurement and structural models and improve the accuracy of relationship prediction between variables (Sharabati et al., 2024).

The initial one involved testing a measurement model that helps assess the reliability and validity of constructs. Composite Reliability (CR) and Cronbach's alpha were presented to test internal consistency, whereas average variance extracted was used to estimate convergent validity. The discriminant validity had been considered according to the Fornell-Larcker criterion and based on the cross-loading comparisons. The model fit was determined using the standardized root mean square residual (SRMR). Then, the hypothesis testing was applied to the structural model with references to the path coefficients, signs of significance (carried out using bootstrapping), R2 values, and effect sizes ( $f^2$ ).

Table 1 presents the demographic composition of respondents. The respondent group consisted of 658 people, of whom the proportion of men was 62.3 percent and that of women was 37.7 percent. The largest age group comprised respondents between 30 and 40 years old (35.1%), and 15.2 percent were above the age of 50 years. Considering education level, 3.0 percent had a diploma, 60.8 percent a bachelor's degree, 32.4 percent a master's degree, and 3.8 percent a Ph.D. Regarding work experience, 41.6 percent had between 5 and 9 years, and 15.7 percent had more than 15 years of experience. Regarding employment status, 34.7 percent were employees, 48.5 percent supervisors, and 16.9 percent managers.

**Table 1.** Demographic characteristics of the sample

| Variable        | Category            | Frequency | Percentage |
|-----------------|---------------------|-----------|------------|
| Gender          | Male                | 410       | 62.3%      |
|                 | Female              | 248       | 37.7%      |
| Age             | Less than 30 years  | 130       | 19.8%      |
|                 | From 30 to 40 years | 231       | 35.1%      |
|                 | From 41 to 50 years | 197       | 29.9%      |
|                 | Over 50 years       | 100       | 15.2%      |
| Academic Degree | Diploma             | 20        | 3.0%       |
|                 | Bachelor's          | 400       | 60.8%      |
|                 | Master's            | 213       | 32.4%      |
|                 | Ph.D.               | 25        | 3.8%       |
| Work Experience | Less than 5 years   | 130       | 19.8%      |
|                 | From 5 to 9 years   | 274       | 41.6%      |
|                 | From 10 to 14 years | 151       | 22.9%      |
|                 | 15 years and above  | 103       | 15.7%      |
| Job Position    | Employee            | 228       | 34.7%      |
|                 | Supervisor          | 319       | 48.5%      |
|                 | Manager             | 111       | 16.9%      |

### 3. RESULTS

The study applied partial least squares structural equation modeling (PLS-SEM) through SmartPLS version 4.0.7.8 to test the existing relationships among the constructs and the hypotheses outlined. The given strategy fits best when latent variables are utilized in complex models. It was selected because it is sturdy regarding non-normal data and predictive modeling testing. To perform the evaluation, the standard steps for measuring the model (Hair et al., 2014) were followed: the measurement model was evaluated first, followed by the structural one.

A measurement model was used to test the reliability and validity of the research constructs. The internal consistency value was established using Cronbach's alpha, where all the constructs exceeded the minimum cutoff of 0.70, which is a point of satisfactory reliability. Moreover, the composite reliability of any construct was above 0.90, which is additional proof of internal consistency. The outer weightings of individual items were above 0.70, which meant that the indicators contributed to the constructions they described. The convergent validity was checked with the help of the average variance extracted (AVE), and the thresholds surpassed 0.50. It provides a general expla-

nation of latent constructs accounting for most of the variance in observed variables; consequently, the measurement model is proven convergent. The Cronbach's alpha, Composite reliability, and AVE results in Table 2 are within the prescribed limits.

The heterotrait-monotrait (HTMT) ratio of correlations was used to determine the discriminant validity. All HTMT values indicated that the empirical difference between constructs was less than the acceptable level of 0.90. This result proves that the constructs used in the model are not duplicates of one another and have significant overlap. Table 3 demonstrates the HTMT among each pair of constructs. The standardized root mean square residual (SRMR) and Normed Fit Index (NFI) were also used to obtain the goodness of fit analysis of the model. The value of SRMR (0.034) considerably satisfies the requirements as it is far below the highest value that can be accepted (0.08), which shows that the observed and expected data fit well together. The NFI value of 0.929 is higher than the minimum value of 0.90, asserting a proper fit of the model. Table 4 displays the outcome of these fit indicators.

Once the measurement model was tested for validity and reliability, the structural model was run to test the study's hypotheses and investigate the direction of relationships between the constructs (predictive direction). The coefficient of determination ( $R^2$ ) of employee innovation behavior was determined as 0.71, indicating that the variance in employee innovation behavior can be explained as 71 percent by the blending effect of digital human resource management (D-HRM) and organizational learning. An effect size ( $f^2$ ) analysis further indicated that D-HRM has a medium effect on organizational learning ( $f^2 = 0.18$ ) and employee

innovation behavior ( $f^2 = 0.21$ ), respectively, and organizational learning has a medium impact on employee innovation behavior ( $f^2 = 0.16$ ). These values are consistent with the specifications of Cohen (2013) and indicate that all of them are indeed contributing to the model. A large proportion of explained variance demonstrates a robust model with significant practical consequences.

The bootstrapping procedure was adopted on the five thousand resamples to determine the significance of path coefficients based on a set of hypotheses. The findings, which are presented in Table 5, prove all four hypotheses to be statistically significant. Hypothesis  $H1$ , which hypothesized that digital HRM was directly related to employee innovation behavior, was supported with a standardized path coefficient ( $B$ ) = 0.276, ( $t$ -value) = 5.839, and  $p < 0.001$ . Hypothesis  $H2$ , based on the impact of D-HRM on the organization's learning, was also supported (beta: 0.389,  $t = 7.102$ ,  $p < 0.001$ ). Hypothesis  $H3$  was supported since there was a significant path coefficient of 0.327,  $t$ -value of 6.117, and  $p < 0.001$ . Lastly, Hypothesis  $H4$  examined the mediating role of organizational learning in the relationship between D-HRM and employee innovation behavior. The results showed a significant indirect effect ( $\beta = 0.127$ ,  $t = 3.998$ ,  $p < 0.001$ ), indicating full support for the mediation effect.

These results confirm that digital HRM is critical in promoting employees' innovation behavior directly and indirectly (e.g., through organizational learning). The substantiated model provides strong empirical evidence for the theoretical framework, highlighting the role of digital HRM systems and organizational learning culture in sustaining innovation in the ICT industry in the Middle East

**Table 2.** Convergent validity results

| Construct                         | Cronbach's Alpha | Composite Reliability | Average Variance Extracted (AVE) |
|-----------------------------------|------------------|-----------------------|----------------------------------|
| Digital Human Resource Management | 0.879            | 0.921                 | 0.745                            |
| Organizational Learning           | 0.865            | 0.911                 | 0.726                            |
| Employee Innovation Behavior      | 0.888            | 0.927                 | 0.796                            |

**Table 3.** Heterotrait-monotrait (HTMT) ratio

| Variables                       | 1     | 2     | 3 |
|---------------------------------|-------|-------|---|
| 1. D-HRM                        | –     | –     | – |
| 2. Organizational Learning      | 0.681 | –     | – |
| 3. Employee Innovation Behavior | 0.703 | 0.717 | – |

**Table 4.** Model fit indicators

| Indicator | Saturated Model | Estimated Model |
|-----------|-----------------|-----------------|
| SRMR      | 0.031           | 0.034           |
| NFI       | 0.932           | 0.929           |

**Table 5.** Results of hypothesis testing

| Hypothesis | Path  | Coefficient ( $\beta$ ) | t-value | p-value | Decision |
|------------|---|-------------------------|---------|---------|----------|
| H1         | D-HRM $\rightarrow$ Employee Innovation Behavior  | 0.276                   | 5.839   | 0.000   | Accepted |
| H2         | D-HRM $\rightarrow$ Organizational Learning   | 0.389                   | 7.102   | 0.000   | Accepted |
| H3         | Organizational Learning $\rightarrow$ Employee Innovation Behavior                            | 0.327                   | 6.117   | 0.000   | Accepted |
| H4         | D-HRM $\rightarrow$ Organizational Learning $\rightarrow$ Employee Innovation Behavior (med.) | 0.127                   | 3.998   | 0.000   | Accepted |

region. Generally, the structural model achieved high explanatory power ( $R^2 = 0.71$ ) and an acceptably fit model ( $SRMR = 0.034$ ,  $NFI = 0.929$ ), which implies that the proposed framework is both numerically sound and practically practical to explain innovation behavior at ICT organizations in the Middle East.

## 4. DISCUSSION

This paper sought to investigate how digital human resource management (D-HRM) influenced the innovation behavior of employees within the ICT industry in selected Middle Eastern countries, particularly focusing on the mitigating layer of organizational learning. Results of the PLS-SEM analysis prove that the four suggested hypotheses ( $H1$  to  $H4$ ) are true, and the differences are significant. This indicates that D-HRM plays both a direct and indirect role in encouraging innovation among employees, particularly when the processes of organizational learning are in place.

Hypothesis 1 ( $H1$ ) was that D-HRM would positively impact employees' innovative behavior. The results ( $\beta = 0.276$ ,  $t = 5.839$ ,  $p < 0.001$ ) showed support for this hypothesis, meaning that the availability of digital HR practices in the form of e-recruitment, electronic testing, online performance evaluation, and digital platforms to provide employee training has a significant impact on innovation at the level of the employees. This corresponds to the results of Alqarni et al. (2023), who stated that digital HR systems increase the efficiency of operation and help to establish an environment of innovation. This suggests that as HR practices become more streamlined and digital, employees will be more responsive and empow-

ered to generate new ideas, suggest improvements, participate in creative problem-solving, and so on.

The second hypothesis ( $H2$ ) was concerned with the impact of D-HRM on organizational learning. The association was high and very positive ( $\beta = 0.389$ ,  $t = 7.102$ , and  $p < 0.001$ ) as it has been determined that digital HR tools not only enhance administrative efficiency but also lighten knowledge sharing, learn through past experiences, and advancing ongoing skills strengthening. Such a result is consistent with Alrousan et al. (2025), who emphasized the importance of digital tools in enhancing the learning infrastructure of companies. ICT is the field that requires adjusting and acquiring new knowledge very fast, and digital HRM can serve as a trigger for the learning processes capable of maintaining organizational agility.

$H3$  was the hypothesis that organizational learning would positively affect employee innovation behavior, and the data were consistent with this assumption ( $\beta = 0.327$ ,  $t = 6.117$ ,  $p < 0.001$ ). This strengthens the literature; e.g., Reeves et al. (2021) demonstrated that organizations that could learn faster than their competitors tended to acquire strategic benefits, especially in technology-intensive industries. In this regard, the study recommends that, by investing in learning opportunities, including financial and human resources (in the case of digital knowledge management systems or e-learning platforms), ICT organizations encourage and boost the capabilities of employees to innovate and explore new ideas.

Lastly,  $H4$  referred to the mediating role of organizational learning on the connection between D-HRM and employee innovation behavior. The findings ( $\beta = 0.127$ ,  $t = 3.998$ ,  $p < 0.001$ ) claim that

organizational learning plays a vital role in mediating this relationship and that promoting a learning environment partially mediates the influence created by digital HRM on innovation. This observation can also be compared with the one made by Cheng et al. (2024), who highlighted the use of both internal knowledge systems and learning capacity as critical enablers of converting the technology investment into changed behaviors. Organizational learning in ICT companies in the Middle East serves as the interface between digital systems and human ideas, as the pressure of competition requires constant innovation.

These results are analogous to the ones in the recent literature. As another example, Kutieshat and Farmanesh (2022) revealed that the application of HRM in the context of COVID-19 stimulated a rise in performance in innovation within an educational environment. In contrast, Alrousan et al. (2025) established that the use of digital HR tools boosts the organizational learning capacity in the Middle East. On the same note, Alqarni et al. (2023) also revealed that the e-HRM system builds sustainable innovation, and Cheng et al. (2024) have also shown that organizational learning enhances innovation in SMEs that are implementing Industry 4.0. By aligning with such studies, our analysis has justified the importance of digital HR practices and learning mechanisms in facilitating employee-level innovations in ICT-based organizations.

Theoretically, the findings contribute to the resource-based view of the firm (RBV) since digital HRM is a distinguished and unequaled capability

that contributes to innovation when complemented by organizational learning. Concurrently, the results support the organizational learning theory as they show that learning processes serve as the conduit through which digital resources turn into innovative ends. The two contributions also see organizational learning as a primary conduit between digital competencies and innovative behavior amongst employees.

To conclude, the results confirm the theoretical framework. They show that the best digital HRM approaches both directly and indirectly promote employee innovation through the improvement of the capabilities to learn in the organization. The findings can contribute to substantial knowledge of the technological, managerial, and cognitive framework's influence on innovation behavior. In practical terms, corporations within the ICT sector are not advised to take digital HRM as a simple administrative role; instead, they think of it as an entirely strategic process of innovation and change.

To the practitioners, the results indicate that HR managers in ICT organizations should not only adopt digital HR tools but also integrate them into a robust learning culture. As an example, e-recruitment facilities, online education, and HR analytics can be more effective when combined with ongoing learning programs and knowledge exchanges. This incorporation will ensure the workforce is equipped to transform digital systems into innovative solutions, thereby maintaining competitiveness in the rapidly evolving Middle Eastern ICT market.

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## CONCLUSION

The study was conducted primarily by testing the effect of digital human resource management (D-HRM) on employee innovation behavior in the Middle Eastern ICT sector, with organizational learning used as a mediating variable. The results demonstrated a far-reaching positive direct and indirect impact of D-HRM on innovation, as it promotes innovation by improving organizational learning processes. Each hypothesis was proved, and digital HR tools are more than administrative solutions, as they can enable innovation.

Digital recruitment, online performance management, and e-learning platforms are among the D-HRM practices that increase employee creativity, as the latter have further flexibility, access to information, and real-time feedback. Using these tools can also support a learning culture that better facilitates the acquisition, transfer, and retention of organizational knowledge. Incorporating organizational learning

in the model as a mediator substantiated that constant learning programs foster closer learning among employees, increasing the likelihood that employees will innovate.

Some recommendations can be drawn based on these findings. To begin with, ICT companies should combine digital HR technology with specific learning curricula to enhance their effectiveness in terms of innovation. E-learning systems, knowledge-sharing mechanisms, and digital collaboration platforms are among the systems that should be invested in, together with HR digitalization. Second, the HR and the leadership team need to coordinate digital transformation objectives with the overall innovation agenda, and staff should be trained and able to act on their own and present ideas.

Lastly, the paper advises corporations to perceive D-HRM as an element of a comprehensive innovation strategy instead of technical change. Combining digital efficiency with a strong focus on learning enables firms to better equip their employees to respond creatively to fast-changing technologies. In future research, another direction can be diversified to other areas or cultural contexts and focus on other mediators, such as organizational culture or leadership approach, to improve our understanding of innovational dynamics.

As a managerial input, ICT companies should integrate digital HRM systems, such as e-recruitment, HR analytics, and e-learning systems, with ongoing learning processes. Incorporating digital technologies with organizational learning initiatives enables employees to access knowledge, share best practices, and create innovative solutions. The integration helps organizations navigate innovation within rapidly changing ICT environments in the Middle East.

Despite this contribution, the study is limited by several flaws. First, it is not possible to establish causality through the cross-sectional design. Second, convenience sampling can reduce the interest of the findings. Third, the study was limited to ICT organizations; therefore, the findings cannot be fully replicated in other industries.

In future research, longitudinal designs can be used to obtain more causal relationships. Applications of probability sampling methods that aim to achieve broader representation are also encouraged. Moreover, it would be essential to consider possible moderating factors like organizational culture, the leadership style, or technological preparedness to have a better insight into how digital HRM facilitates innovation within various organizations.

## AUTHOR CONTRIBUTIONS

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## APPENDIX A

**Table A1.** List of participating organizations

| No. | Organization (anonymized if needed)      | Country      | Sector           |
|-----|--|--------------|------------------|
| 1   | Orange Jordan                            | Jordan       | Telecom / ICT    |
| 2   | Zain Jordan                              | Jordan       | Telecom / ICT    |
| 3   | Umniah                                   | Jordan       | Telecom / ICT    |
| 4   | Etisalat                                 | UAE          | Telecom / ICT    |
| 5   | du (Emirates Integrated Telecom Company) | UAE          | Telecom / ICT    |
| 6   | Microsoft Gulf                           | UAE          | Software / Cloud |
| 7   | STC (Saudi Telecom Company)              | Saudi Arabia | Telecom / ICT    |
| 8   | Mobily                                   | Saudi Arabia | Telecom / ICT    |
| 9   | Zain KSA                                 | Saudi Arabia | Telecom / ICT    |
| 10  | Vodafone Egypt                           | Egypt        | Telecom / ICT    |
| 11  | Telecom Egypt                            | Egypt        | Telecom / ICT    |
| 12  | Etisalat Misr                            | Egypt        | Telecom / ICT    |
| 13  | Ooredoo Qatar                            | Qatar        | Telecom / ICT    |
| 14  | Vodafone Qatar                           | Qatar        | Telecom / ICT    |
| 15  | Meeza (Qatar ICT Services)               | Qatar        | ICT Services     |

*Note:* The organizations listed above represent the 15 ICT and telecom companies that participated in the study. Company names are provided for transparency; however, results are reported in aggregate to ensure confidentiality of individual responses.