

Impact of Digital HRM on Academicians' Performance in Higher Educational Institutions of Sindh: Exploring the Mediating Role of Organizational Empowerment and Moderating Role of Digital Innovation

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Abstract: The digitalization of HRM has significantly influenced organizational performance across various sectors, such as higher education. This study examines the influence of Digital HRM on the performance of Pakistan's Sindh region HEIs' academicians and its mediating and moderating influence through organizational empowerment, and digital innovation. Although corporate settings have been experiencing the growing adoption of digital HRM practices, limited empirical studies have explored their adoption and effectiveness in HEIs, particularly in the developing world. This study employed a quantitative approach, using structural equation modeling completed through structured questionnaires from 356 Sindh's HEIs academicians. Findings indicate a strong positive correlation between Digital HRM and academicians' performance, where organizational empowerment mediates this relationship. Digital innovation also moderates the Digital HRM and academic performance relationship, such that its effects are magnified when institutions effectively utilize innovative digital solutions. This study contributes to theoretical knowledge on Digital HRM in academic settings via offering evidence of its influence on enhancing academic performance through empowerment and innovation. From a pragmatic point of view, the study provides insights to policymakers, education leaders, and HR practitioners in HEIs of Sindh, Pakistan on how to utilize digital HRM strategies to create a more empowered and high-performing academic faculty. The study emphasizes the pivotal role of digital infrastructure and innovative HRM practices in increasing research productivity, pedagogical effectiveness, and institutional success.

Keywords: Digital HRM, Academicians' Performance, Organizational Empowerment, Digital Innovation, Higher Education Institutions, Structural Equation Modeling (SEM).

1. Introduction

Higher education institutions play a crucial role in promoting social and economic development within the current dynamic related with academic environment. Academic performance inside educational institutions create the foundation for delivering quality education and maintaining inventive research activities along with sound community engagement practices. The process of maintaining academic performance remains demanding because of quick technological advancements. However, Digital HRM practices emerged to reshape organizational structures by creating efficient solutions that empower employees (Zhang et al., 2024). This study delves into the relationship between digital HRM and the performance of academicians in Sindh's HEIs, with a specific focus on the mediating role of organizational empowerment.

The academic domain and HEIs in Sindh have not received adequate research regarding the adoption of digital HRM systems despite its widespread sectoral use. Existing research primarily concentrated on corporate sectors that created a knowledge gap about digital HRM in educational institutions within developing areas (Bhattacharyya et al., 2021). The research addresses a missing area in current study because it evaluates the academic impact of digital tools including online performance appraisals and e-recruitment and training systems and other technology-based HR functions. The main aim of this research is seeking the verification of role in organizational empowerment between digital HRM practices and academic performance's improvement. Specific questions guide the research to determine how digital HRM practices affect academicians' performance abilities. The study analyzes towards which extent organizational empowerment works as a bridge to explain this connection and also particular human resource management procedures deliver the best results in this scenario.

This research offers multiple contributions. The research theoretically enlarges academic knowledge about human resource management by showing how digital technologies affect higher education institutions in developing areas. The literature has emphasized technology as an enhancer of human resource practices yet neglected to study how these systems operate across different cultural organizations (Alenezi, 2023). The study presents real-world guidance for higher educational institutions to improve their human resources methods through digital systems which increase staff competencies and motivation levels. The study emphasizes organizational empowerment through evidence that enabled academics maintain stronger ability to embrace technological change while fostering partnership coordination along with research and teaching excellence.

This research study used structured questionnaires that were distributed among the academicians in HEIs of Sindh. Structural equation modeling enables the analysis to confirm the proposed effects between digital HRM and organizational empowerment such that influence academic performance. This study investigates these phenomena specifically in Sindh because digital infrastructure varies along with technological readiness affecting research results (Ullah et al., 2025). This study provides essential guidelines for digital HRM institutionalization which educational leaders together with HR professionals and policymakers can use for creating academic growth strategies.

The research purpose is to provide HEIs with crucial knowledge as well as practical resources that enable better performance from academicians through digital HRM system implementation. Creating empowerment-driven operations establishes institutions as platforms to achieve maximum productivity from their academic staff members. The implementation of this approach meets educational requirements worldwide according to (Shaikh & Shar, 2023) and simultaneously serve the regional mission to advance higher education quality.

2. Literature Review

Digital HRM

Digital human resource management exists today as a crucial management research topic according to (Thite, 2022; Mumtaz et al., 2022). Technology proliferation has caused the digital transformation of different organizational processes which now includes human resource management systems. Using digital technology to enhance and optimize human resources functions represents the definition of Digital HRM. The deployment of digital HRM methods in educational establishments produces substantial consequences that determine the performance levels of academic personnel.

Academic Performance

The performance level in academics contains multiple assessment components which measure student educational involvement. The construct incorporates multiple aspects that express students' academic advancement and results from diverse biological and psychological economic and sociological elements (Limniou et al., 2021). The academic standing of students manifests in their scholastic grades together with their classroom participation and course material involvement (Rasheed et al., 2022). Academic performance refers to the student's grades achieved, that were found to significantly correlate with the development of transversal competencies in reasoning for complexity and digital transformation, highlighting its importance in educational interventions and professional development.

Organizational Empowerment

Organizational empowerment represents a complex idea that aims to boost individual and group autonomy at workplaces to unlock innovation and boost performance and team success (Supriyanto et al., 2023). Organizations need such empowerment to adjust to complicated challenges while staying competitive. Improved contextual and adaptive performance follows from empowerment because it promotes innovative work behavior. Organizations need to establish proper control mechanisms that pair up with enabling structures as they work to achieve beneficial results from empowerment initiatives.

Digital Innovation

Digital innovation includes two dimensions within companies which focus on organizational structure and operational procedures to achieve better organizational results. Hervas-Oliver et al. (2021) explain digital innovation as the method of employing technology for producing modern or refined products or processes or services. The digital transformation of organizations forms a key role in driving industry changes because it provides the opportunity to mix digital elements with physical elements which generates fresh digital solutions and fortifies established digital products. The ascendancy of digital technology in corporate operations has triggered firms to combine IT strategic goals with business objectives into unified digital business strategies which prove essential because organizations thereby can utilize their digital assets to achieve innovation and operational enhancements with better customer satisfaction.

Digital HRM and Academicians' Performance

Digital technologies now play a major role in transforming how organizations handle workforce management within their continually developing human resource environments. The academic sector highly depends on Digital Human Resource Management as a core organizational success factor (Dihan et al., 2024). The digital era revolutionized human resource function development by requiring organizations to transform their employee motivation methods and staffing systems and routines (Varadaraj & Al Wadi, 2021). Human resource management experiences transformation through technology because this tool functions as an enabler that boosts performance metrics of HRM but maintains core human elements (Shaikh & Shar, 2023). Sustainable organizational performance grows substantially from human resource management abilities in technology-based academic organizations.

The field of research has demonstrated that Digital HRM produces substantial effects on business operational outcomes. Research results show that organizations achieve performance improvements through proper Digital HRM implementation even within academic learning institutions. The emergence of e-HRM brings strategic control to essential organizational choices in addition to providing administrative support for human resources functions (Thite, 2022).

Academic institutions rely on their professors to create fundamental changes in both knowledge advancement and innovation development. Resource management practices that effectively engage and develop academicians produce better teaching quality with improved research output which results in a more solid academic environment. The evolution of higher education systems demands that human resource management practices match organizational targets for building adaptable educational systems (Halid et al., 2020; Malokani et al., 2022). Through alignment, institutions achieve greater effectiveness and their academics gain the power to make substantial contributions which drives research progress while supporting an ideal environment of innovation and teamwork. Academic institutions that promote cross-field cooperation between scholars become better able to help professionals exchange knowledge that leads toward solutions that resolve educational and societal complex problems. The spirit of collaboration between educators enhances learning and produces revolutionary teaching methods and research solutions through multidimensional perspective sharing (Berber et al., 2018). Educational institutions that align their resources toward faculty training tactics will maintain teaching staff prepared to meet evolving trends and challenges with certainty. Therefore, researchers hypothesized that:

H1: Digital HRM is a significant relationship with Academicians' performance

The Mediating Role of Organizational Empowerment

Organizational empowerment acts as a key factor that significantly connects digital Human Resource Management (HRM) practices with academicians' performance (Khashman & Al-Ryalat, 2015). The empowerment of academicians in their work environment leads to better performance results for organizations. Digital HRM training accompanied by advanced digital tools enables academic staff to acquire the necessary competencies and resources for productive performance enhancement.

Digital HRM implements technological solutions such as e-learning platforms in addition to virtual collaboration tools and data-driven HR practices so it enhances the digital competencies of academicians while streamlining HR processes. Employee empowerment resulting from these initiatives generates substantial job performance gains through the active promotion of innovative thinking and adaptation together with employee contentment. Studies show that when academicians receive empowerment, they become prepared to handle changing academic settings leading to better achievement of organizational targets (Alsarairah et al., 2023).

The link between digital HRM initiatives and organizational performance gets enhanced through motivational and engaging practices that establish organizational empowerment. University administrators who experience empowerment assume responsibility for their academic tasks which leads to enhanced production alongside innovation. The implementation of HRM sustainability through supportive cultures maximizes empowerment strategies in higher education institutions and produces better results (Deng et al., 2024). Research confirms that organizational empowerment acts as an intermediate force (Afram et al., 2022) yet studies indicate that its results depend on variables such as organizational commitment and culture (Malokani et al., 2024). Strategies that match institutional challenges and targets generate maximum impact when empowerment approaches are properly adjusted to those factors (Oliveira et al., 2023). Academic institutions will achieve greater success through the enhanced performance of their teachers when digital HRM supports effective empowerment systems. Hence, proposed that:

H2: Organizational Empowerment mediating role between Digital HRM and Academicians' performance

Digital innovation moderating role

The continuous development of the digital age makes digital innovation in academia vitally important for academic activities. Research studies investigate how Digital Human Resource Management affects academic performance while stressing that scholars need to understand better the variables affecting this connection (Alsarairh et al., 2023). Organizational effectiveness together with individual performance now rely heavily on innovation in modern digital times. Digital innovation involves implementing new technologies in addition to innovative practices that help organizations achieve better efficiency and productivity together with enhanced collaboration (Liu et al., 2023). Academic institutions have acknowledged digital human resource management (Digital HRM) as the key modern method to oversee and build their workforce. Through performance management systems learning platforms and data analytics, Digital HRM offers processing capabilities that both improve administrative efficiency create better decision support, and facilitate career advancement (Alsarairh et al., 2023).

Academics show improved performance through Digital HRM yet research remains insufficient about how digital innovation measures the effectiveness of this relationship. The implementation of digital innovation would boost Digital HRM advantages when it helps academicians maximize their time between teaching activities and research and administrative duties. Academicians enhance their productivity by using AI-based research assistants and collaborative tools according to (Varadaraj & Al Wadi, 2021). Educational professionals need digital innovation to develop adaptability skills and continuous learning capacity as they move through an evolving educational system.

Hence,

H3: Digital innovation moderating role between Digital HRM and Academicians' performance

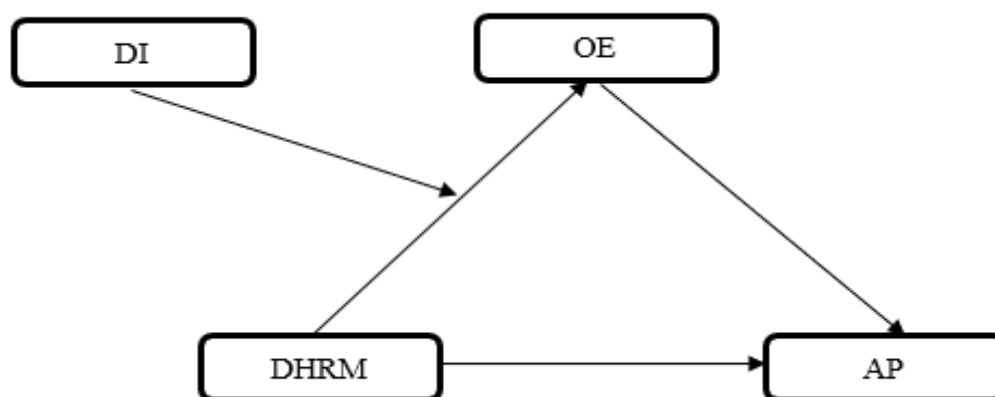


Figure 1: Conceptual framework

3. Methodology

This quantitative study evaluated established hypotheses by utilizing the proposed model which matched previous research work (Shaikh & Shar, 2023; Zhang et al., 2024). The statistical technique used deductive research to investigate the model through hypotheses that incorporate extensive conceptual frameworks (Tej et al., 2021). The research focuses on understanding the impact of digital HRM practices on academicians performance within Sindh's higher education institutions (HEIs) in Pakistan. The research adopts convenience sampling as its sampling technique while following patterns established in previous works and studies (Zehir et al., 2020). The research benefits from convenience sampling because it saves time and rolls out

more easily. A research survey was conducted among the academicians in Sindh's higher education institutions (HEIs). This survey collected 400 questionnaires which yielded 356 valid responses at a response rate of 71.2%. An adapted questionnaire from literature sources serves as part of this research survey to evaluate the proposed study model concepts (Shah et al., 2024).

Analytical analysis

This research utilized SPSS software-25 and AMOS-24. The research study used a modeling sequence that included separate steps for model measurement assessment followed by structural model examination to generate findings (Barclay et al., 1995). Internal consistency and convergent validity together with discriminant validity form requirements for valid measurement models (Hair et al., 2014). The structure of the model received evaluation through the investigation of relationships between the independent external variables and dependent internal variables (Hair et al., 2020).

Measurement Model

An 8-item high-performance work system measurement tool adapted to measure the companies' digital HRM practices (Patel et al., 2013). Sample items included: 'Great effort is taken to select the right person' and 'The duties in this job are clearly defined,' The Cronbach's alpha for this study and its scale was 0.93. Student Academic Performance' 6-item measurement scale adopted from the study (DuPaul et al., 1991). Scale item included: how early this student learns new material. The Cronbach's alpha for this study and its scale was 0.92. Organizational empowerment was measured using a 10-item scale modified from the empowerment literature (Ismail et al., 2011). Scale item included: I am confident with my ability to do my job. Also, the digital innovation scale was measured using an 8-item scale-modified (Shah et al., 2024). Scale items included. 'Quality of digital solutions is superior compared to our competitors'. The DI Cronbach alpha is 0.872.

4. Data Analysis

Demographics Analysis

In Table 1, demographic analysis shows a majority of male respondents (56.73%) and a notable female representation (43.27%). Most participants are aged 18-25 (35.38%), with smaller proportions in the 26-32 (27.78%), 33-40 (21.64%), and 40+ (15.20%) age groups. Over half have 1-2 years of experience (52.05%), while others have 3-4 years (32.75%), 5-8 years (19.01%), or 9+ years (13.16%). In terms of designation, Lecturers make up the largest group (44.74%), followed by Assistant Professors (19.88%), Associate Professors (18.71%), and Professors (16.67%).

Table 1 Demographics Analysis

Items	Category	Frequency	%
Gender	Male	194	56.73
	Female	148	43.27
Age	18-25	121	35.38
	26-32	95	27.78
	33-40	74	21.64
	40 & above	52	15.20
Experience	1-2	178	52.05
	3-4	112	32.75
	5-8	65	19.01
	9 & more	45	13.16
Designation	Lecturer	153	44.74
	Assistant Professor	68	19.88
	Associate Professor	64	18.71
	Professor	57	16.67

Descriptive Statistics

Descriptive statistics were computed using IBM SPSS version 25 software, which revealed high or medium average levels for all the variables. DHRM use has a positive and significant correlation with AC ($r = 0.557$ and $p < 0.01$). AC has a positive and significant correlation with OE ($r = 0.562$ and $p < 0.01$). OE has a positive and significant correlation with DI ($r = 0.304$ and $p < 0.01$). Also, reported HTMT values fall below 0.85, confirming discriminant validity across the constructs (Fornell & Larcker, 1981).

Table 2: Heterotrait monotrait ratios (HTMT)

	1	2	3	4
Digital HRM	(0.830)			
Academic Performance	0.557	(0.754)		
Organizational empowerment	0.541	0.562	(0.723)	
Digital Innovation	0.446	0.187	0.304	(0.654)

Table 3 presents factor loadings, CR, A.V.E, and Cronbach's Alpha values for individual variables examined. All items demonstrated accepted values related. Presented below are model fit indices as outlined in Table 4.

Table 3: Factor loading, CR, and AVE

Variable	Items	F.L	CR	AVE	α
Digital HRM	DHRM1-DHRM8	0.715-0.879	0.916	0.525	0.898
Academic Performance	AP1-AP6	0.785-0.885	0.902	0.648	0.862
Organizational empowerment	OE1-OE10	0.812-0.905	0.752	0.901	0.834
Digital Innovation	DI1-DI10	0.860-0.875	0.752	0.901	0.834

Table 4: Model fit indices

Indices	Acceptable level	fit-indices
1. CMIN/DF	$X^2/df \leq 5$	4.48
2. AGFI	$.90 \leq AGFI \leq 1$	0.910
3. TLI	$.90 \leq TLI \leq 1$	0.912
4. CFI	$.90 \leq CFI \leq 1$	0.914
5. RMSEA	$0 \leq RMSEA \leq 0.08$	0.072

Hypothesis Testing

Table 5 shows structural analysis results reveal that hypothesis H1, that examines the relationship between Digital Human Resource Management (DHRM) and AP is supported by a significant positive effect ($\beta = 0.269$, $t = 4.444$). In the indirect path analysis, hypotheses H2 and H3 explore the parallel mediation of AP between DHRM and organizational effectiveness (OE) and digital innovation (DI), as indicated in Table 6. Both indirect paths show significant mediation, with H2 (DHRM - AP - OE) exhibiting a small positive effect ($\beta = 0.0367$) and H3 (DHRM - AP - DI) revealing a moderate positive effect ($\beta = 0.0441$). The confidence intervals for both indirect effects do not include zero, confirming the validity of these parallel mediation processes. Overall, the findings highlight the important mediating role of AP in the relationships between DHRM and DI.

Table 5: Structural analysis

	Hypothesis	β	T	Results
H1	DHRM - AP	0.269	4.444	accepted

Table 6: Indirect Paths

	Hypothesis	β	LL	UL	Results
H2	DHRM - AP- OE	0.0367	0.0119	0.0673	Parallel mediation
H3	DHRM - AP- DI	0.0441	0.4020	0.5756	Parallel moderation

5. Discussion:

The research outcomes help develop complex knowledge about how digital Human Resource Management (HRM) practices modify performance outcomes of academicians in Sindh's higher education institutions (HEIs). The research evaluated organizational empowerment as a mediating factor together with digital innovation as a moderating variable and delivered various noteworthy findings. Research demonstrates that digital Human Resource Management practices create strong positive effects on academic performance according to earlier studies (Thite, 2022). Digital technologies offer revolutionary capabilities for academic institutions by linking fundamental HR processes through e-recruitment systems together with online training tools and digital performance management solutions which result in improved efficiency throughout the workforce. Digital HRM functions through reducing manual work while utilizing performance-driven decisions which creates enhanced educational instruction and research productivity and better university-community connection.

The research results support existing evidence which demonstrates that technology acts as a performance catalyst, especially within resource-limited academic institutions in Sindh. The implementation of digital Human Resource Management practices enables teachers to acquire vital resources that help them solve academic as well as administrative issues effectively. This study revealed that organizational empowerment works as a major intermediary factor that connects digital HRM systems to academic performance. Academicians receive empowerment through digital HRM initiatives that include both advanced collaboration tools and virtual training sessions which improve their competencies and self-assurance while providing independence. Academic empowerment leads to enhanced motivation and autonomous responsibility which drives staff towards higher performance and better creative solutions and enhanced job contentment. Digitized human resource management systems produce these results because empowerment operates as a fundamental process that improves academic results. Research findings match previous existing studies (Alsarairh et al., 2023) which indicates that Higher Education Institutions need to establish an empowering organizational culture. HEIs can achieve maximum results from digital HRM through consistent institutional support of empowerment initiatives aimed at institutional alignment.

The research data confirms digital innovation exists as a key factor that intensifies the relationship between digital HRM practices and academicians' work outcomes. Education institutions that heavily adopt digital innovation tools including artificial intelligence learning management systems and virtual collaboration tools obtain the largest benefits from their digital human resource management strategy. The implementation of digital innovation develops an adaptable learning culture which enables academic staff to handle complex educational demands. The implementation of digital innovation creates beneficial conditions which boost the operational effectiveness of digital HRM programs. The analysis tracks the findings of (Hervas-Oliver et al., 2021) by showing the need to integrate technological innovations in business strategies for performance improvement. Digital innovation collaborates with Digital HRM to generate complete synergies which enhances both institutional abilities and academic performance.

6. Practical Implications

The study provides useful information for HEIs' administrative personnel and HR experts and lawmakers. Educational institutions need to set up complete digital Human Resource

Management systems that serve each institution's individual requirements. The combination of digital investments with specialized training programs provides organizations with improved faculty performance and institutional operational efficiency.

Digital HRM requires an empowering workplace environment because it drives maximum effectiveness from modern HR approaches. Work institutions need to create open communication pathways and allow their academicians to take part in decision processes while granting them freedom to explore experimental approaches in their work assignments.

Institutions require digital integration within their strategic plans to maintain their competitive advantage. HEIs can achieve academic excellence with growth through ongoing investments in technological infrastructure and by implementing innovation promotion strategies within their organizational culture.

7. Limitations and Future Directions

Despite its contributions, this study has limitations that provide avenues for future research. The cross-sectional design limits causal inferences, and future studies should consider longitudinal approaches to capture the dynamic relationship between digital HRM, empowerment, and performance over time. Additionally, this research focuses on HEIs in Sindh, and its findings may not be generalizable to other regions or contexts. Comparative studies across different geographical or institutional settings would provide broader insights. Finally, while this study highlights the moderating role of digital innovation, future research could explore other potential moderators, such as organizational culture, leadership styles, or technological readiness. Such investigations would deepen our understanding of the contextual factors shaping the efficacy of digital HRM in academia.

8. Conclusion

This study underscores the transformative impact of digital HRM on academicians' performance in Sindh's HEIs, with organizational empowerment mediating and digital innovation moderating this relationship. By embracing digital HRM practices, fostering an empowering culture, and leveraging digital innovation, HEIs can enhance their academic workforce's performance and adaptability. These findings contribute to both theoretical and practical discourses, offering actionable strategies for integrating digital technologies into the fabric of academic institutions to achieve sustained excellence.

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