Unlocking Success: Exploring the Impact of Human Resource Competence on Job Performance in Pakistan's Engineering Sector

Eimad Hafeez Gogia

School of Economics and Management, Harbin Institute of Technology, China
eimad_hafeez@yahoo.com (corresponding author)

Zhen Shao

School of Economics and Management, Harbin Institute of Technology, China
shaozhen@hit.edu.cn (corresponding author)

Ali Raza Akhter

Department of Applied Psychology, The Islamia University of Bahawalpur, Pakistan
alirazaakhter@outlook.com

ABSTRACT

Based on innovation diffusion theory, this paper develops a research model to investigate the influence mechanism of Human Resources (HR) competency on employees' job performance through the mediation effect of HR analytics and the positive moderation effect of Technology Adoption (TA). A survey was carried out in civil engineering firms in Pakistan, adapting measures with good reliability and validity from different sources, and collecting data through social media platforms and questionnaires from HR professionals. The responses of 297 respondents were collected and structural equation modeling was applied. The results show that there is a positive and significant relationship between HR competency and employee job performance, a significant partial mediation of HR analytics in the relationship between HR competency and employee job performance, and a significant positive moderation of TA in the mediation of HR analytics in the relationship between HR competency and employee job performance. This study provides an essential contribution to the diffusion of innovation theory, as TA is slow compared to other countries, and practical guidelines for the fast adoption of technology and HR analytics in the HR departments of civil engineering organizations to enhance talented employees' performance.

Keywords-HR analytics; HR competency; technology adoption; employee job performance; civil engineering

I. INTRODUCTION

For several years, organizations have collected and analyzed data to make significant and valuable decisions about Human Resources (HR) management. As a result, HR analytics is gaining the interest of researchers and HR professionals. Some areas, such as Pakistan, are still lagging in adopting technology in HR analytics-based management and decisions. Rapid technological change is a challenge for Pakistan's engineering industry. Therefore, there is a demand for skilled workers with the knowledge and expertise to operate complex and technical equipment. Talented and skilled employees can be hired through data-driven decision-making. Data-driven decision-making is beneficial not only for HR decisions but also for the entire organization [1]. In the modern world, most decisions are based on data analytics [2]. Several global organizations implement HR analytics to make the best strategic decisions for their workers. HR analytics has not been utilized to make business decisions despite HR management decisions. Therefore, analytical decision-making is required to transform HR and other organizational functions.

When contrasting the analytical capabilities of HR with other departments, such as finance, marketing, and supply chain, it becomes apparent that HR lacks in this area, leading to inefficient organizational outcomes such as poor performance [3]. For this purpose, a proper transformation is required. Proper models, strategies, and procedures are required to transform organizations to adopt changes and survive in the competitive environment [4]. Renowned organizations, such as Google, P&G, Best Buy, and Sysco, have adopted such technologies by implementing analytics to attract and retain employees and connecting them with employee data to improve business performance [5].

HR analytics have a significant impact on the management of workers around the world. HR measurement is the best example of Human Rresource Analytics (HRA) and can be traced back to the early 1900s [6]. Technology is a kind of innovation adopted by different organizations. Innovation and creativity are necessary for the survival and progress of any organization [7]. This study aims to investigate the intricate dynamics between technology, HR practices, and employee and organizational performance. The significance of this study lies in enhancing organizational performance through employee performance with the adoption of technology in certain organizational practices. In engineering organizations, talent management plays a vital role in delivering the project on time with innovation. Competencies should be identified to drive employee performance by tailoring HR practices to improve organizational effectiveness. This study can provide more insight into data-driven decision-making in HR departments to improve employee Job Performance (JP) by investigating the mediating role of HR analytics. Pakistani engineering organizations are adopting automation and digital tools in their tasks, therefore, Technology Adoption (TA) is necessary in enhancing the HR competencies and employee JP. This study contributes significantly to the academic literature by filling the gap in the role of human resource analytics, HR competency, and adoption of technology in the context of civil engineering organizations in Pakistan. Therefore, the purpose of this paper is to focus on the software and technology and investigate the impact of HR competency on employee JP with the mediating role of HR analytics and the positive moderating role of TA. In [8], the impact of HR competency on HR analytics was examined in the presence of TA as a moderator. The study was carried out in Thailand, which recommended further research to study the model in other areas. Therefore, this study examines the relationship between Human Resource Competency (HRCO) and JP, and then the mediating role of HR analytics. Furthermore, the importance of TA in the mediation of HR analytics is discussed, highlighting how it can enhance employee performance and, therefore, improve organizational performance.

II. LITERATURE REVIEW

A. Theoretical Background

This study is based on the diffusion of innovation theory [9], which focuses on human behavior about accepting technology and its acceptance according to different organizational functions. This study adopted the diffusion of innovation theory for HR analytics implementation in the presence of TA and the ability of HR to enhance employee performance. The implementation of HR analytics is innovative through improved decision-making in HR operations. Several studies have applied the diffusion of innovation theory to TA and the explanation of different factors [10]. Innovation is the concept of an idea, practice, or project that is perceived to be new and different for adoption [9]. Innovation is perceived as new for the individual or the organization, although it could have been invented a long time ago. In Pakistan, adopting HR analytics as a technology is a new concept in organizations.

B. HR Competency and Job Performance

Competencies in human resources mean the skills, abilities, and knowledge that are possessed to effectively perform tasks and responsibilities. In academic research, questions about HR competencies have been raised to meet new and unique strategic demands [11]. These strategic demands also require knowledge and values on the use of technology in HR operations. Knowledge, values, and abilities in using technology define expectations, needs, and improvements in the HR process of professionals [12]. Competencies such as HR, are the key competencies to build the capabilities to make the organization competitive [13]. Several studies have investigated the importance of HR competencies in influencing employee JP within engineering organizations. HR competencies, such as change agents, strategic partners, and administrative experts, play a crucial role in enhancing employee performance [14]. These competencies enable learning, effective talent management, a supportive work environment, and development opportunities, all of which contribute to improving employee performance. Technical skills are important in engineering organizations, therefore the ability of the HR department to recruit, retain, and develop talent can directly affect the innovative capacity and operational efficiency of the organization. Investment in HR competencies is not about changing HR practices but rather improving the competitiveness of the engineering sector in the global market. The quality of HR in an organization is one of the important factors in improving employee performance, leading to organizational performance. For this purpose, highly competent workers are required, as competence is important in improving employee performance [15]. Most organizations are working on the behavioral model through HR policies to enhance employee performance. The behavioral model is the most appropriate to define competencies, as it can improve employee JP [16]. Therefore, it can be concluded that the competence of the HR department leads to the hiring of qualified employees, leading to increased employee and organizational performance. Thus, it can be hypothesized that:

H1: HR competency has a significant positive impact on employee JP.

C. Mediating Impact of HR Analytics

Some studies have revealed the mediating role of HR analytics in the relationship between HR competencies and JP. In [17], the positive impact of technological change, employee competency, and law compliance on digital HR practices was studied, highlighting the mediating role of employee attitude between digital HR practices and employee JP. In [18], the critical role of HR analytics in the form of soft skills was shown to enhance the dynamics of HR competencies and employee JP, with the significant mediating role of employee motivation and attitude. JP is about the expected quality of a particular task or job according to employee behavior in a specific period [19]. Different studies have identified the importance of technology in improving employee JP. Employee performance has been shown to improve with the implementation of technology [20], such as HR analytics, therefore increasing organizational performance [21]. New and innovative working methods have been identified in this

technological area to enhance employee performance. Improving employee performance and performance measurement cannot be possible without scientific methods. A framework should be generated for accurate information on HR management functions [22]. Employee performance is an essential organizational factor dependent on unbiased performance measurement. Organizations have begun to encourage timely, accurate, and unbiased performance evaluations with the help of accurate and timely information, enhancing the quality and speed of HR decision-making [23]. Therefore, the organization requires conscious and regular efforts to use accurate information for unbiased decision-making [24]. At this point, HR analytics can play a significant role. Traditional HR functions have changed with the involvement of information technology, leading to Human Resource Information Systems (HRISs), and HR analytics will further change and transform HR functions into strategic business partners providing accurate performance information to enhance employee performance [3]. The use of HR analytics to organize and retrieve performance data from different sources, either internal or external, allows senior management to check employee performance in terms of behavior and outcomes, increasing JP. Therefore, it can be hypothesized that:

H2: HR analytics plays a significant mediating role in the relationship between HR competency and employee JP.

D. Moderating Impact of Technology Adoption

This context is about the positive or negative impact on the decision-making process regarding the adoption of new technology in different functions [25], such as HR. Different characteristics like compatibility, complexity, and relative advantage have been pointed out while adopting innovation and technology in specific organizational functions. In [9], two more characteristics were identified, namely observability (visible results) and trialability (innovation experimented and adopted), which were added to the previous characteristics. TA also depends on the IT capabilities of the organization, an organizational process used to acquire, deploy, and support different IT assets according to organizational functions [26]. In general, technology can be broadly expressed in terms of the digital age, digital employees, or digital tasks [27], and the narrower definition is called E-HRM [28]. HR analytics also helps the organization analyze different data types using machine learning and statistics [29]. Performance can be improved due to extensive time savings and increased productivity [30]. In [31], the critical interaction between TA and human resource competencies within HR analytics that influence JP was highlighted. There is a need to implement strategies that focus on the right skills and competencies for digital transformation, affecting HR analytics, its effectiveness, and employee JP. Transformation of HR functions can be achieved through TA, to improve business results and decision-making based on data on human capital, employee performance, organizational performance, and different external economic targets [32]. The influence of emerging technology such as HR analytics is perceived to be an opportunity to transform the organization in general and the HR department in particular. For this purpose, it is necessary to adopt technologies to enhance HR competencies with the help

of HR analytics to improve employee and organizational performance. Therefore, it can be hypothesized that:

H3: TA has a positive moderating impact on the relationship between HR competency and HR analytics.

H4: TA positively moderates the mediation of HR analytics in the relationship between HR competency and employee JP.
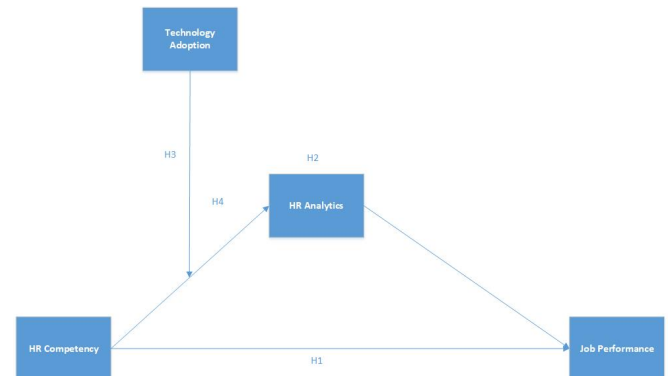

Fig. 1. Hypotheses mapping.

III. METHODOLOGY AND FINDINGS

A. Research Setting and Data Collection

The survey was carried out in the HR departments of civil engineering organizations in Pakistan. Respondents were managers, assistant managers, and senior executives in the HR department. Data were collected using a survey questionnaire using the 5-point Likert scale. Some questionnaires were designed on Google Forms and distributed on social media, but most of them were distributed on printed papers. Convenient sampling was used, and the sample size calculation aligned with the guidelines suggesting that it should exceed the total number of items used in the questionnaire [33]. Data were collected from different locations in Pakistan and transparency was ensured to minimize biases.

B. Demographical Results

Demographics were analyzed using descriptive analysis and frequency distribution in SPSS. Table I shows the results of all demographical trends in this study. Almost 350 questionnaires were distributed. The majority of the participants were male (68%) and fell within the age range of 26-30 (24%). Among the participants, employees with 0-5 years of experience made up the largest proportion. Notably, most engineering sector employees possess qualifications equivalent to a master's degree.

C. Measurements

Items were adapted from different sources. A pilot study was conducted to verify the reliability for further data collection. The questionnaire consisted of different sections. The first was about demographics, including age, gender, qualification, and experience of HR professionals. The next section was about HR analytics, containing eight items adapted from the UTAUT model [34-36]. The third section addressed TA, including 10 items adapted from [36-37]. The next section was about HR competencies, containing 12 items adapted from

[12], showing the different dimensions of HR competencies that are best suited for implementation. The next part of the questionnaire was related to employee JP, containing five items adapted from [38].

TABLE I. DEMOGRAPHICS

Gender	Frequency	Percentage
Male	202	68
Female	95	32
Age		
20-25	54	18.2
26-30	73	24.6
31-35	59	19.9
36-40	64	21.5
41-45	46	15.5
Above 46	1	0.3
Experience (years)		
0-5	109	36.7
6-10	70	23.6
11-15	60	20.2
16-20	40	13.5
Above 21	18	6.1
Educational qualifications		
Bachelors	59	19.9
Masters	158	53.2
MS/MPHIL	55	18.5
Others	25	8.4

D. Structural Equational Modeling

Smart PLS was used to minimize the problem of common method variance. The basic partial least-squares test was used for model estimation and hypothesis evaluation. Smart PLS 4 is a suitable software to ensure effectiveness, calculate reliability and validity, and confirm or reject a hypothesis. Discriminant validity was performed with the help of the Heterotrait-Monotrait (HTMT) ratio, with the test named the PLS-Algorithm. Factor loading was also checked with Cronbach's Alpha and composite reliability. Subsequently, the bootstrapping method was applied to check path estimations, mediation, moderation, and moderated mediation.

E. Analysis of the Measurement Model

Table II shows the discriminant validity results. There are two discriminant validity value criteria: 0.90 and 0.85 or less. This study used less than 0.85 [39], and all values were below the threshold, showing that the data is valid and reliable and can be used for further analysis.

TABLE II. DISCRIMINANT VALIDITY

	Constructs	1	2	3	4	5
1	HRA					
2	HRC0	0.742				
3	JP	0.639	0.66			
4	TA	0.731	0.713	0.777		
5	TA x HRC0	0.422	0.51	0.642	0.676	

F. Factor Loading and Path Coefficient

As seen in Table III, all the items of the variables show a consistent relationship and are reliable and valid for further analysis. Cronbach's alpha value was more than 0.7 [40]. Some values were more than 0.6, which can be acceptable [39]. All

the AVE values were bigger than 0.5, which shows they are reliable and valid.

TABLE III. FACTOR LOADING

	Items	Factor loading	Cronbach's *a*	CR	AVE
HRA	HRA1	0.831	0.922	0.922	0.598
	HRA20	0.837			
	HRA31	0.797			
	HRA42	0.727			
	HRA5	0.693			
	HRA6	0.814			
	HRA7	0.679			
	HRA8	0.791			
JP	JP1	0.784	0.877	0.876	0.588
	JP2	0.801			
	JP3	0.621			
	JP4	0.78			
	JP5	0.829			
HRCO	HRCO1	0.687	0.948	0.947	0.599
	HRCO2	0.684			
	HRCO3	0.811			
	HRCO4	0.747			
	HRCO5	0.705			
	HRCO6	0.8			
	HRCO7	0.792			
	HRCO8	0.743			
	HRCO9	0.786			
	HRCO10	0.795			
	HRCO11	0.792			
	HRCO12	0.915			
TA	TA1	0.774	0.927	0.925	0.555
	TA2	0.841			
	TA3	0.809			
	TA4	0.733			
	TA5	0.727			
	TA6	0.69			
	TA7	0.736			
	TA8	0.675			
	TA9	0.732			
	TA10	0.716			

G. Analysis of the Structural Model

Table IV summarizes the hypotheses test results.

TABLE I. SUMMARY OF RESULTS

Hypothesis	Standard beta	*t*-stat	*p*-value	R^2	F^2	Result
HRC0 → JP (H1)	0.42	4.448	0.00	0.486	0.15	Supported
HRC0 → HRA → JP (H2)	0.155	3.089	0.002			Supported
TA × HRCO → HRA (H3)	0.129	2.904	0.004			Supported
TA × HRCO → HRA → JP (H4)	0.042	2.576	0.011			Supported

H1 concerns the relationship between HRCO and employee JP. The standard beta was 0.420 with a t-stat of 4.448 and a p-value of less than 0.05, indicating that the hypothesis is accepted. Adjusted R^2 indicates a 48.6% relationship between independent and dependent variables. H2 was about the mediation of HRA in the relationship between HRCO and JP. The beta value was 0.155 with a t-stat of 3.089 and a p-value of 0.002, showing that the hypothesis is supported. H3 concerns the moderation of TA in the relationship between HRCO and

HRA. The beta value was 0.129 with a t-stat of 2.904 and a p-value less than 0.05, supporting the hypothesis. H4 shows the relationship between the moderation of TA and the mediation of HRA in the relationship between HRCO and JP. The beta value was 0.042 with a t-stat of 2.576 and a p-value of 0.010, supporting the moderated mediation model.
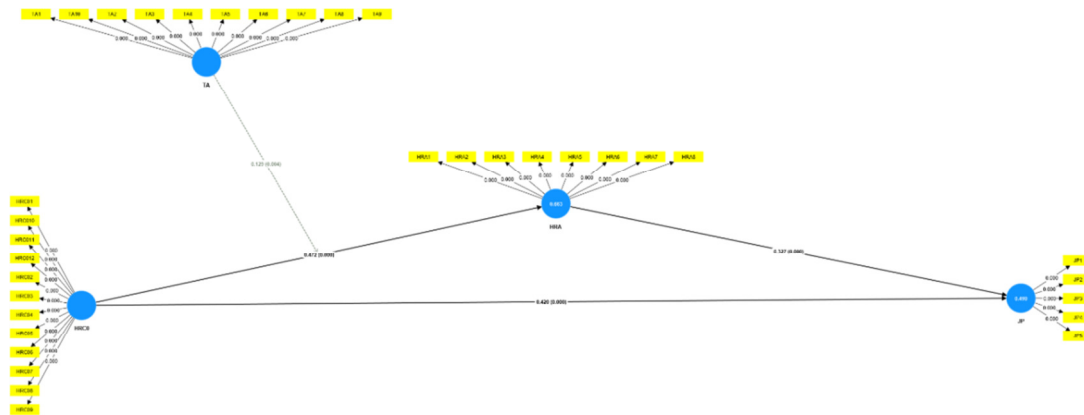

Fig. 2.   Hypotheses test results summary.

IV.   CONCLUSION AND DISCUSSION

The study investigated the relationship between HR competencies and JP, as well as the mediating role of HR analytics and the positive moderating role of TA in this relationship. The results showed a positive and significant connection accepting all hypotheses and aligning with [8, 41-43]. HR analytics has a significant impact on civil engineering companies, playing a vital role in workforce optimization, enhancing productivity, and mitigating risks in these organizations. HR analytics improve factors such as workforce planning, acquisition, talent retention, performance management, and, most importantly, safety and risk management.

V.   IMPLICATIONS

This paper is based on the diffusion of innovation theory, which is about the ideas and behavior of humans in adopting innovation and technology. Using HR analytics in an organization helps to strategically allocate resources for training and development programs, maximizing their effectiveness. The results emphasize the importance of data-driven decision-making to improve organizational performance through employee performance. Adopting technology not only enhances the effectiveness of HR practices but also has a positive impact on HR competencies on employee JP. The results support the innovation of diffusion theory, which elaborates on the importance of dissemination of knowledge regarding HR competencies and HR analytics within the organization. Leveraging analytics, embracing technology, and HR competencies in the Pakistani engineering sector not only enhances employee performance but also nurtures the culture of competitiveness with the help of innovation, aligning with the principles of diffusion of innovation theory.

VI.   LIMITATIONS AND FUTURE RECOMMENDATIONS

The results show a very slow adoption of technology and HR analytics in the HR departments of civil engineering organizations. Future research on the relationship between HR competencies, employee JP, HR analytics, and technology adoption has great prospects to advance the field of HRM. By discovering these domains, researchers can develop HR practices based on evidence, interventions, and strategies that promote employee well-being in a digitalized business and competitive environment. Continued pursuit of knowledge in big data, remote work technologies, AI, and machine learning is essential for driving growth, innovation, and sustainable success as organizations adapt to emerging trends and challenges.

REFERENCES

[1]   V. Fernandez and E. Gallardo-Gallardo, "Tackling the HR digitalization challenge: key factors and barriers to HR analytics adoption," *Competitiveness Review: An International Business Journal*, vol. 31, no. 1, pp. 162–187, Jan. 2020, https://doi.org/10.1108/CR-12-2019-0163.

[2]   A. M. Almatrafi and Z. H. Alharbi, "The Impact of Web Analytics Tools on the Performance of Small and Medium Enterprises," *Engineering, Technology & Applied Science Research*, vol. 13, no. 5, pp. 11753–11762, Oct. 2023, https://doi.org/10.48084/etasr.6261.

[3]   E. E Lawler, A. Levenson, and J. W. Boudreau, "HR Metrics and Analytics – Uses and Impacts," Center for Effective Organizations, University of Southern California, GEO Publication G04-8(460), May 2004.

[4]   K. Teymournejad and R. Elghaei, "Effect of Transformational Leadership on the Creativity of Employees: An Empirical Investigation," *Engineering, Technology & Applied Science Research*, vol. 7, no. 1, pp. 1413–1419, Feb. 2017, https://doi.org/10.48084/etasr.765.

[5]   T. H. Davenport, J. Harris, and J. Shapiro, "Competing on talent analytics," *Harvard Business Review*, vol. 88, no. 10, pp. 52–58, Oct. 2010.

[6]   B. E. Kaufman, "The historical development of American HRM broadly viewed," *Human Resource Management Review*, vol. 24, no. 3, pp. 196–218, Sep. 2014, https://doi.org/10.1016/j.hrmr.2014.03.003.

[7]   M. Yazdanifar, "Effect of Social Capital on Innovation: A Mediating Role of Employee Motivation," *Engineering, Technology & Applied Science Research*, vol. 8, no. 4, pp. 3098–3102, Aug. 2018, https://doi.org/10.48084/etasr.1730.

[8]   S. Penpokai, S. Vuthisopon, and A. Saengnoree, "The Relationships Between Technology Adoption, HR Competencies, and HR Analytics of Large-Size Enterprises," *International Journal of Professional Business*

Review, vol. 8, no. 3, Mar. 2023, Art. no. e0971, https://doi.org/10.26668/businessreview/2023.v8i3.971.

[9] E. M. Rogers, A. Singhal, and M. M. Quinlan, "Diffusion of Innovations," in *An Integrated Approach to Communication Theory and Research*, 2nd ed., Routledge, 2008.

[10] C. Ax and J. Greve, "Adoption of management accounting innovations: Organizational culture compatibility and perceived outcomes," *Management Accounting Research*, vol. 34, pp. 59–74, Mar. 2017, https://doi.org/10.1016/j.mar.2016.07.007.

[11] G. T. H. Vu, "A Critical Review of Human Resource Competency Model: Evolvement in Required Competencies for Human," *Journal of Economics, Business and Management*, vol. 5, no. 12, pp. 357–365, 2017, https://doi.org/10.18178/joebm.2017.5.12.539.

[12] D. Ulrich, W. Brockbank, D. Johnson, and J. Younger, "Human resource competencies: Responding to increased expectations," *Employment Relations Today*, vol. 34, no. 3, pp. 1–12, Sep. 2007, https://doi.org/10.1002/ert.20159.

[13] J. Gamble, A. Thompson, and M. Peteraf, *Essentials of Strategic Management*, 4th ed. New York, NY, USA: McGraw Hill, 2014.

[14] R. Mitchell, S. Obeidat, and M. Bray, "The Effect of Strategic Human Resource Management on Organizational Performance: The Mediating Role of High-Performance Human Resource Practices," *Human Resource Management*, vol. 52, no. 6, pp. 899–921, 2013, https://doi.org/10.1002/hrm.21587.

[15] S. Kaur and G. Kaur, "Human resource practices, employee competencies and firm performance: a 2-1-2 multilevel mediational analysis," *Personnel Review*, vol. 51, no. 3, pp. 1100–1119, Jan. 2021, https://doi.org/10.1108/PR-08-2020-0609.

[16] C. Woodruffe, "What Is Meant by a Competency?," *Leadership & Organization Development Journal*, vol. 14, no. 1, pp. 29–36, Jan. 1993, https://doi.org/10.1108/eb053651.

[17] J. B. B. Pea-Assoungang and J. L. Bindel Sibassaha, "Impact of technological change, employee competency, and law compliance on digital human resource practices: Evidence from congo telecom," *Sustainable Futures*, vol. 7, Jun. 2024, Art. no. 100195, https://doi.org/10.1016/j.sftr.2024.100195.

[18] E. Lastriani, A. Moeins, and A. Zami, "The Influence of Training and Soft Skills on Employee Performance with Motivation as a Moderation Variable at pt. ABC in Pekanbaru," *PENANOMICS: International Journal of Economics*, vol. 3, no. 1, Apr. 2024, https://doi.org/10.56107/penanomics.v3i1.159.

[19] S. J. Motowildo, W. C. Borman, and M. J. Schmit, "A Theory of Individual Differences in Task and Contextual Performance," *Human Performance*, vol. 10, no. 2, pp. 71–83, Jun. 1997, https://doi.org/10.1207/s15327043hup1002_1.

[20] N. Nantee and P. Sureeyatanapas, "The impact of Logistics 4.0 on corporate sustainability: a performance assessment of automated warehouse operations," *Benchmarking: An International Journal*, vol. 28, no. 10, pp. 2865–2895, Jan. 2021, https://doi.org/10.1108/BIJ-11-2020-0583.

[21] M. Bettiol, M. Capestro, E. Di Maria, and S. Micelli, "Disentangling the link between ICT and Industry 4.0: impacts on knowledge-related performance," *International Journal of Productivity and Performance Management*, vol. 71, no. 4, pp. 1076–1098, Jan. 2021, https://doi.org/10.1108/IJPPM-10-2020-0573.

[22] A. Baron, "Measuring human capital," *Strategic HR Review*, vol. 10, no. 2, pp. 30–35, Jan. 2011, https://doi.org/10.1108/14754391111108338.

[23] J. Hill, "Using the Cloud to Accelerate Transformation and Influence Change," *Performance Improvement*, vol. 52, no. 5, pp. 19–27, 2013, https://doi.org/10.1002/pfi.21347.

[24] V. S. Maas and R. Torres-González, "Subjective Performance Evaluation and Gender Discrimination," *Journal of Business Ethics*, vol. 101, no. 4, pp. 667–681, Jul. 2011, https://doi.org/10.1007/s10551-011-0763-7.

[25] D. K. Maduku, M. Mpinganjira, and H. Duh, "Understanding mobile marketing adoption intention by South African SMEs: A multi-perspective framework," *International Journal of Information*

[26] L. Sook-Ling, M. A. Ismail, and Y. Yee-Yen, "Information infrastructure capability and organisational competitive advantage: Framework," *International Journal of Operations & Production Management*, vol. 35, no. 7, pp. 1032–1055, Jan. 2015, https://doi.org/10.1108/IJOPM-12-2013-0553.

[27] E. Fregnan, S. Ivaldi, and G. Scaratti, "HRM 4.0 and New Managerial Competences Profile: The COMAU Case," *Frontiers in Psychology*, vol. 11, Nov. 2020, https://doi.org/10.3389/fpsyg.2020.578251.

[28] R. Priya and E. Al, "A Review of Digital Technologies in HRM," *Psychology and Education Journal*, vol. 58, no. 4, pp. 4373–4382, May 2021.

[29] R. Kune, P. K. Konugurthi, A. Agarwal, R. R. Chillarige, and R. Buyya, "The anatomy of big data computing," *Software: Practice and Experience*, vol. 46, no. 1, pp. 79–105, 2016, https://doi.org/10.1002/spe.2374.

[30] A. Gunasekaran *et al.*, "Big data and predictive analytics for supply chain and organizational performance," *Journal of Business Research*, vol. 70, pp. 308–317, Jan. 2017, https://doi.org/10.1016/j.jbusres.2016.08.004.

[31] A. Hamdan, A. Harraf, A. Buallay, P. Arora, and H. Alsabatin, Eds., *From Industry 4.0 to Industry 5.0: Mapping the Transitions*, vol. 470. Cham, Switzerland: Springer Nature Switzerland, 2023.

[32] P. Dahlbom, N. Siikanen, P. Sajasalo, and M. Jarvenpää, "Big data and HR analytics in the digital era," *Baltic Journal of Management*, vol. 15, no. 1, pp. 120–138, Jan. 2020, https://doi.org/10.1108/BJM-11-2018-0393.

[33] A. Field, Discovering Statistics Using IBM SPSS Statistics. SAGE, 2013.

[34] C. Aoun, S. Vatanasakdakul, and Y. Li, "AIS in Australia: UTAUT application & cultural implication," *ACIS 2010 Proceedings*, Jan. 2010.

[35] L. Schaper and G. Pervan, "ICT & OTs: a model of information and communications technology acceptance and utilisation by occupational therapists (part 2)," *Studies in health technology and informatics*, vol. 130, pp. 91–101, Jan. 2007.

[36] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly*, vol. 36, no. 1, pp. 157–178, 2012, https://doi.org/10.2307/41410412.

[37] R. Sharma and R. Mishra, "A review of evolution of theories and models of technology adoption," *Indore Management Journal*, vol. 6, no. 2, pp. 17–29, 2014.

[38] O. Janssen and N. W. Van Yperen, "Employees' Goal Orientations, the Quality of Leader-Member Exchange, and the Outcomes of Job Performance and Job Satisfaction," *Academy of Management Journal*, vol. 47, no. 3, pp. 368–384, Jun. 2004, https://doi.org/10.5465/20159587.

[39] J. Henseler, G. Hubona, and P. A. Ray, "Using PLS path modeling in new technology research: updated guidelines," *Industrial Management & Data Systems*, vol. 116, no. 1, pp. 2–20, Jan. 2016, https://doi.org/10.1108/IMDS-09-2015-0382.

[40] J. Hulland, "Use of partial least squares (PLS) in strategic management research: a review of four recent studies," *Strategic Management Journal*, vol. 20, no. 2, pp. 195–204, 1999, https://doi.org/10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7.

[41] Y. Tomaj, "Developing a process model of competencies of HR managers in governmental sections based on the general policies of the bureaucracy," Ph.D. dissertation, University of Tehran, Iran, 2012.

[42] S. Lišková and P. Tomšík, "Competency-based approach to human resources management," *Agricultural Economics*, vol. 59, no. 11, pp. 496–504, 2013.

[43] "Rewriting the rules for the digital age - 2017 Deloitte Global Human Capital Trends," 2017, [Online]. Available: https://www2.deloitte.com/content/dam/insights/us/articles/HCTrends_2017/DUP_Global-Human-capital-trends_2017.pdf.