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Role of artificial intelligence in human resource to achieve sustainable organizational performance

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Abstract

This study explores the impact of artificial intelligence (AI) on human resource management (HRM) practices and organizational performance. It aims to examine the role of AI-driven HR constructs, including artificial intelligence in human resources, strategic HRM, and technological competence, in enhancing sustainable organizational performance. A cross-sectional study design was adopted, and data were collected from 366 respondents using a convenience sampling technique. Path analysis was employed to investigate the relationships between AI-driven HR constructs and organizational performance. The study provides empirical insights into the role of AI in transforming HRM practices. The results indicate significant positive relationships between artificial intelligence in human resources, strategic HRM, technological competence, and sustainable organizational performance. The study highlights the transformative potential of AI in HRM, emphasizing the need for organizations to develop technological competence among employees to maximize AI's benefits. The findings reinforce the strategic importance of AI integration in HRM, demonstrating its role in driving innovation, efficiency, and sustainable growth. AI-driven HRM enhances decision-making, workforce capabilities, and long-term organizational success in the digital era. This study provides valuable insights for organizations seeking to integrate AI into HRM practices. It underscores the necessity of strategic HR management and technological expertise to leverage AI's full potential, ensuring sustainable organizational performance and competitive advantage.

Keywords: Artificial intelligence, Human resource, Organization, Performance.

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1. Introduction

The process of IT adoption has remained a prominent focus of research, with its dissemination and influence on human resource management (HRM) representing a significant area of study within HRM research. IT innovations serve as key drivers in transforming HRM practices by enabling organizations to enhance efficiency, streamline operations, and improve

employee management [1]. Throughout history, human civilization has evolved through groundbreaking innovations, from the discovery of fire to the invention of the wheel and, more recently, artificial intelligence (AI) [2]. AI is now revolutionizing business operations, and its integration into HRM functions is reshaping traditional approaches to talent acquisition, performance management, and employee engagement. Since human capital is the most valuable asset of any organization, HRM plays a crucial role in workforce management, performance optimization, and fostering a productive organizational culture [3]. By incorporating AI technologies, HR departments can enhance their strategic capabilities, automate routine administrative tasks, and improve decision-making processes, thereby strengthening overall organizational performance [4]. Burg [5] study of 650 senior HR managers highlights that integrating AI into training and development can yield rapid, efficient, and nearly error-free results. Traditional methods of performance assessment for new recruits are time-consuming for both managers and employees. Shanmugam and Garg [6] note that organizations with around 500 employees spend approximately 3,000 hours annually on performance assessments. However, incorporating AI technologies can reduce preparation time by 50% and overall assessment duration by 60% [6]. Given AI's significant role in interacting with human factors in organizations, it is poised to profoundly impact HR processes.

Despite the increasing adoption of AI in HRM, several critical research gaps persist. While existing studies largely focus on AI's role in automating HR processes, such as recruitment and performance evaluations, there is limited understanding of its broader strategic impact on HRM functions and sustainable organizational performance. Specifically, prior research has not sufficiently examined how AI-driven HRM fosters long-term organizational success, particularly in enhancing employees' technology competence and aligning AI capabilities with strategic HRM practices. Additionally, the implementation of AI in HRM raises concerns regarding algorithmic biases, employee trust, and ethical considerations [7]. AI-driven HR tools can assist in decision-making; however, if employees perceive AI evaluations as impersonal or unfair, it may lead to job dissatisfaction and resistance to technology adoption [8]. There is also a gap in understanding the role of AI-driven training programs in skill development and workforce transformation. Many organizations struggle with effectively integrating AI in training and development, which is essential for ensuring employees acquire the necessary skills to leverage digital advancements.

To bridge these gaps, this study investigates the impact of AI on HRM practices and sustainable organizational performance. It specifically examines the relationships between AI-driven HR constructs, including artificial intelligence in human resources, strategic HRM, and technological competence. The study employs a cross-sectional research design, collecting data from 366 respondents using a convenience sampling technique. Path analysis is used to explore how AI-driven HRM enhances strategic HR practices and contributes to sustainable performance. The findings provide valuable insights into how AI can optimize HR functions by improving employee competencies, facilitating strategic HRM, and fostering a culture of continuous learning and adaptation. Furthermore, the study highlights the importance of addressing ethical and practical challenges associated with AI adoption in HRM to ensure its effective implementation.

By integrating AI-driven HRM strategies, organizations can unlock new opportunities for growth, efficiency, and innovation. This research contributes to the existing body of knowledge by providing empirical evidence of AI's transformative role in HRM and offering practical recommendations for organizations aiming to harness AI technologies to improve HRM effectiveness and achieve long-term success.

2. Literature Review

2.1. Artificial Intelligence Human Resource (AIHR)

AIHR involves the incorporation of AI technologies into various facets of HRM within organizations [9]. This allows HR professionals to concentrate on strategic initiatives while AIHR manages routine and administrative tasks [10]. The deployment of AI technologies within HR departments can replace traditional systems with advanced ones designed to uphold high service quality standards [11]. Such technological advancements not only facilitate employee interactions with diverse systems but also expedite HR processes, improving the efficiency of candidate identification [12]. AI's ability to detect nuanced data patterns with algorithmic accuracy gives it a competitive edge over human capabilities. In the current HR landscape, where cost reduction and minimizing labor loss are crucial, AI enables more efficient utilization of human resources. Additionally, AI fosters enhanced coordination and strengthens connections among employees managing distributed tasks [13]. By automating routine tasks, AI technology frees up time for HR professionals, promoting greater social interaction and collaboration among colleagues. Improved communication can enhance individual motivation and contribute to a collaborative work environment. AI's role extends to supporting employees by raising work standards and optimizing time management. Consequently, employees can redirect their efforts towards strategic innovation, creative problem-solving, and significant tasks. As Autor [14] suggested, AI should be employed for routine, codifiable tasks, allowing individuals to focus on areas requiring knowledge and adaptability. While AI lacks human sensory perception and social skills, it can complement human strengths by fostering genuine relationships and attracting top talent [15]. Despite AI's capacity to handle non-routine tasks, its primary advantage lies in delivering faster and more efficient results [16]. AI's integration into HRM is transforming task execution, with future applications expected to encompass more complex and intellectually demanding functions, such as problem-solving and strategic planning, thereby enhancing HRM functions in diverse ways [17]. Hence, the following hypotheses are proposed.

*H*₁: AIHR influences on strategic HRM.

*H*₂: *AIHR influences on sustainable organizational performance.*

*H*₃: AIHR influences on technology competence.

2.2. Strategic HRM

Strategic HRM is a proactive approach to managing human capital within organizations, aligning HR practices with strategic business goals to enhance organizational effectiveness and competitiveness [18]. By integrating HR strategies with overall business objectives, SHRM seeks to maximize the use of HR and create sustainable competitive advantage. This entails a focus on talent acquisition, development, and retention, as well as fostering a supportive organizational culture that encourages innovation and high performance [19]. Strategic HRM initiatives enable organizations to adapt to evolving market conditions, leverage emerging opportunities, and secure sustained long-term success. According to Saha and Gregar [20] strategic HRM is conceptualized as a deliberate framework for leveraging human resources within a firm towards achieving organizational objectives. Their perspective emphasizes the significant role of human resources in influencing organizational performance of integrating HRM practices with other organizational activities to create a cohesive strategic system [21, 22].

Despite ongoing critiques of this concept, extensive scholarly research highlights the significant impact of HR on organizational performance. A growing body of studies consistently supports this relationship, emphasizing the critical role of HR in enhancing organizational outcomes [23, 24]. These diverse approaches reflect the multifaceted nature of HRM and its influence on performance [25, 26]. Based on this extensive evidence and theoretical grounding, the following hypotheses are proposed.

*H*₄: Strategic HRM influences on sustainable organizational performance.*H*₆: Strategic HRM mediates between AIHR and sustainable organizational performance.

2.3. Technology Competence

Technological competence encompasses the skills and knowledge required to effectively utilize and manage technology [27]. It involves a deep understanding of various technological tools and systems, enabling individuals to navigate and leverage digital resources with confidence [28]. The accumulation of knowledge is pivotal for enhancing an organization's absorptive capacity, thereby promoting organizational innovation [29]. As a result, technology competence enables organizations to effectively deploy new technologies [27]. Given that AI adoption requires substantial IT resources and expertise [30] organizations with high technology competence are better positioned to support innovation [31]. Based on this extensive evidence and theoretical grounding, the following hypotheses are proposed.

H₅: Technology competence influences on sustainable organizational performance.

H₇: Technology competence mediates between AIHR and sustainable organizational performance. Figure 1 illustrates the research model.



3. Methodology

During March 2024, surveys were conducted from employees those working in Saudi Arabian private sector, employing a questionnaire consisting of 26 items grouped into four constructs. Participants rated their opinions on a five-point Likert scale, where 1 signified strong disagreement and 5 signified strong agreement. To enhance understanding, the questionnaire items were translated into Arabic. A total of 366 responses were collected through convenience sampling via an online survey. Table 1 summarizes the demographics of 366 respondents: 56% male and 44% female. Age-wise, 34% were 26-30 years old, 29% under 25, 27% 31-40, and 10% over 40. Most participants had a Bachelor's degree (71%), followed by Master's (13%), High School Diploma (13%), and PhD (3%). Experience levels included less than 3 years (33%), 3-5 years (29%), 6-10 years (18%), and over 10 years (20%). Geographically, 68% were from the Central region, 12% Eastern, 11% Western, 5% Northern, and 4% Southern. Job titles included other management roles (73%), Program Officers (14%), and Project Managers (13%). The measurement instruments used in the study included 10 items for AIHR, adapted from Kambur and Akar [32]. Six items were used to measure strategic HRM, adapted from Wang, et al. [33]. Technology competence was measured with three items, adapted from Pan, et al. [34]. Finally, sustainable organizational performance was assessed using

eight items, adapted from Wang, et al. [33] and Maletič, et al. [35]. The data analysis was performed using SmartPLS version 4 for Structural Equation Modeling.

Table	1.
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Demographics (n=366).

	Frequency	Percent
Gender		
Male	205	56%
Female	161	44%
Age		
Below 25 years	105	29%
26 to 30	125	34%
31 to 40	98	27%
Above 40 years	38	10%
Education		
High school diploma	47	13%
Bachelor	261	71%
Master	46	13%
PhD	12	3%
Experience		
Less than 03 years	121	33%
3 to 5	105	29%
6 to 10	67	18%
Above 10 years	73	20%
Workplace region		
Southern	16	4%
Northern	18	5%
Western	40	11%
Central	249	68%
Eastern	43	12%
Job title		
Project manager	46	13%
Program officer	53	14%
Other management role	267	73%

4. Results

Table 2 summarizes the measurement model's evaluation, highlighting the reliability and validity metrics for each construct. All item loadings exceeded the 0.7 threshold, indicating strong indicator reliability. The AIHR construct has good internal consistency ($\alpha = 0.817$, CR = 0.859) and acceptable convergent validity (AVE = 0.583). Strategic HRM is also reliable ($\alpha = 0.773$, CR = 0.841) with acceptable convergent validity (AVE = 0.570). Sustainable Organizational Performance shows high internal consistency ($\alpha = 0.820$, CR = 0.864) and robust convergent validity (AVE = 0.644). Technology Competence is reliable as well ($\alpha = 0.782$, CR = 0.825) with acceptable convergent validity (AVE = 0.611). Table 3 presents the results of the Fornell-Larcker criterion, a key measure for assessing discriminant validity, confirming the distinctiveness of the constructs and their differentiation, which is essential for accurately understanding their interrelationships.

Table 2.Measurement model.

Constructs	Loadings	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Artificial intelligence human resource		0.817	0.859	0.583
AIHR01: "I think it will be easier to adapt to the possible				
changes in the salary system (time, per piece, premium)	0.877			
with artificial intelligence"				
AIHR02: "I think that artificial intelligence technology can				
hinder to delay due to human reasons in salary, premium,	0.899			
prize, bonus and such payments"				
AIHR03: "I think that my extra wages (premium, bonus,				
overtime) except for my salary will be calculated correctly	0.710			
with artificial intelligence technology"				
AIHR04: "I think that artificial intelligence technology will	0.750			
help to determine the amount of salary I will receive fairly"	0.730			
AIHR05: "I think that artificial intelligence technology will				
help me which qualifications I should have in achieving my	0.708			
dream career"				

Constructs	Loadings	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
AIHR06: "I think that artificial intelligence technology will automate the wage rise depending on the skill increase"	0.697			
AIHR07: "I think that artificial intelligence technology will make it easier to recognize the employees who really deserve promotion in their career"	0.786			
AIHR08: "I think that the appropriate team member can be identified quickly via artificial intelligence technology"	0.724			
AIHR09: "I think that artificial intelligence technology will help me to acquire the necessary skills for my career plan"	0.763			
AIHR10: "I think that artificial intelligence technology will help me to determine my ideal career plan"	0.727			
Strategic HRM		0.773	0.841	0.570
SHRM1: "Employee selection is taken very seriously by my company"	0.759			
SHRM2: "Employee selection places priority on the candidate's potential to learn"	0.746			
SHRM3: "Employee selection emphasizes capacity to perform well right away"	0.703			
SHRM4: "Employees in my company have clear careerpaths"	0.728			
SHRM5: "The training programs emphasize on-the-job experiences"	0.711			
SHRM6: "Performance appraisals emphasize development of abilities/skills"	0.758			
Sustainable organizational performance		0.820	0.864	0.644
SOP1: "Return on investment (ROI) has increased above industry average during the last 3 years"	0.740			
SOP2: "Sales growth has increased above industry average during the last 3 years"	0.854			
SOP3: "Profit growth rate has increased above industry average during the last 3 years"	0.774			
SOP4: "Market share has increased during the last 3 years"	0.786			
SOP5: "The organization has introduced during the last 5 years"	0.707			
SOP6: "Our new products and services are perceived by our customers as innovative"	0.780			
SOP7: "The speed of adoption of new technology is faster than at our main competitors"	0.878			
SOP8: "The number of innovations that provide the organization with a sustainable competitive advantage has increased during the last 3 years"	0.717			
Technology competence		0.782	0.825	0.611
TC1: "The technology infrastructure of our company is available for supporting AI tools"	0.789			
TC2: "Our company is dedicated to ensuring that HR employees are familiar with AI tools"	0.760			
TC3: "Our company contains a high level of AI tool knowledge"	0.796			

Table 3.

Discriminant validity (Fornell-larcker criterion).

	(1)	(2)	(3)	(4)
AIHR (1)	0.819			
Strategic HRM (2)	0.731	0.885		
Sustainable organizational performance (3)	0.684	0.730	0.866	
Technology competency (4)	0.522	0.604	0.619	0.782

Table 4 shows significant path coefficients across the model. AIHR positively impacts strategic HRM (0.731), sustainable organizational performance (0.280), and technology competence (0.522), supporting Hypotheses 1, 2, and 3. Strategic HRM affects sustainable organizational performance (0.378), validating Hypothesis 4. Technology competence influences sustainable organizational performance (0.245), confirming Hypothesis 5. The combined effects of AIHR and strategic HRM (0.276) and AIHR and technology competence (0.128) on sustainable organizational performance support Hypotheses 6 and 7. All hypotheses (H1 to H7) are supported.

The R-square values in Figure 2 are: strategic HRM (0.534), sustainable organizational performance (0.619), and technology competence (0.272), indicating that the predictor variables explain 53.4%, 61.9%, and 27.2% of the variance, respectively.

Table 4.
Path coefficients

Paths	β	Standard deviation	T statistics	P values	Results
AIHR → Strategic HRM	0.731	0.035	20.891	0.000	H1 accepted
AIHR \rightarrow Sustainable organizational performance	0.280	0.073	3.853	0.000	H2 accepted
AIHR \rightarrow Technology competence	0.522	0.058	8.969	0.000	H3 accepted
Strategic HRM → Sustainable organizational performance	0.378	0.071	5.286	0.000	H4 accepted
Technology competence → Sustainable organizational performance	0.245	0.057	4.274	0.000	H5 accepted
AIHR \rightarrow Strategic HRM \rightarrow Sustainable organizational performance	0.276	0.052	5.314	0.000	H6 accepted
AIHR \rightarrow Technology competence \rightarrow Sustainable organizational performance	0.128	0.035	3.679	0.000	H7 accepted



Structural model assessment.

5. Discussion

The findings from the data analysis provide valuable knowledge between key constructs in the context of organizational management, particularly focusing on the integration of AI, strategic HRM, technology competence (TC), and sustainable organizational performance (SOP). Firstly, the path analysis revealed significant relationships between AIHR and various constructs. Notably, AIHR exhibited strong positive associations with SHRM, SOP, and TC, indicating the pivotal role of AI in shaping organizational dynamics. The significant path coefficients underscore the importance of leveraging AI capabilities to enhance strategic HRM practices, improve technological competence, and ultimately drive sustainable organizational performance [12, 28]. This implies that the integrated model incorporating AIHR, SHRM, TC, and SOP variables offers a robust framework for understanding and predicting organizational outcomes related to HRM and performance [36].

The study has significant implications in the field of organizational management. Firstly, organizations should recognize the strategic value of integrating artificial intelligence (AI) into their HRM practices [37]. By leveraging AI technologies,

organizations can streamline HR processes, optimize talent management strategies, and enhance decision-making efficiency [10, 38]. Moreover, the study underscores the importance of developing technological competence among employees to effectively utilize AI tools and platforms. Training programs and initiatives should be deployed to ensure that employees acquire the essential competencies and expertise required to navigate technological advancements and proficiently utilize AI-driven solutions in HRM [36]. Furthermore, HRM strategies should be closely aligned with organizational objectives and priorities to ensure that AI-driven initiatives contribute to sustainable organizational performance [16]. This entails a careful balance between leveraging AI to enhance efficiency and ensuring that HR practices remain ethical, transparent, and aligned with organizational values.

Additionally, the study highlights the need for continuous learning and adaptation in HRM practices in response to rapid technological advancements. HR professionals and managers should stay informed about emerging trends and best practices in AI and HRM to remain competitive and responsive to changing business environments [37]. Collaboration among researchers, practitioners, and policymakers is essential for advancing the understanding of AI's implications in HRM. Promoting platforms for knowledge exchange and collaboration is necessary to facilitate the sharing of insights, best practices, and ethical guidelines for the responsible implementation of AI in HRM.

6. Conclusion

The study provides valuable insights into the role of AI in shaping HRM practices and organizational performance. The results depict that AIHR plays a pivotal role in influencing various aspects of HRM, including strategic HRM practices, technological competence, and sustainable organizational performance. The significant path coefficients indicate strong positive associations between AIHR and other constructs, emphasizing the transformative potential of AI in enhancing HRM outcomes. Furthermore, the study underscores the importance of developing technological competence among employees to effectively leverage AI technologies in HRM. Organizations must allocate resources to training and skill enhancement programs to equip employees with the requisite competencies and expertise needed to adapt to technological advancements and effectively leverage AI-driven solutions. The implications of this study extend beyond theoretical understanding to practical applications in organizational management. By embracing AI technologies strategically and aligning HRM practices with organizational objectives, organizations can drive innovation, enhance efficiency, and achieve sustainable growth in the digital era.

6.1. Research Implications

The findings of this study highlight the strategic importance of AI integration in HRM practices, demonstrating its potential to enhance efficiency, decision-making, and sustainable organizational performance. Organizations should view AI as more than an automation tool and instead leverage its capabilities to optimize talent acquisition, performance management, and employee development. However, successful AI adoption requires investing in employees' technological competence to ensure they can effectively interact with AI-driven systems. Ethical considerations, including fairness, transparency, and data privacy, must also be addressed to maintain employee trust and engagement. Organizations need to implement AI in a way that complements human capabilities rather than replacing them, emphasizing reskilling and upskilling initiatives to mitigate concerns about job displacement. Additionally, AI-driven HRM should be aligned with broader organizational strategies to drive innovation and long-term growth.

6.2. Future Research Avenues

Future research should explore the long-term effects of AI in HRM, particularly its impact on employee engagement, job satisfaction, and organizational culture. Industry-specific studies are needed to examine how AI adoption varies across different sectors and how contextual factors influence its effectiveness. Further research should also assess AI's role in promoting diversity and inclusion by evaluating whether AI-driven decision-making reduces biases in recruitment and performance evaluations. Longitudinal studies would provide deeper insights into the evolving challenges and benefits of AI in HRM, helping organizations refine their strategies over time. Additionally, investigating the relationship between AI adoption and leadership styles could offer valuable perspectives on how leadership influences AI-driven transformations. Comparative studies between organizations that have successfully integrated AI in HRM and those that have not could also provide best practices and lessons for effective AI implementation.

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