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Research Article

The Impact of Using Artificial Intelligence on Achieving Sustainable Performance Through the Mediating Role of Digital Human Resource Management and Green Practices: A Field Study

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative technology that enables organizations to improve operational efficiency, accelerate digital transformation, and promote sustainable development. This study investigates the impact of Artificial Intelligence on Sustainable Performance through the mediating roles of Digital Human Resource Management (DHRM) and Green Human Resource Management (GHRM) practices. A conceptual framework was developed linking AI, DHRM, GHRM, and Sustainable Performance and empirically tested using Structural Equation Modeling (SEM). Data were collected from 120 employees working in Iraqi mobile telecommunications companies (Atheer Telecom Company & Asiacell Company) using a structured questionnaire. Reliability, construct validity, Confirmatory Factor Analysis (CFA), and path analysis were conducted using SPSS and AMOS. The results demonstrated that Artificial Intelligence significantly enhances Sustainable Performance ($\beta = 0.751$, $t = 12.768$, $p < 0.001$, $R^2 = 0.580$), Digital Human Resource Management ($\beta = 0.903$, $t = 20.835$, $p < 0.001$, $R^2 = 0.759$), and Green Human Resource Management practices ($\beta = 0.851$, $t = 14.149$, $p < 0.001$, $R^2 = 0.592$). Furthermore, Digital Human Resource Management positively affected Sustainable Performance ($\beta = 0.794$, $t = 14.371$, $p < 0.001$, $R^2 = 0.636$), while Green Human Resource Management practices also exerted a significant positive effect ($\beta = 0.691$, $t = 13.561$, $p < 0.001$, $R^2 = 0.609$). Mediation analysis revealed that the direct effect of Artificial Intelligence on Sustainable Performance became statistically insignificant ($\beta = 0.231$, $t = 1.883$, $p = 0.060$) after introducing the mediators, whereas the indirect effects through Digital Human Resource Management ($\beta = 0.342$) and Green Human Resource Management practices ($\beta = 0.253$) remained significant, indicating full mediation. These findings demonstrate that the contribution of Artificial Intelligence to Sustainable Performance is realized primarily through digital transformation of human resource management and the implementation of environmentally sustainable HR practices. The study provides valuable theoretical and managerial implications for organizations pursuing sustainable competitive advantage through AI-driven human resource innovation.

Keywords: Artificial intelligence; digital human resource management; green human resource management; sustainable performance; structural equation modeling; digital transformation

INTRODUCTION

Artificial Intelligence (AI) has proven to be a transformative technology capable of bringing about fundamental changes in today's world. From automating routine and time-consuming tasks to enhancing and extending human capabilities, AI possesses enormous potential to revolutionize the way people live and work. In the era of the Fourth Industrial Revolution and digital transformation, AI has become one of the most influential technologies, with applications spanning numerous disciplines. Among these, Human

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Resource Management (HRM) represents one of the areas most significantly affected by AI, although this impact has often received limited attention.

Human resource management has traditionally focused on human interaction and interpersonal communication. However, organizations are increasingly leveraging the unique capabilities of AI to improve HR functions. The adoption of AI is no longer merely an opportunity but has become an organizational necessity. HR professionals are now striving to optimize the integration of human intelligence with artificial intelligence in order to establish more efficient, user-friendly, and flexible work environments that allow employees to devote greater attention to strategic activities and performance improvement.

As organizations continue adapting to the requirements of Industry 4.0 and transitioning toward intelligent enterprises, they must simultaneously respond to the evolving expectations of customers and increasing environmental concerns. Consequently, Green Human Resource Management (GHRM) has gained considerable attention as organizations seek to minimize their environmental impact, improve operational efficiency, and adopt cleaner production methods. Artificial intelligence has become an essential strategic tool for achieving organizational objectives while satisfying both internal and external stakeholders. It contributes to improving employee performance, increasing employee engagement, and strengthening environmental commitment.

Furthermore, the emergence of sustainability has introduced a new perspective on organizational performance that integrates environmental responsibility, social responsibility, and economic performance. Sustainable performance requires organizations to achieve environmental, social, and financial objectives simultaneously without compromising any of these dimensions. Today, organizations urgently need to recognize the strategic importance of these variables, which have become indispensable components of modern business environments worldwide rather than concepts limited to specific countries or industries.

RESEARCH PROBLEM

The rapid expansion of artificial intelligence applications has created significant challenges for organizations attempting to balance technological advancement with the requirements of sustainable performance. Simultaneously, the increasing digital transformation of organizations has highlighted the need to understand how AI influences human resource management in the context of digitalization. Organizations are currently facing growing pressure to adopt environmentally responsible practices that contribute to sustainable performance. However, many institutions still lack comprehensive policies and well-established strategies for achieving sustainability while simultaneously seeking to exploit the opportunities provided by artificial intelligence. Accordingly, the fundamental research question addressed in this study is: To what extent does the use of artificial intelligence contribute to achieving sustainable organizational performance through its influence on Digital Human Resource Management (DHRM) and Green Human Resource Management (GHRM) practices in companies within the research area? ?

RESEARCH OBJECTIVES

This study aims to achieve the following objectives:

1. To examine the direct effect of artificial intelligence on sustainable performance.
2. To investigate the influence of Digital Human Resource Management and Green Human Resource Management practices on sustainable performance.
3. To determine the effect of artificial intelligence on Digital Human Resource Management and Green Human Resource Management practices.
4. To examine the indirect effect of artificial intelligence on sustainable performance through the mediating roles of Digital Human Resource Management and Green Human Resource Management.

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The conceptual framework illustrating AI as the independent variable, DHRM and GHRM as mediating variables, Sustainable Performance as the dependent variable, and hypotheses H1–H6 (see Fig. 1).

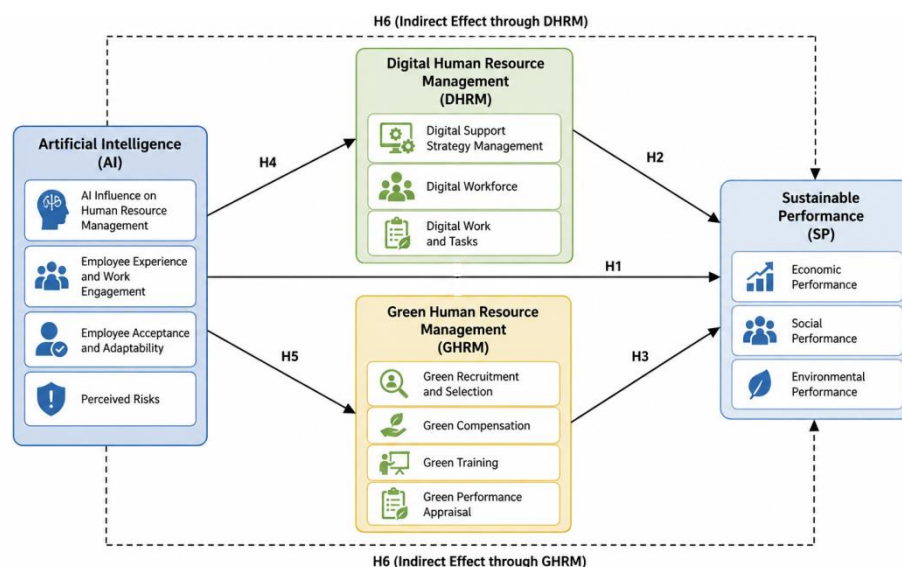


Fig. 1. Proposed conceptual research model illustrating the hypothesized relationships among Artificial Intelligence (AI), Digital Human Resource Management (DHRM), Green Human Resource Management (GHRM), and Sustainable Performance (SP)

PROPOSED RESEARCH MODEL

The proposed conceptual model consists of the following variables:

1. Independent Variable

- Artificial Intelligence (AI)

2. Mediating Variables

- Digital Human Resource Management (DHRM)
- Green Human Resource Management Practices (GHRM)

3. Dependent Variable

- Sustainable Performance

RESEARCH HYPOTHESES

The study proposes the following hypotheses:

H1: Artificial Intelligence has a statistically significant effect on Sustainable Performance.

H2: Digital Human Resource Management has a statistically significant effect on Sustainable Performance.

H3: Green Human Resource Management practices have a statistically significant effect on Sustainable Performance.

H4: Artificial Intelligence has a statistically significant effect on Digital Human Resource Management.

H5: Artificial Intelligence has a statistically significant effect on Green Human Resource Management practices.

H6: Artificial Intelligence has a statistically significant indirect effect on Sustainable Performance through the mediating roles of Digital Human Resource Management and Green Human Resource Management.

SIGNIFICANCE OF THE STUDY

THEORETICAL SIGNIFICANCE

Following an extensive review of previous studies addressing Artificial Intelligence, Digital Human Resource Management, Green Human Resource Management, and Sustainable Performance, it was found that limited research has integrated these variables into a comprehensive framework. This study seeks to fill this important research gap by investigating their combined influence on sustainable performance.

SCIENTIFIC SIGNIFICANCE

This study contributes to the growing body of literature by proposing an integrated framework that links Artificial Intelligence, Digital Human Resource Management, Green Human Resource Management, and Sustainable Performance. It enriches academic knowledge in the fields of AI, Digital HRM, Green HRM, and sustainability management.

PRACTICAL SIGNIFICANCE

The practical importance of this research lies in its relevance to organizations undergoing digital transformation. The findings provide practical guidance for organizations seeking to digitalize HR processes, implement environmentally responsible HR practices, improve operational efficiency, reduce costs, and ultimately achieve sustainable organizational performance.

RESEARCH SAMPLE

The study sample consisted of employees working in mobile telecommunications companies (Atheer & Asiacell). A total of 120 valid questionnaires were collected and analyzed for statistical purposes.

PROPOSED RESEARCH MODEL

Figure 1. Proposed conceptual research model illustrating the hypothesized relationships among Artificial Intelligence, Digital Human Resource Management, Green Human Resource Management, and Sustainable Performance.

LITERATURE REVIEW

ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is a multidisciplinary field of computer science that aims to develop intelligent systems capable of performing tasks that normally require human intelligence, including learning, reasoning, problem-solving, decision-making, perception, and language understanding. The term "artificial intelligence" consists of two components: *intelligence*, which refers to the cognitive ability to understand, learn, and adapt to new situations, and *artificial*, which refers to systems created by humans rather than occurring naturally.

According to Yaseen, (2012), artificial intelligence can be defined as the science of designing computer systems capable of performing tasks that require human intelligence. More comprehensively, AI represents a branch of computer science dedicated to developing intelligent programs and systems capable of analyzing large amounts of data, interacting with users, learning from experience, and making accurate decisions with remarkable speed and efficiency. (Wajih, 2024).

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ARTIFICIAL INTELLIGENCE IN THE WORKPLACE

During the past three decades, artificial intelligence has evolved from a theoretical concept into an essential organizational resource. Modern AI technologies extend beyond computational efficiency to include knowledge representation, reasoning, learning, and intelligent decision-making. Artificial intelligence employs numerous techniques, including expert systems, neural networks, fuzzy logic, machine learning, deep learning, semantic networks, and natural language processing, to solve complex organizational problems that exceed human computational capabilities. (Tiwari&etl.,2021)

One of the most significant contributions of AI in the workplace is the automation of repetitive and time-consuming activities. Routine administrative tasks such as data entry, report generation, document processing, scheduling, payroll processing, and employee record management can now be automated through AI-powered applications. Consequently, employees are relieved from repetitive work and are able to focus on higher-value strategic activities requiring creativity, innovation, and critical thinking.

Artificial intelligence also reduces human errors, increases operational efficiency, enhances productivity, and improves organizational effectiveness. These improvements ultimately contribute to achieving sustainable organizational performance.

AI has further revolutionized workplace communication and collaboration. Intelligent chatbots and virtual assistants provide immediate responses to employee inquiries, improve customer service, facilitate internal communication, and increase organizational responsiveness. Likewise, AI-powered language translation systems eliminate communication barriers among employees from different linguistic and cultural backgrounds, thereby fostering global collaboration.

Moreover, AI-supported project management platforms, intelligent collaboration software, and cloud-based document editing systems enable employees to work efficiently regardless of geographical location. These technologies strengthen teamwork, improve communication quality, accelerate project completion, and increase organizational productivity. (Chaurasiya &etl.,2023)

HUMAN RESOURCE STRATEGY IN THE ERA OF ARTIFICIAL INTELLIGENCE

Previous studies by Douchessi, O'Keefe, and O'Leary (1993) have emphasized that artificial intelligence and digital technologies significantly influence organizational decision-making, workforce management, cost reduction, and overall business strategy. Modern organizations face increasing pressure to develop competitive advantages by integrating AI into their strategic planning processes. (Tiwari & etl.,2021)

Within this context, organizations generally adopt one of two strategic approaches:

- Replacing human labor with artificial intelligence.
- Enhancing human capabilities through collaboration between humans and artificial intelligence.

Strategic Human Resource Management literature suggests that HR strategy should align closely with organizational strategy. Human resources should no longer function solely as administrative support but rather as a strategic business partner responsible for enhancing organizational competitiveness.

Park Woosung, proposed a comprehensive framework consisting of four HR strategies suitable for the AI era:

- Entrepreneurial Human Resource Strategy
- Creative Human Resource Strategy
- Expertise-Based Human Resource Strategy
- Dual Human Resource Strategy

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The dual strategy emphasizes achieving an appropriate balance between operational efficiency and organizational innovation by integrating AI into existing organizational processes while simultaneously supporting creativity and continuous improvement.

The framework also introduces the concept of Collaborative Intelligence, which emphasizes effective cooperation between human intelligence and artificial intelligence. Rather than replacing employees, AI should complement human capabilities by enhancing decision-making, increasing operational efficiency, encouraging innovation, and strengthening organizational competitiveness. Organizations capable of successfully integrating collaborative intelligence are expected to achieve higher levels of sustainable organizational performance.

DIGITAL HUMAN RESOURCE MANAGEMENT (DHRM)

Digital Human Resource Management refers to the planning, implementation, and utilization of digital technologies and information systems to perform HR activities more efficiently and effectively.

Digital HRM encompasses the application of digital transformation technologies to various HR functions, including recruitment, employee selection, training, payroll administration, attendance management, performance evaluation, career planning, and employee development. (Saleh & Dakhil, 2023)

Modern Digital HRM relies heavily on the integration of SMAC technologies, namely:

- Social technologies
- Mobile technologies
- Analytics and Big Data
- Cloud Computing

Collectively, these technologies enable organizations to transform conventional HR operations into intelligent, data-driven management systems. (Strohmeier, S., 2020)

Examples of Digital HRM applications include:

1. Applicant Tracking Systems (ATS) that automatically screen and evaluate job applicants using artificial intelligence and predefined competency criteria.
2. Electronic Recruitment Systems that automate recruitment, onboarding, employee training, attendance monitoring, leave management, payroll processing, and performance evaluation.
3. Big Data Analytics for workforce planning, talent management, employee performance prediction, competency gap analysis, succession planning, and strategic decision-making.

DIGITAL HUMAN RESOURCE MANAGEMENT AND SUSTAINABLE PERFORMANCE

The integration of digital technologies into Human Resource Management significantly improves organizational effectiveness by facilitating data-driven decision-making, enhancing resource utilization, reducing administrative costs, and increasing operational efficiency.

According to Olena Sova & etl. (2023) Digital HRM enables organizations to optimize HR processes while simultaneously supporting sustainability objectives through efficient resource management and long-term organizational development.

Organizations adopting digital HR practices can improve productivity, reduce operational waste, accelerate administrative procedures, and enhance employee satisfaction, all of which contribute directly to sustainable organizational performance.

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Researchers increasingly recognize digital transformation as a fundamental prerequisite for achieving organizational sustainability. Consequently, Digital Human Resource Management has become an indispensable component of Sustainable Human Resource Management. (Bieliaieva, N.& etl.,2021)

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON DIGITAL HUMAN RESOURCE MANAGEMENT AND SUSTAINABLE PERFORMANCE

Artificial intelligence plays a vital role in achieving sustainable organizational performance by improving forecasting capabilities, supporting evidence-based decision-making, and facilitating strategic planning.

The integration of AI with Big Data analytics has fundamentally transformed organizational operations and Human Resource Management practices. Karaboğa & et al. (2023) argue that the AI enables organizations to process enormous volumes of structured and unstructured data, identify meaningful patterns, generate predictive insights, and support proactive managerial decision-making.

These capabilities extend to numerous sustainability-related domains, including: . (Olena Sova & etl.,2023)

- Energy management
- Waste reduction
- Supply chain optimization
- Resource allocation
- Environmental monitoring
- Workforce optimization

AI-assisted Human Resource Analytics provides managers with valuable strategic insights regarding employee performance, workforce planning, talent acquisition, retention, and organizational development.

Therefore, Digital Human Resource Management supported by artificial intelligence creates substantial opportunities for organizations to improve operational efficiency while simultaneously advancing sustainable development objectives.

PREVIOUS STUDIES ON ARTIFICIAL INTELLIGENCE, DIGITAL HUMAN RESOURCE MANAGEMENT, AND GREEN HUMAN RESOURCE MANAGEMENT

Several previous studies have investigated the relationships among Artificial Intelligence (AI), Digital Human Resource Management (DHRM), Green Human Resource Management (GHRM), and Sustainable Performance.

Kramar (2022) identified six key characteristics of Sustainable Human Resource Management (SHRM) and explained how it differs from Strategic Human Resource Management and Digital Human Resource Management. Likewise, Strohmeier (2020) developed a comprehensive conceptual framework for Digital Human Resource Management by introducing new terminology and classifications that clarify the concept and distinguish it from related HR approaches.

Dantas et al. (2021) conducted an extensive study examining how the integration of the Circular Economy with Industry 4.0 technologies contributes to achieving the Sustainable Development Goals (SDGs). Similarly, Meijerink (2021) emphasized the importance of Digital Human Resource Management by synthesizing multidisciplinary developments and research findings related to digital HR transformation.

El Bilali (2019) focused on sustainability transitions in agricultural and food systems through a multi-level perspective, whereas Aldieri and Vinci (2018) investigated the role of knowledge diffusion in promoting sustainable economic development and employment generation among multinational corporations.

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Renwick et al. (2013) highlighted the importance of integrating environmental management with Human Resource Management to identify research gaps and establish Green Human Resource Management as an emerging discipline. Their study emphasized that employee participation and engagement in environmental initiatives significantly improve organizational environmental performance.

Similarly, Cheema and Javed (2017) concluded that Green Human Resource Management practices positively influence environmental sustainability and corporate social responsibility.

Despite these valuable contributions, the literature still lacks comprehensive studies examining the integrated relationships among Artificial Intelligence, Digital Human Resource Management, Green Human Resource Management, and Sustainable Performance within a unified conceptual framework. This gap constitutes the primary motivation for the present study.

GREEN HUMAN RESOURCE MANAGEMENT (GHRM)

Green Human Resource Management (GHRM) refers to the integration of environmental management principles into Human Resource Management policies and practices to promote environmental sustainability while simultaneously enhancing organizational performance.

Green HRM seeks to encourage environmentally responsible behavior among employees by embedding sustainability principles into all HR activities, including recruitment, selection, training, performance appraisal, compensation, rewards, employee participation, and organizational culture.

According to Stojanoski (2016), Green HRM consists of organizational activities and managerial frameworks designed to guide employees toward environmentally responsible behavior that benefits individuals, organizations, society, and the natural environment.

Tang (2018) emphasized that Green HRM reflects strategic HR practices characterized by high-performance work systems and strong organizational commitment. Likewise, Ahuja (2015) described Green HRM as the integration of environmental objectives into recruitment, employee training, performance evaluation, and reward systems.

Zoogah (2011) defined Green HRM as the application of human resource philosophies, policies, and practices that encourage sustainable resource utilization while minimizing environmental damage within organizations.

Similarly, Arulajah and Opatha (2014) argued that Green HRM comprises HR practices that foster environmentally responsible employee behavior, enabling individuals to maximize their contribution toward sustainable business models.

GREEN HUMAN RESOURCE MANAGEMENT AND SUSTAINABLE PERFORMANCE

Green Human Resource Management contributes directly to the three fundamental dimensions of sustainable performance. (Wagner et al., 2016)

1. Economic Performance

Green HRM improves organizational efficiency by enhancing operational effectiveness, reducing waste, optimizing resource utilization, lowering energy consumption, and minimizing production costs. Furthermore, environmentally responsible HR practices improve employee morale, organizational commitment, job satisfaction, occupational health and safety, and perceptions of organizational justice. These improvements ultimately increase productivity, sales, profitability, and long-term financial sustainability. (Kromar and Hariadi, 2010)

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2. Social Performance

Green HRM provides an administrative framework that supports Corporate Social Responsibility (CSR) initiatives by incorporating sustainability into HR policies and employee development programs.

Organizations implement social sustainability through: (Jamali et al,2015) (Jabbour and Santos,2008)

- Green recruitment and selection
- Environmental education and training
- Community engagement initiatives
- Employee volunteering programs
- Fair treatment and equal employment opportunities
- Transparent promotion systems
- Continuous monitoring of social performance indicators

These practices strengthen employee commitment while simultaneously enhancing organizational reputation and stakeholder trust.

3. Environmental Performance

Perhaps the most significant contribution of Green HRM lies in improving environmental performance.

Green HRM encourages organizations to protect natural resources through environmentally responsible policies and employee behavior. It increases environmental awareness, strengthens pro-environmental values, promotes pollution prevention, encourages recycling initiatives, reduces waste generation, and supports the development of environmentally friendly products and services. (Arulajah and Thevanes,2017)

Employee participation in environmental management systems enables organizations to achieve higher levels of environmental sustainability while improving overall organizational performance.

PRACTICAL STUDY

CONSTRUCT VALIDITY ASSESSMENT

ARTIFICIAL INTELLIGENCE SCALE

The Artificial Intelligence construct was measured using four principal dimensions:

- AI influence on Human Resource Management
- Employee Experience and Work Engagement
- Employee Acceptance and Adaptability
- Perceived Risks

The measurement scale consisted of 20 questionnaire items.

Confirmatory Factor Analysis (CFA) demonstrated that all model fit indices fell within internationally accepted thresholds, indicating that the proposed measurement model adequately represents the observed data and confirms the construct validity of the Artificial Intelligence scale.

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Furthermore, all standardized factor loadings were statistically significant. The calculated t-values exceeded the critical value of 1.984 at the 0.05 significance level, while all p-values were below 0.05, confirming that every measurement item significantly contributes to its underlying latent construct.

DIGITAL HUMAN RESOURCE MANAGEMENT SCALE

Digital Human Resource Management was measured using three dimensions:

- Digital Support Strategy Management
- Digital Workforce
- Digital Work and Tasks

The scale consisted of nine measurement items.

The results of Confirmatory Factor Analysis demonstrated satisfactory model fit according to established goodness-of-fit criteria. All standardized factor loadings were statistically significant, with calculated t-values greater than 1.984 and p-values below 0.05, confirming the construct validity and reliability of the Digital Human Resource Management measurement model.

GREEN HUMAN RESOURCE MANAGEMENT SCALE

Green Human Resource Management was measured through four dimensions:

- Green Recruitment and Selection
- Green Compensation
- Green Training
- Green Performance Appraisal

The measurement scale contained 12 questionnaire items.

The CFA results indicated that all model fit indices satisfied accepted statistical standards. Every measurement item exhibited statistically significant factor loadings, with t-values exceeding the critical value of 1.984 and p-values less than 0.05, confirming the validity of the Green Human Resource Management construct.

SUSTAINABLE PERFORMANCE SCALE

The Sustainable Performance construct consisted of 12 measurement items.

The Confirmatory Factor Analysis demonstrated that all goodness-of-fit indicators were within acceptable limits, confirming the adequacy of the measurement model.

Additionally, every measurement item achieved statistically significant standardized factor loadings, with t-values greater than 1.984 and p-values below 0.05, indicating strong construct validity for the Sustainable Performance scale.

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PRACTICAL STUDY

HYPOTHESIS TESTING

DIRECT EFFECT HYPOTHESES

HYPOTHESIS 1

H1: *Artificial Intelligence has no statistically significant effect on Sustainable Performance.*

The results presented in Table 1 indicate that the calculated F-value for the effect of Artificial Intelligence on Sustainable Performance reached 163.018, which is considerably higher than the tabulated F-value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.762, while the coefficient of determination (R^2) reached 0.580, indicating that Artificial Intelligence explains 58.0% of the variance in Sustainable Performance.

Furthermore, the calculated t-value for the regression coefficient (β) was 12.768, exceeding the critical value of 1.984, with a significance level of $p = 0.000$. These findings confirm that Artificial Intelligence exerts a positive and statistically significant influence on Sustainable Performance.

Accordingly, the null hypothesis is rejected, and the alternative hypothesis is accepted, confirming that Artificial Intelligence significantly enhances Sustainable Performance.

To examine the effect of Artificial Intelligence on Sustainable Performance, a simple linear regression analysis was performed. The statistical results are presented in Table 1.

Table 1. Statistical indicators of the effect of artificial intelligence on sustainable performance

Dependent Variable	Artificial Intelligence	Coefficient	t-value	R	R^2	Adjusted R^2	F-value	Sig.	Decision
Sustainable Performance	α	1.013	4.681	0.762	0.580	0.577	163.018	0.000	Accept the Alternative Hypothesis
	β	0.751	12.768	—	—	—	—	—	—

Note: $F = 3.94$; $t = 1.984$; Sample size (N) = 120.

As shown in Table 1, the calculated F-value was 163.018, which is greater than the critical F-value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.762, while the coefficient of determination (R^2) was 0.580, indicating that Artificial Intelligence explains 58.0% of the variance in Sustainable Performance. Furthermore, the calculated t-value for the regression coefficient ($\beta = 0.751$) was 12.768, exceeding the critical value (1.984) with $p = 0.000$. Therefore, Artificial Intelligence has a positive and statistically significant effect on Sustainable Performance, and the alternative hypothesis is accepted.

HYPOTHESIS 2

H2: *Digital Human Resource Management has no statistically significant effect on Sustainable Performance.*

The results shown in Table 2 reveal that the calculated F-value reached 206.529, substantially exceeding the tabulated value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.798, while the coefficient of determination (R^2) reached 0.636, indicating that Digital Human Resource Management explains approximately 63.6% of the variation in Sustainable Performance.

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The regression coefficient produced a calculated t-value of 14.371, which is significantly greater than the critical value of 1.984, with $p = 0.000$.

These findings demonstrate that Digital Human Resource Management has a strong positive and statistically significant effect on Sustainable Performance. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted.

To examine the effect of Digital Human Resource Management on Sustainable Performance, a simple linear regression analysis was conducted. The statistical results are presented in Table 2.

Table 2. Statistical indicators of the effect of digital human resource management on sustainable performance

Dependent Variable	Digital Human Resource Management	Coefficient	t-value	R	R ²	Adjusted R ²	F-value	Sig.	Decision
Sustainable Performance	α	0.826	4.023	0.798	0.636	0.633	206.529	0.000	Accept the Alternative Hypothesis
	β	0.794	14.371	—	—	—	—	—	—

Note: $F = 3.94$; $t = 1.984$; Sample size (N) = 120.

As shown in Table 2, the calculated F-value was 206.529, which exceeds the critical F-value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.798, while the coefficient of determination (R²) was 0.636, indicating that Digital Human Resource Management explains 63.6% of the variance in Sustainable Performance. Furthermore, the calculated t-value for the regression coefficient ($\beta = 0.794$) was 14.371, exceeding the critical value (1.984) with $p = 0.000$. Therefore, Digital Human Resource Management has a positive and statistically significant effect on Sustainable Performance, and the alternative hypothesis is accepted.

HYPOTHESIS 3

H3: Green Human Resource Management practices have no statistically significant effect on Sustainable Performance.

As presented in Table 3, the calculated F-value was 183.896, exceeding the tabulated value (3.94) at the 0.05 significance level.

The correlation coefficient (R) reached 0.780, indicating a strong positive relationship between Green HRM practices and Sustainable Performance. The coefficient of determination (R²) was 0.609, implying that Green HRM explains 60.9% of the variance in Sustainable Performance.

The calculated t-value for the regression coefficient was 13.561, exceeding the critical value (1.984) with $p = 0.000$.

The standardized regression coefficient ($\beta = 0.691$) indicates that a one-unit increase in Green Human Resource Management practices leads to approximately a 69.1% improvement in Sustainable Performance.

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Accordingly, the null hypothesis is rejected, confirming that Green Human Resource Management practices significantly improve Sustainable Performance.

To examine the effect of Green Human Resource Management practices on Sustainable Performance, a simple linear regression analysis was conducted. The statistical results are presented in Table 3.

Table 3. Statistical indicators of the effect of green human resource management practices on sustainable performance

Dependent Variable	Green Human Resource Management Practices	Coefficient	t-value	R	R ²	Adjusted R ²	F-value	Sig.	Decision
Sustainable Performance	α	1.250	6.692	0.780	0.609	0.606	183.896	0.000	Accept the Alternative Hypothesis
	β	0.691	13.561	—	—	—	—	—	—

Note: $F = 3.94$; $t = 1.984$; Sample size (N) = 120.

As presented in Table 3, the calculated F-value was 183.896, which exceeds the critical F-value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.780, indicating a strong positive relationship between Green Human Resource Management practices and Sustainable Performance. The coefficient of determination (R^2) was 0.609, demonstrating that Green Human Resource Management practices explain 60.9% of the variance in Sustainable Performance. Furthermore, the calculated t-value for the regression coefficient ($\beta = 0.691$) was 13.561, exceeding the critical value (1.984) with $p = 0.000$. Therefore, Green Human Resource Management practices have a positive and statistically significant effect on Sustainable Performance, and the alternative hypothesis is accepted.

HYPOTHESIS 4

H4: *Artificial Intelligence has no statistically significant effect on Digital Human Resource Management.*

The findings reported in Table 4 indicate that the calculated F-value reached 434.104, greatly exceeding the critical value (3.94) at the 0.05 significance level.

The correlation coefficient (R) was 0.871, while the coefficient of determination (R^2) reached 0.759, indicating that Artificial Intelligence explains approximately 75.9% of the variance in Digital Human Resource Management.

The calculated t-value was 20.835, which is substantially greater than the critical value (1.984) with $p = 0.000$.

Moreover, the standardized regression coefficient ($\beta = 0.903$) indicates that increasing Artificial Intelligence adoption by one unit results in approximately a 90.3% increase in Digital Human Resource Management implementation.

These findings demonstrate the pivotal role of Artificial Intelligence in accelerating digital transformation and modernizing Human Resource Management practices.

Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted.

To examine the effect of Artificial Intelligence on Digital Human Resource Management, a simple linear regression analysis was conducted. The statistical results are presented in Table 4

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Table 4. Statistical indicators of the effect of artificial intelligence on digital human resource management

Mediating Variable	Artificial Intelligence	Coefficient	t-value	R	R ²	Adjusted R ²	F-value	Sig.	Decision
Digital Human Resource Management	α	0.384	2.317	0.871	0.759	0.757	434.104	0.000	Accept the Alternative Hypothesis
	β	0.903	20.835	—	—	—	—	—	—

Note: $F = 3.94$; $t = 1.984$; Sample size (N) = 140.

As shown in Table 4, the calculated F-value was 434.104, which exceeds the critical F-value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.871, while the coefficient of determination (R²) was 0.759, indicating that Artificial Intelligence explains 75.9% of the variance in Digital Human Resource Management. Furthermore, the calculated t-value for the regression coefficient ($\beta = 0.903$) was 20.835, exceeding the critical value (1.984) with $p = 0.000$. These findings demonstrate that Artificial Intelligence has a strong positive and statistically significant effect on Digital Human Resource Management. Therefore, the alternative hypothesis is accepted.

HYPOTHESIS 5

H5: *Artificial Intelligence has no statistically significant effect on Green Human Resource Management practices.*

The results summarized in Table 5 show that the calculated F-value reached 200.204, exceeding the tabulated value (3.94) at the 0.05 significance level.

The correlation coefficient (R) was 0.769, while the coefficient of determination (R²) reached 0.592, indicating that Artificial Intelligence explains approximately 59.2% of the variance in Green Human Resource Management practices.

The calculated t-value was 14.149, exceeding the critical value (1.984) with $p = 0.000$.

Furthermore, the standardized regression coefficient ($\beta = 0.851$) indicates that increasing Artificial Intelligence utilization by one unit enhances Green Human Resource Management practices by approximately 85.1%.

These results confirm that Artificial Intelligence significantly supports the adoption of environmentally responsible organizational practices.

Consequently, the null hypothesis is rejected, and the alternative hypothesis is accepted.

To examine the effect of Artificial Intelligence on Green Human Resource Management Practices, a simple linear regression analysis was conducted. The statistical results are presented in Table 5.

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Table 5. Statistical Indicators of the Effect of Artificial Intelligence on Green Human Resource Management Practices

Mediating Variable	Artificial Intelligence	Coefficient	t-value	R	R ²	Adjusted R ²	F-value	Sig.	Decision
Green Human Resource Management Practices	α	0.516	2.242	0.769	0.592	0.589	200.204	0.000	Accept the Alternative Hypothesis
	β	0.851	14.149	—	—	—	—	—	—

Note: $F = 3.94$; $t = 1.984$; Sample size (N) = 140.

As shown in Table 5, the calculated F-value was 200.204, which exceeds the critical F-value (3.94) at the 0.05 significance level. The correlation coefficient (R) was 0.769, while the coefficient of determination (R^2) was 0.592, indicating that Artificial Intelligence explains 59.2% of the variance in Green Human Resource Management Practices. Furthermore, the calculated t-value for the regression coefficient ($\beta = 0.851$) was 14.149, exceeding the critical value (1.984) with $p = 0.000$. These findings demonstrate that Artificial Intelligence has a strong positive and statistically significant effect on Green Human Resource Management Practices. Therefore, the alternative hypothesis is accepted.

MEDIATION ANALYSIS

HYPOTHESIS 6

H6: *Artificial Intelligence has no statistically significant indirect effect on Sustainable Performance through the mediating roles of Digital Human Resource Management and Green Human Resource Management.*

The Structural Equation Modeling (SEM) results presented in Table 6 and Figure 2 provide strong evidence supporting the mediating roles of Digital Human Resource Management and Green Human Resource Management.

The major findings are summarized below:

To evaluate the mediating effects of Digital Human Resource Management and Green Human Resource Management Practices on the relationship between Artificial Intelligence and Sustainable Performance, Structural Equation Modeling (SEM) was employed. The direct and indirect effects are summarized in Table 6.

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Table 6. Direct and indirect effects of artificial intelligence on sustainable performance through the mediating roles of digital human resource management and green human resource management practices

Research Path	Direct Effect	Indirect Effect (1)	Indirect Effect (2)	t-value	Sig.	Direct Effect Significance	Type of Mediation
Artificial Intelligence → Digital Human Resource Management	0.849	—	—	18.137	0.000	Significant	Full Mediation
Artificial Intelligence → Green Human Resource Management Practices	0.905	—	—	15.190	0.000	Significant	—
Artificial Intelligence → Sustainable Performance	0.231	0.342	0.253	1.883	0.060	Not Significant	—
Green Human Resource Management Practices → Sustainable Performance	0.253	—	—	3.196	0.001	Significant	—
Digital Human Resource Management → Sustainable Performance	0.342	—	—	3.401	0.000	Significant	—

As presented in Table 6 and Figure 2, Artificial Intelligence has a significant positive effect on both Digital Human Resource Management ($\beta = 0.849$, $t = 18.137$, $p < 0.001$) and Green Human Resource Management Practices ($\beta = 0.905$, $t = 15.190$, $p < 0.001$). In turn, Digital Human Resource Management ($\beta = 0.342$, $t = 3.401$, $p < 0.001$) and Green Human Resource Management Practices ($\beta = 0.253$, $t = 3.196$, $p = 0.001$) significantly enhance Sustainable Performance. Although the direct effect of Artificial Intelligence on Sustainable Performance ($\beta = 0.231$, $t = 1.883$, $p = 0.060$) was not statistically significant, the indirect effects through Digital Human Resource Management (0.342) and Green Human Resource Management Practices (0.253) were stronger and statistically meaningful. These findings indicate full mediation, suggesting that Artificial Intelligence contributes to Sustainable Performance primarily by promoting digital transformation in Human Resource Management and strengthening green organizational practices.

ARTIFICIAL INTELLIGENCE → DIGITAL HUMAN RESOURCE MANAGEMENT

The calculated t-value reached 18.137, which exceeds the critical value (1.984) at $p = 0.000$.

This finding indicates that Artificial Intelligence significantly enhances Digital Human Resource Management through improvements in:

- AI-supported HR functions
- Employee experience
- Employee engagement
- Employee adaptability
- Acceptance of intelligent technologies
- Reduction of perceived technological risks

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DIGITAL HUMAN RESOURCE MANAGEMENT → SUSTAINABLE PERFORMANCE

The calculated t-value reached 3.401, exceeding the critical value (1.984) with $p = 0.000$.

This result confirms that Digital HRM significantly improves Sustainable Performance through digital support strategies, digital workforce capabilities, and digital work processes.

ARTIFICIAL INTELLIGENCE → GREEN HUMAN RESOURCE MANAGEMENT

The calculated t-value reached 15.190, which exceeds the critical value (1.984) with $p = 0.000$.

This finding demonstrates that Artificial Intelligence substantially strengthens the implementation of Green Human Resource Management practices and supports environmentally sustainable organizational initiatives.

GREEN HUMAN RESOURCE MANAGEMENT → SUSTAINABLE PERFORMANCE

The calculated t-value reached 3.196, exceeding the critical value (1.984) with $p = 0.001$.

This result confirms that Green Human Resource Management significantly contributes to improving Sustainable Performance.

OVERALL MEDIATION EFFECT

The Structural Equation Model demonstrates that both Digital Human Resource Management and Green Human Resource Management serve as significant mediating variables in the relationship between Artificial Intelligence and Sustainable Performance.

The analysis revealed that:

- The direct effect of Artificial Intelligence on Sustainable Performance was 0.231, with $t = 1.883$ and $p = 0.060$, indicating that the direct relationship is not statistically significant.
- The indirect effect through Digital Human Resource Management was 0.342.
- The indirect effect through Green Human Resource Management was 0.253.

Both indirect effects are stronger than the direct effect.

These findings indicate the existence of full (complete) mediation, meaning that Artificial Intelligence enhances Sustainable Performance primarily by promoting Digital Human Resource Management and Green Human Resource Management rather than through a direct pathway.

Accordingly, organizations seeking to maximize the benefits of Artificial Intelligence should prioritize digital transformation of Human Resource Management while simultaneously embedding environmentally sustainable HR practices into their organizational strategies

Figure 2 presents the standardized path coefficients obtained from the Structural Equation Modeling (SEM) analysis, illustrating the direct and indirect relationships among Artificial Intelligence (AI), Digital Human Resource Management (DHRM), Green Human Resource Management (GHRM) practices, and Sustainable Performance (SP). The model demonstrates that Artificial Intelligence has strong positive effects on both Digital Human Resource Management ($\beta = 0.849$) and Green Human Resource Management practices ($\beta = 0.905$). In turn, Digital Human Resource Management positively influences Sustainable Performance ($\beta = 0.342$), while Green Human Resource Management practices also contribute positively to Sustainable Performance ($\beta = 0.253$). Although Artificial Intelligence exhibits a direct effect on Sustainable Performance ($\beta = 0.231$), this relationship is statistically insignificant ($p = 0.060$), indicating that the influence of Artificial Intelligence on Sustainable Performance is primarily transmitted through the two mediating variables. These findings support the existence of full mediation, confirming that Digital Human Resource Management and Green Human Resource Management practices constitute the principal

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mechanisms through which Artificial Intelligence enhances Sustainable Performance. Consequently, organizations can maximize the sustainability benefits of Artificial Intelligence by accelerating the digital transformation of Human Resource Management while simultaneously strengthening environmentally sustainable HR practices.

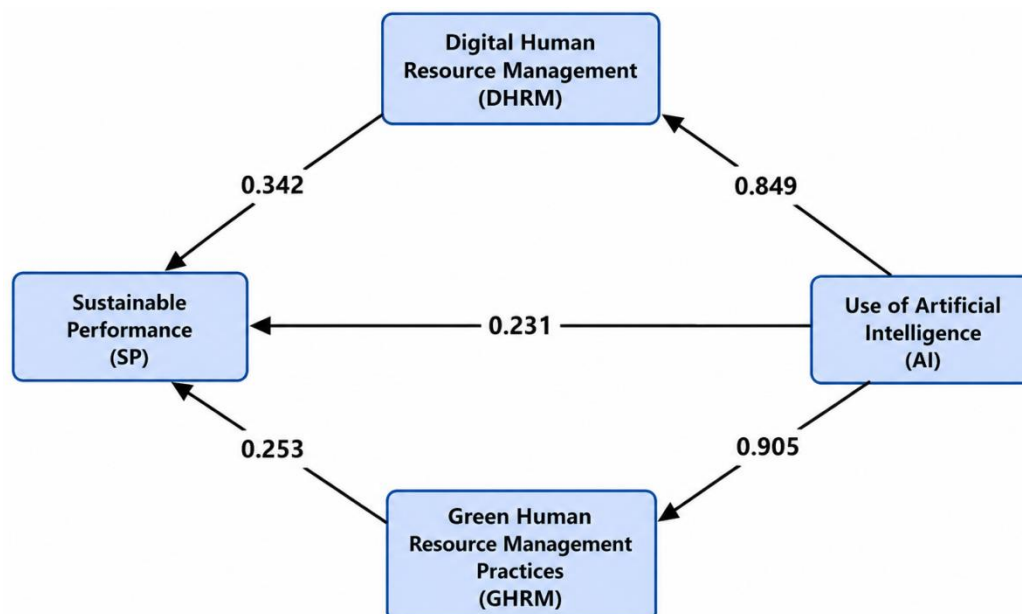


Figure 2. Structural path model illustrating the direct and indirect effects of artificial intelligence (AI) on sustainable performance (SP) through the mediating roles of digital human resource management (DHRM) and green human resource management (GHRM) practices.

CONCLUSION

Based on the empirical findings of this study, the following conclusions can be drawn:

1. Artificial Intelligence has a significant positive effect on Sustainable Performance, demonstrating that the adoption of intelligent technologies enhances an organization's ability to achieve its sustainability objectives. AI enables organizations to improve operational efficiency, optimize decision-making processes, and strengthen long-term organizational resilience.
2. Digital Human Resource Management exerts a significant positive influence on Sustainable Performance. The digital transformation of HR functions enhances organizational agility, improves workforce efficiency, facilitates data-driven decision-making, and serves as a key driver of sustainable organizational development.
3. Green Human Resource Management practices significantly improve Sustainable Performance. Integrating environmental considerations into HR policies and practices promotes environmental responsibility, strengthens organizational commitment to sustainability, and contributes to improved economic, environmental, and social performance.
4. Artificial Intelligence strongly influences Digital Human Resource Management. The results indicate that AI applications represent a fundamental catalyst for accelerating digital transformation within HR departments by improving recruitment, training, performance management, workforce analytics, and strategic decision-making.
5. Artificial Intelligence significantly enhances Green Human Resource Management practices. AI-based technologies facilitate the implementation of environmentally responsible HR practices by supporting

sustainable resource utilization, improving environmental monitoring, reducing operational waste, and promoting environmentally conscious employee behavior.

6. The influence of Artificial Intelligence on Sustainable Performance is primarily indirect rather than direct. The findings demonstrate that AI improves Sustainable Performance mainly through its positive effects on Digital Human Resource Management and Green Human Resource Management, indicating the existence of full mediation.

7. Achieving Sustainable Performance requires an integrated organizational framework that combines Artificial Intelligence, Digital Human Resource Management, and Green Human Resource Management. These three strategic dimensions should be viewed as complementary components of a unified management system capable of improving organizational competitiveness while simultaneously supporting sustainable development.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed:

1. Develop a comprehensive organizational strategy for Artificial Intelligence that is directly aligned with sustainability objectives and fully integrated with Human Resource Management strategies.
2. Expand the implementation of Artificial Intelligence across all Human Resource Management functions, particularly recruitment and selection, employee training and development, compensation and rewards, performance appraisal, occupational health and safety, workforce planning, and talent management.
3. Implement continuous digital skills development programs to equip employees with the competencies required to effectively utilize Artificial Intelligence applications and emerging digital technologies.
4. Design specialized training programs on environmental sustainability and Green Human Resource Management to improve employees' environmental awareness, strengthen green organizational culture, and enhance sustainable workplace practices.
5. Promote strategic collaboration among Human Resources, Information Technology, and Sustainability departments to ensure that digital technologies effectively support environmental objectives and long-term organizational sustainability.
6. Conduct regular assessments of Digital Human Resource Management maturity and Green Human Resource Management implementation to identify performance gaps, monitor organizational progress, and establish continuous improvement plans.
7. Encourage organizational investment in Artificial Intelligence infrastructure and digital innovation to enhance organizational adaptability, improve employee experience, and maintain sustainable competitive advantage in an increasingly digital business environment.
8. Develop organizational policies that promote responsible Artificial Intelligence governance, ensuring ethical AI implementation, transparency, data privacy, fairness, accountability, and employee trust in intelligent systems.
9. Integrate sustainability indicators into Human Resource performance measurement systems, enabling organizations to evaluate the contribution of AI-supported HR initiatives toward environmental, social, and economic sustainability goals.
10. Support future interdisciplinary research examining the integration of Artificial Intelligence, Digital Human Resource Management, Green Human Resource Management, Industry 5.0 technologies, and Environmental, Social, and Governance (ESG) practices across different industrial sectors and countries.

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