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# The contribution of green human resource management to promoting the use of artificial intelligence in Arab universities

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**Abstract**

This study aims to examine the extent to which Green Human Resource Management (GHRM) contributes to promoting the use of Artificial Intelligence (AI) in Arab universities. It also seeks to identify the key challenges hindering such integration and propose practical solutions to enhance AI adoption. A mixed-methods approach was employed, involving a sample of 550 faculty members and 45 academic leaders. The findings revealed that the contribution level of GHRM to AI adoption was moderate. The most prominent challenge identified was the shortage of qualified human capital capable of applying AI technologies effectively. The study further suggests designing specialized training programs in AI techniques for faculty members and administrative staff as a potential solution.

**Keywords:** Green Human Resource Management (GHRM), Artificial Intelligence (AI), Arab Universities, Sustainability, Higher Education

## Introduction

In the contemporary era, Arab universities have evolved beyond their traditional roles of education and knowledge production to become strategic institutions driving societal, economic, and environmental transformation. With the accelerating pace of global change, universities face complex challenges that demand simultaneous adaptation to digital and environmental transitions. This shift necessitates redefining institutional functions to align with sustainability goals and to strengthen competitiveness at both regional and international levels.

Within this evolving context, Green Human Resource Management (GHRM) has emerged as a strategic approach that integrates environmental considerations into all human resource functions. This integration fosters a culture of institutional sustainability across Arab universities (Albadarneh, Daradkah, & Telfah, 2024). GHRM combines environmental responsibility with conventional HR practices—including recruitment, training, performance evaluation, and reward systems—to achieve both organizational and environmental sustainability (Ogbeibu et al., 2023; Albadarneh et al., 2024). Empirical studies have shown that adopting green HRM practices enhances resource efficiency, reduces institutional carbon footprints, and increases environmental awareness among university employees (Bijoria, 2024).

GHRM represents a modern paradigm that seeks to balance institutional performance with environmental stewardship through the redesign of administrative processes such as hiring, training, appraisal, and motivation. Studies suggest that organizations adopting green HR strategies achieve higher efficiency and stronger environmental

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commitment compared to those that do not (Ogbeibu et al., 2023). However, implementing GHRM within Arab universities remains challenging due to limited financial resources, lack of necessary infrastructure, and insufficient institutional awareness regarding sustainability principles.

Human Resource Management (HRM) also plays a strategic role in facilitating the integration of Artificial Intelligence (AI) within universities. HR has shifted from a traditional administrative function to a strategic partner in digital transformation, supporting the development of smart educational and administrative ecosystems. This strategic contribution is evident in workforce planning, where HR identifies future skill gaps and designs reskilling and upskilling programs to prepare employees for AI adoption (Übellacker, 2025).

Moreover, HR departments are increasingly using AI-driven recruitment systems that minimize human bias and enhance candidate selection efficiency (Belzunce et al., 2024). They also lead continuous learning initiatives—such as professional development and digital reskilling—which are essential for improving institutional readiness for AI transformation (IBM, 2023). Additionally, HR functions play a key role in cultural change management, helping to build trust between employees and intelligent systems while mitigating fears of job displacement by machines (Boukef et al., 2023).

Another critical function is the development of ethical and governance frameworks for AI implementation, ensuring transparency, data privacy, and compliance with local and international regulations (Soni & Singh, 2024). Furthermore, AI-based HR analytics have become central to data-driven decision-making, enabling institutions to predict employee turnover, assess training needs, and optimize performance management systems (Mishra et al., 2024). Collectively, these practices position HRM as a primary enabler of AI integration and innovation in higher education.

AI has proven to be a transformative force capable of revolutionizing both academic and administrative processes. Studies demonstrate that AI enhances operational efficiency through automation, big data analysis, personalized training design, and evidence-based decision-making (Gupta & Kumar, 2024). When integrated with GHRM, AI provides a unique opportunity to build more sustainable, adaptive, and innovative universities.

AI technologies also enhance GHRM practices by offering advanced analytical tools that improve recruitment, training, and performance evaluation aligned with environmental goals (Gupta & Kumar, 2024; Mollah et al., 2024). Moreover, research indicates that AI enables better forecasting of training needs and the design of sustainability-oriented educational programs (Ahmed et al., 2025; Alzyoud, 2024).

While some universities in the Arab world—such as those in the UAE and Saudi Arabia—have begun incorporating sustainability practices and AI-driven HR policies, their efforts remain fragmented and lack strategic coordination (Ahmed et al., 2025; Alghamdi, 2023). In Jordan, for example, universities still struggle to develop clear frameworks that link green HRM initiatives with AI implementation (Albadarneh et al., 2024).

Recent studies emphasize that the integration of GHRM and AI can yield multiple benefits, including reduced human error, accelerated data processing, and improved decision-making regarding recruitment and environmental performance (Sahyaja et al., 2024; Sharma et al., 2024). Universities that have adopted such smart and sustainable HR practices report higher levels of institutional performance and environmental impact (Anastasiou, 2025).

Despite this progress, a significant research gap remains in understanding how Arab universities can strategically integrate GHRM and AI to achieve comprehensive sustainability. Most existing studies address AI separately from environmental or sustainability perspectives, while green HRM is often discussed independently from digital transformation frameworks (Sahyaja, Shankar, Zeeshan, & Nagaraj, 2024). Therefore, developing a unified model that combines both domains is essential for filling this gap and offering actionable insights for decision-makers.

Global frameworks, such as the United Nations Sustainable Development Goals Report (2023), highlight higher education as a central driver of

sustainability. Regional initiatives—such as Saudi Vision 2030 and UAE Centennial 2071—further reinforce the importance of integrating AI and GHRM to achieve long-term sustainability and competitiveness. However, realizing these ambitions depends on universities' ability to adopt innovative HR and technological systems that jointly promote sustainability, efficiency, and ethical governance.

In summary, the integration of Green Human Resource Management and Artificial Intelligence serves as a strategic lever for enhancing institutional performance and environmental sustainability in Arab universities. This study aims to contribute to the emerging body of knowledge by empirically examining this integration and proposing a conceptual model to guide future research and policy development (Ahmed et al., 2025; Anastasiou, 2025; Alzyoud, 2024).

## Statement of the problem

Arab universities are currently facing a dual challenge: escalating environmental crises and unprecedented technological transformations. Within this context, the concept of Green Human Resource Management (GHRM) aims to integrate environmental concerns into higher education administrative processes, including eco-oriented recruitment, sustainability-focused training programs, green performance appraisal systems, and environmentally driven incentive structures (Deif, 2024; Al-Bashar et al., 2024). Nevertheless, the comprehensive implementation of such practices in Arab universities remains limited, adversely affecting their ability to contribute effectively to local and regional sustainable development goals.

Artificial Intelligence (AI) has emerged as a central enabling mechanism capable of enhancing GHRM policies. Through advanced analytical tools, AI supports smart and targeted recruitment, the design of training programs aligned with environmental needs, and data-driven administrative decision-making. However, the adoption of AI across Arab universities faces numerous barriers, including weak technological infrastructure, a shortage of technically qualified human capital, and inadequate regulatory frameworks (Gupta & Kumar, 2024; Ahmed et al., 2025).

The research gap arises from the scarcity of studies examining the integration of GHRM and AI within Arab higher education. Most existing studies have focused either on technological dimensions independent of sustainability or on environmental management without addressing technology as an enabling force (Sahyaja et al., 2024).

Empirical evidence shows that UAE universities have launched certain AI-based sustainability initiatives, but these remain at experimental or partial stages (Ahmed et al., 2025). Similarly, Jordanian and Egyptian universities have begun adopting GHRM practices, yet without clear technological alignment or a unified strategic approach (Al-Bashar et al., 2024; Deif, 2024).

In general, studies in the Arab context indicate that GHRM and AI applications in universities—particularly in the UAE, Saudi Arabia, and Jordan—remain limited in scope and lack comprehensive integration between administrative and technological dimensions (Alghamdi, 2023; Abid et al., 2024). Major challenges include underdeveloped digital infrastructure, insufficiently skilled staff, and resistance to change among key institutional stakeholders (Mollah et al., 2024; Bijoria, 2024).

Additional research highlights the role of smart technologies in improving university work environments through resource monitoring, waste reduction, energy efficiency, and environmental performance assessment (Sharma et al., 2024; Sahyaja et al., 2024). These studies demonstrate that universities implementing AI-enhanced sustainability strategies exhibit stronger institutional performance and greater environmental responsibility, underscoring the need for integrating AI with GHRM practices across Arab higher education.

Accordingly, the core research problem can be summarized as follows: there exists a strategic and operational gap between national sustainability goals and institutional implementation within Arab universities, stemming from the absence of an integrated framework that combines Green Human Resource Management and Artificial Intelligence to support sustainable institutional performance effectively.

Therefore, the central research question of this study is:

*What role can Artificial Intelligence play in supporting and activating Green Human Resource Management practices in Arab universities to achieve effective institutional and environmental sustainability?*

## Research questions and objectives

This study seeks to answer the following questions:

1. To what extent does Green Human Resource Management contribute to strengthening Artificial Intelligence practices in Arab universities?
2. What are the main challenges facing the contribution of Green Human Resource Management to Artificial Intelligence integration in Arab universities?
3. What solutions can be proposed to enhance the effectiveness of Green Human Resource Management in supporting Artificial Intelligence in Arab universities?

## Significance of the study

### 1. Theoretical significance

The theoretical importance of this study lies in its effort to enrich academic literature on the intersection between Green Human Resource Management (GHRM) and Artificial Intelligence (AI) within Arab higher education. While several international studies have examined these topics (Ogbeibu et al., 2023; Gupta & Kumar, 2024), most were conducted in Western or industrial contexts, leaving a substantial research gap in Arab academia (Ahmed et al., 2025; Abbas et al., 2025).

This research develops an integrated conceptual framework that clarifies how AI can reinforce GHRM practices, contributing to both regional and international academic discourse. It also bridges two traditionally separate streams of research—GHRM studies, which typically focus on environmental or administrative practices (Albadarneh et al., 2024), and AI studies, which emphasize technological processes (Sahyaja et al., 2024). Combining these perspectives constitutes a novel academic contribution that helps build a stronger theoretical foundation for sustainable university management.

### 2. Practical significance

Practically, the study provides actionable insights for Arab universities seeking to enhance sustainability through HR and technological innovation. The findings may assist decision-makers in adopting more effective green recruitment policies, designing AI-supported sustainability training programs, and implementing performance evaluation systems linked to environmental outcomes (Alghamdi, 2023).

Additionally, this study proposes a practical framework for leveraging AI to reduce resource consumption, minimize waste, and enhance energy efficiency—key steps toward achieving the UN Sustainable Development Goals (SDGs).

The findings could also support Arab universities in improving their global competitiveness by demonstrating their capability to adopt innovative and sustainable practices. Given that international university rankings increasingly emphasize environmental and technological criteria, integrating these elements could significantly improve the standing of Arab universities worldwide (Ahmed et al., 2025).

At the policy level, the outcomes of this study can serve as a reference for higher education authorities, including ministries and accreditation councils, in developing unified strategies that integrate environmental and technological dimensions within university management. Such integration aligns with national sustainability visions such as Saudi Vision 2030, Jordan Vision 2033, and the development agendas of the UAE and Egypt.

In sum, this research contributes both theoretically, by advancing understanding of GHRM–AI integration in Arab academia, and practically, by offering evidence-based recommendations that enhance sustainable and technology-driven university management.

## Definition of terms

1. Green Human Resource Management (GHRM): A strategic approach that integrates environmental considerations into HR policies and practices—including recruitment, training, performance evaluation, and motivation—to promote

environmental sustainability and minimize institutional ecological impact. It also involves fostering a sustainable organizational culture that enhances environmental awareness among employees and faculty (Ogbeibu et al., 2023; Albadarneh et al., 2024; Abid et al., 2024).

**Operational definition:** Practical HR activities in Arab universities that include incorporating environmental standards in hiring and promotion, offering sustainability-focused training, and applying environmentally linked performance appraisal and incentive systems. It is measured through respondents' evaluations on the research instrument.

**2. Artificial Intelligence (AI):A** branch of computer science focused on developing systems capable of simulating human reasoning, decision-making, and problem-solving to enhance institutional efficiency and strategic outcomes (Gupta & Kumar, 2024; Mollah et al., 2024).

**Operational definition:** The use of AI tools—such as machine learning, predictive analytics, and automated decision-making—to optimize HR functions, improve institutional performance, and promote environmental sustainability.

**3. Environmental sustainability:** The institutional capacity to manage resources responsibly to meet present needs without compromising those of future generations, achieved by reducing pollution, conserving natural resources, and implementing sustainable environmental practices (Ahmed et al., 2025; Sahyaja et al., 2024).

**4. Institutional performance enhancement:** The ability of universities to effectively achieve educational, administrative, and environmental objectives through the integration of GHRM and AI practices to strengthen internal operations and institutional sustainability (Ogbeibu et al., 2023; Sharma et al., 2024).

## Research Methodology

This study adopted a mixed-methods design, combining both quantitative and qualitative approaches to achieve a comprehensive and integrated understanding of the research phenomenon. The choice of this methodology was driven by the nature of the topic, which requires, on the one hand, a quantitative assessment of the attitudes and perceptions of employees in Arab universities, and on the other hand, an in-depth qualitative analysis of the practical dimensions and real-world experiences related to implementing Green Human Resource Management (GHRM) and Artificial Intelligence (AI).

From the quantitative perspective, an electronic questionnaire was employed and distributed to faculty members and administrative staff in selected Arab universities. The questionnaire covered several dimensions related to GHRM practices (green recruitment, green training, and environmental performance evaluation). Items were designed using a five-point Likert scale, enabling precise measurement of participants' levels of awareness and perception.

From the qualitative perspective, semi-structured interviews were conducted with a purposive sample of academic leaders from the same universities. These interviews aimed to explore experiences, challenges, and institutional practices associated with integrating AI into green HRM policies. Participants were encouraged to freely share their insights and experiences, enriching the results with interpretive and contextual depth that complemented the quantitative findings.

Quantitative data were analyzed using SPSS software to conduct descriptive statistics (means and standard deviations), while qualitative data were analyzed using thematic analysis to identify dominant themes and core patterns emerging from the interviews. Integrating both methods allowed for deeper and more robust findings—quantitative data provided empirical precision, whereas qualitative insights offered interpretive context—thus strengthening the study's credibility, validity, and generalizability.

### Population and sample

The study population consisted of faculty members and staff working in HR departments of Arab universities, given their key roles in adopting GHRM practices and implementing AI-based processes. Due to the large size of the population and the impracticality of including all members, the study employed a stratified random sampling technique to

select participants for the quantitative component.

The quantitative sample comprised 550 participants across the targeted universities, selected through a stratified random sampling approach to ensure adequate representation of diverse subgroups. In contrast, the qualitative sample consisted of 45 in-depth interviews conducted with academic leaders and administrative policymakers. Participants were selected purposefully to capture expert insights, institutional experiences, and contextual challenges related to integrating GHRM practices with AI applications.
This methodological integration between the study population and sampling strategies facilitated a more holistic understanding of the phenomenon, combining empirical precision with interpretive richness.

### Research instruments

In alignment with the mixed-methods framework, the study utilized two primary data collection instruments:

#### 1. Electronic questionnaire

An online questionnaire was developed to gather quantitative data on the extent of GHRM implementation and the role of AI in supporting it. The questionnaire included 42 items organized into seven core dimensions, as follows:

- Green Organizational Culture – 6 items
- Green Training and Development – 6 items
- Environmental Performance Evaluation – 6 items
- AI Applications in Human Resource Management – 7 items
- Institutional Impact of GHRM–AI Integration – 6 items
- Green Strategic Planning – 5 items
- Green Motivation and Rewards – 6 items

A five-point Likert scale (ranging from 1 = Very Low to 5 = Very High) was used to assess participants' responses and perceptions.

#### 2. Semi-structured interviews

A total of 45 semi-structured, in-depth interviews were conducted with academic leaders and HR directors from the same institutions to obtain qualitative data that capture their practical experiences, strategic insights, and managerial perspectives on integrating GHRM with AI applications. The interview protocol included eight open-ended questions, focusing on:

- The key challenges hindering the implementation of GHRM practices;
- Proposed solutions and strategies to enhance AI integration in green HRM policies.

### Validity and reliability of instruments

To ensure methodological rigor:

- The questionnaire was reviewed by a panel of academic experts specializing in business administration, artificial intelligence, and education to verify face and content validity and ensure alignment with the research objectives.
- A pilot study was conducted with 30 participants, and Cronbach's alpha coefficients were calculated to verify internal consistency. All values exceeded 0.80, indicating high reliability.
- Interview sessions were audio-recorded (with participants' consent), transcribed verbatim, and analyzed through thematic analysis to identify recurring concepts, categories, and key interpretive patterns.

## Results and Discussion

### Research question 1

*To what extent does Green Human Resource Management (GHRM) contribute to enhancing Artificial Intelligence (AI) integration in Arab universities?*

**Table 1.** The degree of contribution of green human resource management in enhancing artificial intelligence in Arab universities

| Dimension | Mean | SD | Level | Rank |
|---|---|---|---|---|
| Institutional Impact of Integration | 4.13 | 0.98 | High | 1 |
| Green Training and Development | 3.41 | 0.96 | Moderate | 2 |
| AI Applications | 3.40 | 0.9 | Moderate | 3 |
| Green Organizational Culture | 3.37 | 0.79 | Moderate | 4 |
| Environmental Performance Management | 3.35 | 0.67 | Moderate | 5 |
| Green Motivation and Rewards | 3.32 | 0.90 | Moderate | 6 |
| Green Strategic Planning | 3.30 | 0.80 | Moderate | 7 |
| Overall Mean | 3.47 | 0.85 | Moderate | |

As shown in Table (1), the overall contribution of Green Human Resource Management (GHRM) to supporting Artificial Intelligence (AI) adoption in Arab universities was moderate, with an overall mean score of 3.47.

The Institutional Impact of Integration recorded the highest mean (M = 4.13), indicating that universities that have successfully integrated GHRM practices with AI applications exhibit noticeable improvements in institutional performance and sustainability. This finding is consistent with *Ahmad et al. (2021)*, who confirmed that synergy between green HR practices and intelligent technologies fosters innovation, operational efficiency, and long-term institutional excellence.

The Green Training and Development dimension ranked second (M = 3.41), reflecting that continuous professional development remains the cornerstone for improving faculty and staff competencies. This aligns with findings by *Al-Sharafi (2022)*, *Jabbour et al. (2020)*, and *Abdelkarim et al. (2023)*, who emphasized that sustainability-oriented training enhances adaptability to AI and strengthens sustainable human capital capabilities. Although some programs are still at preliminary stages, their presence signifies growing institutional awareness of sustainable digital capacity building.

AI Applications came third (M = 3.40). Results indicate that AI is already used in recruitment, training, and data analysis processes, yet integration with environmental sustainability indicators remains partial. Many applications focus primarily on administrative efficiency rather than ecological goals. This observation corresponds with *Huang and Rust (2021)*, who stated that while AI improves efficiency, its real impact emerges only when linked to sustainability-driven strategies.

The Green Organizational Culture dimension demonstrated a moderate contribution (M = 3.37). Such a culture facilitates innovation and reduces resistance to technological change. Nevertheless, its effectiveness depends on leadership engagement and systematic awareness programs. *Hussain et al. (2022)* emphasized that a strong positive culture promotes effective AI adoption but must be reinforced by visionary leadership to ensure long-term impact.

Environmental Performance Management (M = 3.35) was also moderate, revealing that most universities still rely on traditional performance indicators and have not yet fully merged AI systems with environmental assessment metrics. *García-Sánchez et al. (2022)* noted that the absence of intelligent performance indicators limits environmental evaluation effectiveness, whereas *Khan et al. (2021)* found more advanced universities achieved greater integration of AI into sustainability measurement systems.

Similarly, Green Motivation and Rewards (M = 3.32) received a moderate evaluation, attributed to the lack of clear connection between incentive policies, AI utilization, and sustainability goals. Institutions require better-designed incentive structures to motivate AI adoption. *Al-Sharafi (2022)* found that universities adopting GHRM frameworks were more ready to implement AI efficiently, while *El-Masri and Tarhini (2020)* highlighted that limited resources, weak administrative backing, and insufficient institutional awareness hinder digital transformation in Arab higher education.

Finally, Green Strategic Planning ranked lowest (M = 3.30), reflecting the absence of a coherent strategy

linking GHRM and AI. *Al-Hadid et al. (2023)* reported that fragmented or poorly aligned strategic plans lead to inconsistent and unsustainable digital transformation efforts.

Overall, the integration between Green HRM and AI within Arab universities is emerging but remains uneven across dimensions. The data indicate that around 50% of institutions perceive the GHRM contribution to AI as *moderate*, while 33.3% perceive it as *high and effective*. Institutions that implement structured green HR policies—such as environmental training and sustainable incentive systems—tend to exhibit higher levels of AI integration within both academic and administrative processes.

Practically, green training and development form the foundation for digital transformation, empowering faculty and staff with sustainable digital skills. Moreover, green motivation and reward policies play a vital role in fostering a culture of innovation and experimentation. Nevertheless, 16.7% of universities have yet to achieve effective integration due to resource constraints, lack of leadership support, or limited institutional awareness.

These findings reinforce *Khan et al. (2021)*, who found that integrating GHRM and AI enhances productivity and minimizes institutional inefficiencies. Likewise, *Abdelkarim et al. (2023)* demonstrated that green digital training programs improve staff capacity to apply AI sustainably in data management and academic performance evaluation.

The findings confirm that Green HRM is not merely an environmental or administrative tool, but a strategic enabler of digital innovation and sustainable transformation in higher education. Strengthening its contribution to AI integration requires:

- Developing specialized training programs combining sustainability and AI literacy;
- Implementing transparent, performance-based incentive systems linked to digital goals;
- Fostering institutional awareness of green innovation and digital sustainability.

Implementing these strategies will enhance universities' capacity for innovation, sustainability, and academic excellence, ensuring a meaningful and sustainable integration of AI across the Arab higher education landscape.

## Research question 2

*What are the challenges facing the contribution of Green Human Resource Management (GHRM) in supporting Artificial Intelligence (AI) in Arab universities?*

**Table 2.** Challenges facing the contribution of green human resource management in supporting artificial intelligence in Arab universities

| Challenge | Mean | SD | Frequency |
|---|---|---|---|
| Lack of Qualified Human Capital | 4.10 | 0.47 | 65 |
| Insufficient Funding and Resources | 4.05 | 0.49 | 64 |
| Limited Digital Infrastructure | 3.95 | 0.52 | 62 |
| Weak Institutional Support | 3.88 | 0.55 | 61 |
| Resistance to Change | 3.79 | 0.50 | 60 |
| Overall Mean | 3.95 | — | — |

The results indicate that Arab universities face multiple challenges in integrating Green Human Resource Management (GHRM) with Artificial Intelligence (AI), with an overall mean of 3.95, representing a *high level of challenge*. This finding highlights the presence of tangible barriers that are institutional, human, and financial in nature.

The most significant challenge was the lack of qualified human capital (M = 4.10), reflecting a clear knowledge gap between the skills required by the modern academic labor market and the actual training provided to university staff. This stems from the fact that most academic preparation programs still focus on traditional management aspects without sufficient emphasis on AI concepts and green innovation (*Al Suwaidi, 2023*). This finding aligns with *Khan et al. (2022)*, who reported that the shortage of technical expertise remains a primary obstacle to implementing AI-driven sustainable HRM systems.

The second-ranked challenge, insufficient funding and resources (M = 4.05), underscores the financial constraints faced by many Arab universities, which limit their capacity to invest in smart systems and

green infrastructure. *Al-Kaabi & Al-Kuwari (2021)* similarly found that limited funding is among the most critical barriers hindering the transition toward smart and green universities in the Arab region.

The limited digital infrastructure dimension (M = 3.95) reflects universities' dependence on outdated and fragmented technological systems. Variations in digital readiness, network connectivity, and cybersecurity further exacerbate the issue. *Ahmed & Sutton (2022)* highlighted that universities in developing countries continue to struggle with underdeveloped digital infrastructure, impeding comprehensive digital transformation.

Resistance to change (M = 3.79) also emerged as a substantial challenge. The entrenched traditional culture in some universities still resists new practices—particularly those requiring integration between advanced technology and environmental initiatives. *Haseeb et al. (2021)* attributed this to limited institutional incentives and low environmental awareness among employees.

Finally, weak institutional support (M = 3.88) emphasizes the absence of clear policies and strong leadership commitment necessary for successful integration. *Jabbour et al. (2020)* confirmed that the lack of comprehensive institutional strategies leads to slow adoption and inconsistent implementation of AI-supported GHRM initiatives.

These findings reveal a clear gap between the aspirations and actual capabilities of Arab universities regarding the integration of GHRM and AI. On the one hand, there is growing awareness of the strategic importance of this integration; on the other hand, persistent barriers—financial, human, and infrastructural—continue to hinder progress.

To overcome these challenges, universities must:

- Develop capacity-building programs to enhance digital and environmental competencies among staff.
- Increase funding dedicated to research, innovation, and smart infrastructure.
- Strengthen institutional policies and leadership commitment toward sustainable digital transformation.

Addressing these challenges will enable Arab universities to effectively harness AI for sustainable HR practices, bridging the gap between environmental stewardship and technological innovation.

## Research question 3

*What are the proposed solutions to enhance the contribution of Green Human Resource Management (GHRM) in promoting Artificial Intelligence (AI) in Arab universities?*

**Table 3.** Proposed solutions to activate the contribution of green human resource management in enhancing artificial intelligence in Arab universities

| No. | Item | Mean | SD | Rank | Level |
|---|---|---|---|---|---|
| 1 | Designing specialized training programs on AI technologies for faculty members and administrative staff | 4.45 | 0.68 | 1 | High |
| 2 | Using AI tools in employee performance evaluation and training needs assessment | 4.35 | 0.71 | 2 | High |
| 3 | Developing integrated HR strategies to support AI applications | 4.3 | 0.74 | 3 | High |
| 4 | Creating an innovative digital work environment supportive of AI | 4.25 | 0.72 | 4 | High |
| 5 | Attracting AI-specialized talent and expertise | 4.22 | 0.77 | 5 | High |
| 6 | Promoting a culture of ethical and responsible AI use | 4.2 | 0.75 | 5 | High |
| 7 | Strengthening partnerships with international universities and research centers | 4.15 | 0.79 | 6 | High |
| 8 | Linking AI applications with institutional sustainability goals | 4.1 | 0.8 | 7 | High |
| Overall Mean | — | 4.25 | 0.9 | | High |

The results reveal a high level of agreement among respondents regarding the proposed solutions, indicating strong awareness of the strategic role GHRM can play in advancing AI applications within

Arab universities.

**1. Continuous training and development:** The highest-ranked solution, *"Designing specialized training programs on AI technologies"* (M = 4.45), underscores the centrality of human capacity-building as the foundation for any successful digital transformation. This finding is consistent with *Al-Emran & Malik (2022)*, who emphasized continuous training as the cornerstone of AI initiatives, and *Iqbal et al. (2023)*, who found that specialized programs significantly enhance the efficiency of smart technology adoption.

**2. Intelligent performance management:** The second-ranked item, *"Using AI tools in performance evaluation and training needs assessment"* (M = 4.35), highlights the respondents' recognition of smart systems as a means to enhance fairness and objectivity in evaluation processes. *Sharma et al. (2021)* similarly demonstrated that AI can provide precise analytics for identifying training needs and improving performance management systems.

**3. Strategic planning and digital environment:** Items related to *"Developing integrated HR strategies"* and *"Creating innovative digital environments"* indicate that successful AI adoption requires both clear strategic planning and a technologically supportive infrastructure. *Al-Maroof et al. (2021)* emphasized that flexible organizational environments and technology-driven policies are prerequisites for effective digital transformation in universities.

**4. Partnerships and collaboration:** The item *"Strengthening partnerships with global universities and research centers"* (M = 4.15) demonstrates awareness of the importance of international cooperation in exchanging expertise and accelerating the adoption of emerging technologies. *Dwivedi et al. (2021)* confirmed that academic–industrial collaboration is among the most influential factors driving AI development in higher education.

**5. Ethics and sustainability:** The item *"Linking AI applications with sustainability goals"* (M = 4.10) received slightly lower emphasis, reflecting the limited practical experience of Arab universities in this area. This finding aligns with *Jabbour et al. (2022)*, who reported that integrating AI with sustainability principles remains underdeveloped in educational institutions, despite its crucial role in supporting the concept of green universities.

## General synthesis

Overall, the findings — consistent with prior literature — confirm that Human Resource Management serves as a cornerstone for advancing AI adoption through five interdependent dimensions:

1. Specialized training and professional development;
2. Smart performance management systems;
3. Strategic digital planning;
4. International partnerships; and
5. Ethical and sustainable implementation frameworks.

Furthermore, HRM has evolved from a traditional administrative function into a strategic partner in digital transformation. As *Übellacker (2025)* and *IBM (2023)* note, HR plays a central role in strategic workforce planning by identifying future digital skills gaps and implementing reskilling and upskilling programs to prepare employees for AI-driven environments.

HRM also supports AI-based recruitment systems, which enhance efficiency and reduce bias (*Belzunce, Abid, & Suseno, 2024*; *Boukef, Hanelt, & Marabelli, 2023*), while fostering a culture of innovation and adaptability essential for managing change and reducing anxiety about automation (*Al-Khatib & Hassan, 2022*).

Additionally, HRM contributes to AI governance by establishing ethical and legal frameworks that ensure data privacy, transparency, and compliance with national and international standards (*Mishra, Sharma, & Singh, 2024*). Institutions with robust governance policies exhibit higher trust in AI systems (*Übellacker, 2025*).

Finally, through AI-driven HR analytics, HR departments can predict employee turnover, measure satisfaction, and identify future training needs—thereby promoting sustainable institutional performance (*Mishra et al., 2024*).

The interconnected roles of GHRM—spanning training, strategic planning, performance

management, ethical governance, and global collaboration—illustrate its essential contribution to strengthening Arab universities' readiness for AI integration. HRM thus emerges not as a traditional administrative unit, but as a strategic enabler of sustainable digital transformation and academic innovation.

## Conclusions

The findings of this study confirm that Green Human Resource Management (GHRM) serves as a strategic enabler of sustainable digital transformation in Arab universities rather than merely an environmental or administrative approach. The integration of GHRM practices with Artificial Intelligence (AI) represents a critical pathway toward achieving both institutional excellence and environmental sustainability.

First, the overall results demonstrate a moderate level of GHRM contribution to AI adoption, indicating that while many Arab universities recognize the strategic importance of integrating sustainability and technology, their implementation remains fragmented and lacks a unified strategic framework. The highest impact was observed in the institutional performance dimension, confirming that AI-supported GHRM policies enhance organizational efficiency and environmental responsibility.

Second, the most pressing challenges identified—shortage of qualified human capital, insufficient funding, and limited digital infrastructure—reflect structural and systemic constraints that hinder the transition toward smart and green universities. Addressing these challenges requires a coordinated policy response that combines investment in digital infrastructure with continuous professional development and institutional leadership support.

Third, proposed solutions emphasize the pivotal role of specialized training, AI-driven performance evaluation, and strategic HR planning in building digital and environmental competencies. These findings reinforce the idea that human capacity development forms the cornerstone of sustainable technological transformation. Furthermore, ethical governance and international partnerships are essential to ensure transparency, trust, and global integration of AI practices within higher education.

Ultimately, the study highlights that GHRM and AI should not be treated as separate domains but as mutually reinforcing systems that together foster innovation, sustainability, and competitiveness in Arab universities. By embedding environmental values within HR policies and leveraging AI for smart decision-making, universities can achieve a balance between digital advancement and ecological responsibility.

In conclusion, the study contributes to the growing body of literature on sustainable higher education by offering a conceptual and empirical framework that connects GHRM with AI as dual drivers of sustainable institutional transformation.

Future research is encouraged to develop longitudinal and comparative studies across Arab and international contexts to measure the long-term impact of this integration on university performance, innovation capacity, and environmental outcomes.

## Recommendations

Based on the study findings and conclusions, several recommendations are proposed to strengthen the integration of Green Human Resource Management (GHRM) and Artificial Intelligence (AI) within Arab universities and to enhance their contribution to sustainable institutional development:

1. **Develop specialized capacity-building programs:** Universities should design and implement continuous professional development programs focused on AI literacy, digital sustainability, and green leadership. These programs must target both faculty members and administrative staff to bridge the existing skill gap and promote institutional readiness for AI-driven transformation.
2. **Enhance digital infrastructure and technological investment:** Decision-makers should prioritize allocating financial resources toward upgrading technological systems, data management platforms, and digital infrastructure. Reliable infrastructure is essential for enabling AI-supported GHRM practices and ensuring efficiency in administrative and environmental performance.

3. **Integrate AI into HR policies and evaluation systems:** Human resource departments should utilize AI tools to conduct fair and data-driven employee evaluations, identify training needs, and align staff performance with environmental and institutional goals. Smart analytics can improve decision-making and resource optimization.
4. **Establish strategic institutional frameworks linking GHRM and AI:** Universities need to develop comprehensive strategic plans that explicitly connect green HR practices with AI applications. Such frameworks should define clear objectives, implementation timelines, and performance indicators for sustainable digital transformation.
5. **Strengthen ethical governance and data transparency:** The implementation of AI within HR systems must adhere to ethical guidelines that ensure privacy, fairness, and transparency. Universities should establish clear governance mechanisms to monitor the responsible and accountable use of AI technologies.
6. **Promote a culture of green digital innovation:** Leadership should foster an organizational culture that values sustainability, innovation, and adaptability. This can be achieved through awareness campaigns, incentive systems, and recognition programs that reward environmentally responsible and technologically innovative behaviors.
7. **Foster regional and international collaboration:** Arab universities are encouraged to build partnerships with global institutions and research centers to exchange expertise, adopt best practices, and co-develop AI-based sustainability projects. Such collaborations can accelerate innovation and elevate regional competitiveness.
8. **Increase institutional funding for research and innovation:** Policymakers and higher education authorities should allocate specific funding to interdisciplinary research projects that explore the intersection of GHRM, AI, and sustainability. This will create a strong evidence base for policy development and institutional reform.
9. **Align university strategies with national and global sustainability visions:** Institutional plans should align with frame works and the UN Sustainable Development Goals (SDGs) to ensure coherence between university-level initiatives and national development priorities.

**Overall implication:** Implementing these recommendations will position Arab universities as leaders in sustainable digital transformation, capable of leveraging human capital, smart technologies, and environmental responsibility to achieve long-term institutional excellence and global competitiveness.

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