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The future of sustainable human resource efficiency: A study on the impact of emerging digital tools

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Abstract

This article examines the impact of data analytics, artificial intelligence (AI) technology, and cloud computing on HR efficiency of Jordanian organizations, with emphasis on the moderating effects of information quality. A quantitative approach was utilized, and structured surveys were distributed to HR experts and HR managers who work in different industrial sectors in Jordan. Data from 415 valid respondents were statistically analyzed rigorously using the statistical software SPSS and AMOS, and were able to identify direct effects and moderation pathways. The study proves that operational efficiency in HR advances substantially by using data analytical systems with AI and cloud-based platforms. The quality of the data obtained acts as the fundamental element connecting organizational success. Organizations can fully benefit from digital transformation with proper data governance and consistent human resource data, but the absence or incorrect management blocks their advantages. Organizations should adopt digital technology as it depends on producing quality HR information to maximize HR efficiency. Jordanian businesses should invest in AI ethics, data governance, and cloud security measures to obtain the full advantages of digital transformation in HRM. The study presents applicable guidance for HR professionals, management executives, and governmental policymakers.

Keywords: Human resource efficiency, Digital transformation, Data analytics, Artificial intelligence technology, Cloud computing, Information quality, Jordan

1. Introduction

Various Jordanian organizations from different sectors now experience quick digital transformations through emerging technology adoption to boost operational capabilities and sustain competitive positions [1], [2]. The key human resource management (HRM) field keeps transforming due to increased business in Jordan utilizing digital innovations that automate human resource (HR) functions, optimize workforce schedules, and drive strategic business choices [3], [4]. Core digital parts that include data analytics software, AI tools, and cloud

computing systems are part of HR modernization by building improved operational processes, interacting with employees, and enhancing workforce management capabilities [5], [6]. Although the a growing interest in digital HR solutions, organizations are still dealing with disconnected HR systems and poor data integrity issues, thus hindering the achievement of maximum potential related to the currently prevailing trend in HR digital transformation [7].

HR efficiency is a critical element for determining the performance of any organization, as it provides direct impact on employee engagement, workforce productivity, and decision-making based on evidence [8]. HR professionals facilitate superior recruitment process enhancement, training, and performance assessments through predictive workforce intelligence furnished by contemporary HR technology systems [9], [10], [11]. Artificial intelligence (AI) technologies are conducive to managing HR, automating administrative procedures, accelerating the selection of talent, and reducing the incidence of human errors of judgment in the process of making decisions [12]. Cloud computing offers numerous revolutionary operational advantages to HRM through the implementation of data accessibility improvements, remote workforce enhancement, and employee collaboration [13]. Digital tools are only as effective as the information they generate and process, which may not follow satisfactory standards of quality. The quality of AI, analytics, and HRM systems based on cloud applications is highly dependent on the quality of HR data; poor HR data adversely affects system performance [9].

The use of AI technologies, cloud-based HR systems, and workforce analysis in managing HR by enterprises in Jordan, especially in both the public and private sectors, contributes to the effective HRM [14], [15], [16]. The digital transformation of HRM raises a sequence of problems for those organizations that attempt to implement these processes [17]. In Jordan, businesses face many challenges in the process of digital transformation, which is mainly due to inadequate execution of holistic data governance frameworks [18]. Simultaneously, employees show resistance towards digitization, and there is a shortage of skilled enough HR professionals who can successfully deploy analytics and AI solutions [19]. In Jordan, the implementation of digital HR solutions is not only based on regulatory requirements but also on cultural norms that require organizations to ensure that their digitalization efforts are in harmony with legislation related to the workforce, employee privacy conventions, and traditional business practices [20].

Digital HR transformations exist theoretically by combining the technology acceptance model (TAM) and resource-based view (RBV) [21], [22]. According to TAM, employees assess how well they accept digital tools that eventually affect their usage practices, and RBV highlights the strategic benefits of technological resource utilization [23], [24]. Empirical studies currently disregard the important role that the quality of information plays in the successful realization of HR digitalization initiatives [25]. AI, in collaboration with analytics and cloud computing, delivers less than optimal results in terms of efficiency towards HR departments, largely because of the lack of data connectivity, lack of analytic capabilities, and hostile positions towards digital transformation [26].

Consequently, it is imperative to investigate how data analytics, AI, and cloud computing enhance the efficiency of HR in digital environments through the role of information quality. Previous studies have concluded that the overall effect of digital technologies on HR efficiency is still inadequate in organizations that are seeking process optimization using these digital technologies [27]. Identifying this information gap, therefore, is crucial to deliver true efficiency gains rather than just complexifying the operation processes within the framework of HR digitization [28].

Although a broader exploration of the digital HR transformation has developed, comparatively little attention has been devoted to analyses of the synergetic operation of AI, data analytics, and cloud computing in augmenting HR efficiency through the enhancement of information quality. Investigations on the interrelations between these digital HR elements will help both public and private Jordanian organizations develop more effective HRM strategies, hence support them in overcoming digitalization problems and achieve optimal HRM in their respective business sectors.

2. Literature review and hypotheses development

Digital technologies have rapidly evolved, therefore transforming HRM. Jordanian organizations are increasingly turning to digital solutions to improve workforce productivity, efficiency, and outcomes of strategic decision-making [29]. Data analytics and artificial intelligence are the technological enablers, along with cloud computing, that organizations seek to boost efficient HR, and at the same time mitigate administrative burdens and improve employees' experiences [30].

The extensive use of technological innovations creates complex operational ramifications for HR efficiency, since the quality of processed data and the information generated directly impact the level of success [31], [32]. Information quality acts as a moderating variable that draws a line whether the introduction of digital HR tools leads to measurable improvements in efficiency or not. In this regard, studies about the relationship between data analytics, AI, cloud computing, and information quality in terms of HR efficiency are conducted; hence, research hypotheses are proposed.

2.1. The impact of data analytics on HR efficiency

Contemporary HRM has a significant dependency on data analytics, thus allowing organizations to verify their workforce planning, employees' performance appraisal, and retention strategies on data [25]. HR professionals use predictive analysis tools to analyze employee behavior in the context of staffing and retention projections, and as such, they help to formulate refined hiring practices [33]. The integration of data analytics in HRM produces three significant benefits to the organization, including the elimination of bias during the hiring process, enhancement of workforce planning, and development of employee engagement programs [34].

The efficiency of data analytics in the HRM field is highly dependent on the accuracy of the data, integration of its systems, and the availability of the data [35], [36]. Defective data, along with inaccurate analytical interpretation, results in HR decisions that will prevent efficiency increases and create workforce designs that do not support organizational goals [37].

Jordanian organizations are increasingly adopting HR analytics, at the same time focusing on various industrial sectors [38], [39]. Many organizational leaders face constant challenges that emerge due to erratic HR data and struggle simultaneously with the lack of system integration and shortage of analytical expertise, which weakens the timely implementation of data-driven HRM strategies [40]. Evidence empirically shows that the use of data analytics adds tangible improvements in HR efficiency, which are even enhanced when supported by high-quality information systems [41].

2.2. The impact of artificial intelligence (AI) technology on HR efficiency

The implementation of AI disrupts HRM by simplifying administrative functions, improving the recruitment process, and facilitating the interaction between employees through dialogue tools made possible by AI [42]. Utilizing AI in the hiring process, organizations scan through resumes and enhance performance evaluations and feedback evaluations, thus allowing HR teams to focus their time on developing strategic approaches to HR [30], [43]. The reliability, fairness, and accuracy of AI analysis determine the degree of impact that AI will have on HR efficiency [44].

Organizations in Jordan invest in AI-based solutions for their HR for improvements in recruitment processes and payroll activities to manage personnel fixation in an increasingly sensitive way based on the achievements of the employees [45]. The successful application of AI-derived decision-making in HR is dependent on the availability of high-quality data that is necessary for maintaining compliance with organizational policies and ensuring fair outcomes [46]. The positive impact of AI in terms of HR efficiency is subject to the degree of access of AI to high-quality information [47]. AI-driven workforce forecasting provides inaccurate results as it is based on flawed or discriminatory HR data that perpetuates biased hiring processes [48].

2.3. The impact of cloud computing on HR efficiency

Using cloud computing in HRM has led to a significant transformation in the industry as HR systems are available and provide a storage of data, and help in dealing with a remote workforce [49]. When implemented using a cloud-based platform, HR professionals gain instant access to talent acquisition and payroll processing capabilities as well as the ability to track performance metrics in the workplace, leading to increased operational efficiency [42]. The adoption of cloud-based solutions helps minimize the costs of the information technology infrastructures, along with improved HR services delivery, simultaneously creating flexible and scalable HR processes [50].

The shifting of Jordanian organizations to HR information systems hosted on the cloud continues despite the security concerns, integration issues, and the reliability of the systems [16], [51]. The optimal utilization of the efficiency of cloud computing requires that organizations have rigorous information management strategies [52]. Insufficient synchronization between cloud-based HR platforms breeds organizational inefficiencies in terms of redundant operational activities, increased compliance risks, and poor HR performance [30], [53]. Scholars claim that improvements in HR efficiency due to cloud computing are dependent on the maintenance of structured data governance systems and harmonious integration of HR systems [54].

2.4. The moderating role of information quality

Organizations that incorporate HR data analytics that is integrated with AI and cloud computing affect the HR efficiency to assure the continued quality of HR data [13]. Strategic HR decision-making is inextricably linked to the concept of information quality, which bundles data accuracy, timeliness, and relevance, while simultaneously having a requirement for consistency [55], [56]. Digital HR involvement, tools lose the advantages of efficiency due to insufficient data governance, system disintegration, and varied data standardizations, which in turn, give rise to the operational challenges that decrease the effectiveness of the workforce [41], [57].

The maintenance of high-quality HR data remains a constant challenge, where organizations often do not have integrated HR information systems, and thus have scattered records for the employees [58], [59]. Empirical research shows that high-quality information adds to the efficiency of digital HR technology tools that enable HR professionals to obtain prominent digital insights to optimize talent performance and inform the design of workforce strategies and strategic HRM [60], [61]. The quality of information acts as a decision-making clue between being able to achieve higher levels of performance from data analytics, AI, and cloud confirmations, and the lack of performance improvements in HR.

2.5. Research hypotheses

According to the reviewed literature, this study proposed the following hypotheses:

- H1: Data analytics has a positive impact on HR efficiency.
- H2: AI technology has a positive impact on HR efficiency.
- H3: Cloud computing has a positive impact on HR efficiency.
- H4a: Information quality moderates the relationship between data analytics and HR efficiency.
- H4b: Information quality moderates the relationship between AI technology and HR efficiency.
- H4c: Information quality moderates the relationship between cloud computing and HR efficiency.

2.6. Conceptual framework

This study evaluates primary elements that shape HR efficiency to provide essential theoretical support for subsequent research. This study, thus, performs experimental tests of its hypotheses by focusing on Jordanian businesses to understand the effects of digital HR tool efficiency resulting from information quality moderation. The conceptual framework is presented in Figure 1.

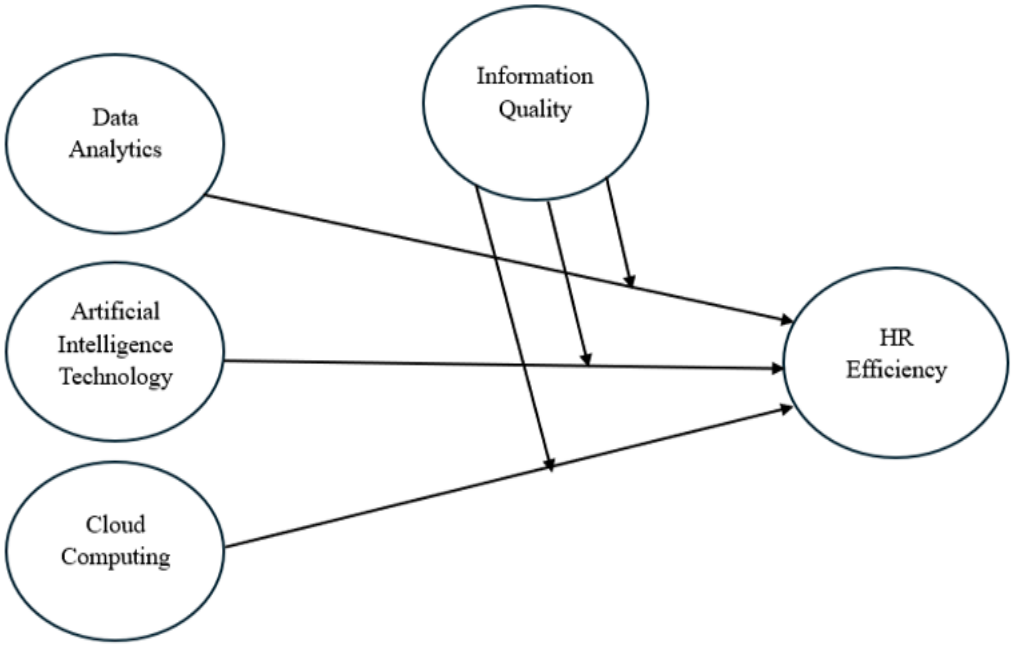

Figure 1. The conceptual framework

3. Methodology

A quantitative research framework was deployed to analyze data analytics and its partners with AI and cloud computing towards HR efficiency in Jordanian organizations through the moderating variable of information quality. A quantitative design gathers objective data that the researcher can analyze to discover general patterns in implementing digital HR and its effects on workforce management [62]. The study's primary data acquisition tool is a structured survey questionnaire because it assesses Jordanian organizations using digital HR solutions.

This study employed a stratified random sampling technique to ensure adequate representation of Jordanian organizations that have adopted digital HR solutions. The target population consisted of HR managers and HR professionals working in organizations operating in both the public and private sectors in Jordan. Stratification was conducted based on two criteria: organizational size (small, medium, and large enterprises) and industry sector. The industry strata included banking and financial services, telecommunications, manufacturing, and service-oriented organizations. These strata were selected to reflect the diversity of digital HR adoption across the Jordanian economy. The selected participants were selected at random in their respective strata to reduce bias and increase the validity of the research findings [63].

A total of 458 questionnaires were distributed proportionally across the defined strata according to the estimated size of each sector and organizational category. Data collection was conducted using an online survey administered via Google Forms. After data screening, 415 valid responses were retained for analysis, yielding a response rate of approximately 90.6%. To address potential non-response bias, reminder messages were sent during the data collection period, and incomplete or inconsistent questionnaires were excluded from the final dataset. These procedures enhanced the reliability and representativeness of the sample.

The research instrument obtains feedback through a five-point Likert scale running from one (i.e., strongly disagree) to five (i.e., strongly agree), which assesses five fundamental constructs related to data analytics, AI, cloud computing, information quality, and HR efficiency by surveying HR professionals. The survey included items designed from empirically validated measures used in antecedent HR technology research to ensure measurement reliability and validity [63].

The statistical package for social science (SPSS) and the analysis of moments software programs (AMOS) were used for descriptive statistical analyses, which resulted in rich descriptions of the sample characteristics, and reliability analyses, which maintained the internal consistency of the survey constructs. The current study uses

confirmatory factor analysis to determine whether all the study's variables correspond to certain theorized relationships. Structural equation modeling (SEM) is the analytical model used to determine the impact of digital transformation tools on the information quality, HR efficiency by direct and indirect routes. Researchers can study all possible causal sequences that reveal how digital innovations boost HR performance in Jordanian organizations through the SEM technique [64].

4. Analysis and results

The analysis provides results about HR efficiency changes from data analytics, AI, and cloud computing while examining how information quality acts as a moderator. The study included examinations of descriptive statistics, reliability testing, confirmatory factor analysis (CFA), and hypothesis testing through SEM. The study also provides specific evidence to reveal the effect of digital HR tools on organizational performance and workforce management effectiveness.

The study performs demographic research to reveal important traits that explain respondents' characteristics in the research data. Many respondents belonged to the 30-39 age group because they comprised 42.6% of the complete participant pool. Regarding the respondents' gender, 54.3% were male and 45.7% were female. Most of the respondents have an advanced degree, master's and PhD degrees, representing 62.3% of the sample population, which is representative of the specialized expertise demands of the high-technology HR positions. Table 1 presents the demographic profile of the respondents.

Table 1. Demographic profile of respondents

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	225	54.3%
	Female	190	45.7%
Age	18–29 years	79	19.0%
	30–39 years	177	42.6%
	40–49 years	111	26.8%
	50+ years	48	11.6%
Education Level	Bachelor's	156	37.7%
	Master's	160	38.6%
	PhD	99	23.7%
Sector	Public organizations	22	44.0%
	Private organizations	28	56.0%

The research design provides a wide range of data collection methods and advanced data analysis methods to determine the relationship between the digital HRM tools and efficiency.

4.1. Descriptive statistics

Table 2 contains the data related to the variables that were evaluated by respondents. Mean scores provide an indicator of consensus between participants, and standard deviations provide an indicator of the full range of the responses.

Table 2. Descriptive statistics for study variables

Construct	Mean (M)	Standard Deviation (SD)
Data Analytics	3.95	0.74
Artificial Intelligence Technology	4.02	0.79
Cloud Computing	3.88	0.77
Information Quality	4.10	0.72
HR Efficiency	3.91	0.76

Empirical evidence shows that respondents largely accept that positive impacts are produced for digital HR technologies. Nevertheless, the results show perceptions of heterogeneity in the extent of digital adoption and HR digital maturity capacities of organizations.

4.2. Reliability and validity testing

The measurement model achieved assessment through Cronbach's alpha (α), composite reliability (CR), and average variance extracted (AVE), which validated its reliability and validity. The measurement model evaluation, as presented in Table 3, α exceeded 0.7, CR surpassed 0.7, and AVE surpassed 0.5 (Hair et al., 2019), which validated construct and internal consistency.

Table 3. Reliability and convergent validity results

Construct	Cronbach's alpha (α)	Composite Reliability (CR)	AVE
Data Analytics	0.82	0.87	0.62
Artificial Intelligence Technology	0.85	0.89	0.64
Cloud Computing	0.81	0.86	0.60
Information Quality	0.87	0.90	0.66
HR Efficiency	0.83	0.88	0.61

Accordingly, SEM analysis can proceed since the evaluation demonstrates strong reliability and validity across all measurement scales.

4.3. Confirmatory factor analysis (CFA)

A confirmatory factor analysis (CFA) evaluated the measurement model quality by a combination of testing methods. Table 4 demonstrates that the model fulfills Hu and Bentler's (1999) fit standards [65].

Table 4. CFA model fit indices

Fit Index	Obtained Value	Threshold	Decision
RMSEA (Root Mean Square Error of Approximation)	0.045	RMSEA < 0.08	Good Fit
CFI (Comparative Fit Index)	0.936	CFI > 0.90	Good Fit
TLI (Tucker-Lewis Index)	0.923	TLI > 0.90	Good Fit
Chi-Square/df	2.17	< 3.00	Good Fit

The study results demonstrate that the measurement model functions appropriately and maintains a solid structure, which justifies exploring future hypotheses.

4.4. Hypothesis testing using structural equation modeling (SEM)

SEM analysis evaluated data analytics, AI, cloud computing, and information quality relationships and their contribution to HR efficiency. The results, including standardized path coefficients, significance levels, and hypothesis testing outcomes, are illustrated in Table 5.

Table 5. Hypothesis testing results

Hypothesis	**Path Coefficient (β)**	**S.E.**	**C.R.**	**P-Value**	**Decision**
H1: Data Analytics → HR Efficiency	0.41	0.06	6.83	< 0.001	Supported
H2: AI Technology → HR Efficiency	0.44	0.07	6.29	< 0.001	Supported
H3: Cloud Computing → HR Efficiency	0.39	0.06	6.50	< 0.001	Supported
H4a: Data Analytics x Information Quality → HR Efficiency	0.42	0.07	6.00	< 0.001	Supported

Hypothesis	Path Coefficient (β)	S.E.	C.R.	P-Value	Decision
H4b: AI Technology x Information Quality → HR Efficiency	0.45	0.06	6.75	< 0.001	Supported
H4c: Cloud Computing x Information Quality → HR Efficiency	0.38	0.07	5.43	< 0.001	Supported

The tested hypothesis reveals how data analytics, AI, and cloud computing positively impact HR efficiency, with information quality acting as a significant moderating factor.

4.5. Structural model fit

The structural model analysis of the tested hypothesis shows a satisfactory fit for hypothesis evaluation, as reported in Table 6.

Table 6. Structural model fit indices

Fit Index	Obtained Value	Threshold	Decision
RMSEA	0.047	RMSEA < 0.08	Good Fit
CFI	0.932	CFI > 0.90	Good Fit
TLI	0.918	TLI > 0.90	Good Fit
Chi-Square/df	2.090	< 3.00	Good Fit

Data analytics, AI, and cloud computing technologies boost HR efficiency, while information quality is an important connecting element between these technologies. Therefore, organizations should maintain excellent data quality criteria to achieve maximum returns from their digital HR implementation.

5. Discussion

This study investigates the role of data analytics, AI, and cloud-based computing technologies on HR efficiency in Jordanian organizations using information quality as a moderator. High-quality information systems promote digital HR transformations and consequently improve HRM and operational performance, while also supporting organizations in making informed decisions. The successful implementation of digital HR systems in Jordanian organizations requires accurate and reliable information that digital tools can provide in a timely manner.

The current study shows that the organizations that use HR analytical methods achieve optimal HRM results and increased performance ($\beta = 0.41$, $p < 0.001$). According to previous studies, data analytics enable organizations to predict the evolution of workforces, as this will help in optimizing recruitment processes and in retaining workers [33], [34]. Through the moderation analysis, it was found that good quality standards of information materials have a significant impact on the level of performance of data analytics, which in turn improves the HR efficiency ($\beta = 0.42$, $p < 0.001$). The intersection of insufficient data integration, legacy data, and conflicting HR databases undermines the breadth of analytical insights, thereby fostering poor hiring decisions and thwarting workforce planning and operational effectiveness in the HR department. Furthermore, optimizing data analytics for the goal of improving HR efficiency in Jordanian organizations requires replicating a comprehensive data governance framework, which also includes sophisticated HR analytical solutions and work in real time across HR information systems.

The use of AI tools helps improve HR performance by streamlining automated processes in various aspects of recruitment, performance appraisal, and employee engagement systems [30]. The AI applications driving digital change within HR practices have innovations that have changed the workforce operations in the form of chatbots. AI helps in resume assessments and talent predictive analytics; therefore, HR professionals are increasingly creating strategic workforce plans [42]. Based on the moderation analysis, information quality stands as the major determinant factor affecting the degree of success of AI that boosts the HR efficiency, as it has a statistically significant effect, $\beta = 0.45$ ($p < 0.001$). Insights from AI systems that use untrustworthy or

unvalidated data source material led to discriminatory selection decisions, imprecise employee assessments, and inaccurate HR predictive modeling. Hence, establishing ethical AI systems, transparent AI decision protocols, and constant development of AI analytics models for HR represent fundamental requirements for organizations in Jordan.

The study shows that cloud infrastructure leads to enormous efficiency enhancements in HR operations ($\beta = 0.39$, $p < 0.001$) because cloud HR systems give better accessibility, high scalability, and flexibility for HR management operations [53], [54]. The remote systems built on cloud platforms enable organizations to handle their payroll, record management, and train employees, resulting in flexible workforce operations. Time storage and accessibility quality of cloud computing systems determine the connection between cloud computing effects and HR efficiency according to moderation analysis ($\beta = 0.38$, $p < 0.001$). The absence of HR database protection and real-time data synchronization with inadequate cloud security protocols leads to split HR data problems, compliance issues, and deterioration of HR processes for Jordanian organizations. Organizations deploying cloud computing technologies in HRM must establish strong protective measures to protect data, perform routine cybersecurity protocols, and ensure that maximum benefits are derived from the technologies.

In addition, the implementation of digital HRM systems is dependent upon the quality of the information because they provide precise data on HR information that forms the backbone of organizational efficiency. The lack of quality information negatively affects the operational efficiency of analytical systems, decreases HR efficiency, and raises levels of operational risks. Organizations should ensure that databases are always up to date with system integration and the establishment of data governance standards to ensure that digital HR practices are efficient.

This study promotes a theoretical understanding of HRM and digital transformation as it shows that information quality plays a key role in optimizing HR efficiency. The current study also confirms that the effectiveness of digital HR capabilities in promoting HR efficiency because they working through the mechanisms of TAM and RBV, depending on achieving high-quality standards. Furthermore, the study is in line with the job demands-resources (JD-R) framework by conceptualizing HR technology as a key organizational resource that reduces administrative burdens and enhances the performance of employees. Consequently, this study shows an explanation of the theoretical framework that can be applied for the optimization of HRM in Jordanian organizations, incorporating digital transformation perspectives, and this may lead to further refining the empirical knowledge about the impact of digitalization on HRM while reinforcing pre-existing theoretical constructs.

The current study delivers relevant conclusions for HR professionals, management executives, and governmental policymakers from organizations and authorities seeking to enhance HR productivity through digital transformation and information quality management. The organizations in Jordan should develop strategic plans that advance data integrity, establish innovative technology connections between HR systems, and establish readiness programs for digital implementation. Combining AI-powered analytics for HR data with real-time validation and established HR data-gathering protocols will yield maximum benefits from digitalization projects. In addition, the initial training programs about AI operational techniques should be implemented to teach HR staff the proper use of AI systems that maintain fair decision-making and ethical HR operational transparency. Protecting employee data through encryption and authentication requires special attention in cloud-based HR security because this combination maintains data privacy and supports local labor legislation.

Implementing digital tools by the HR team depends on adequate change management programs. Professional training about digital HR tools for HR specialists enables them to tackle employee digitalization resistance, thus driving the enhanced application of predictive analytics alongside AI and HRM solutions based on cloud computing. The establishment of ethical guidelines by Jordanian organizations should unite data transparency with AI rules, which ensure fair decision-making processes for HR staff that uphold diversity and inclusion principles. Moreover, the implementation of specific strategies helps organizations achieve optimal HR

efficiency, thus contributing to enhanced employee performance and engagement in digitally transformed operational contexts.

The study produced beneficial results and specific shortcomings. The choice to use the cross-sectoral design confines the authors' capacity to explore the progression of HR performance over time because of digital transformations. Continual research should have constant methodologies of monitoring advancements in AI and associated analytics along with cloud infrastructures, in relation to its impact on HR efficiency measures. The users of the digital HR system are the main empirical group of this study; however, the organizations that have not adopted digital platforms are not included in the discussion. Future research should focus on how digital transformation changes HR functions in specific business areas, especially those industries that are expected to have low technological adoption. The study uses quantitative methodologies to generate statistical data on trends in HR digitalization. Senior HR professionals should be hired for in-depth interview sessions to define their management philosophy regarding digital HR solutions and what obstacles should be addressed. Investigations into the factors that determine the success of digital HRM should question the interplay between organizational culture, leadership endorsement, and the ability to assimilate contemporary HR technologies.

Empirical evidence shows that HRM achieves maximum efficiency with the use of data analytics, AI systems, and cloud-based technologies, incorporating information quality as a salient moderating variable. To achieve the full potential of HR digitalization in the Jordanian context, organizations need to invest financial resources in strong data management and ensure compliance with ethical principles that govern the use of AI and the adoption of robust cloud security protocols. Furthermore, organizations focusing on information quality in their HR digital strategies are more likely to increase productivity in their employees, recognize and understand their workforce, and empower optimal HR-related decision-making. Therefore, the present study outlines directions for HR professionals, executive managers, and policymakers to grasp the path towards increasing operational efficiency through data-driven HR initiatives and digital transformation programs.

6. Conclusions

The present study examined the impact of data analytics, AI, and cloud computing on the HR efficiency of Jordanian organizations, and especially paid attention to the information quality as a significant moderator. This empirical study confirms that adopting digital HR tools significantly improves HR decision-making and operational performance in Jordanian organizations. High-quality information addressing enables HR digital transformation to reach its full performance potential. The combination of poor data handling systems, including inconsistent HR databases and outdated HR information, strongly decreases HR operational efficiency, which results in diminished performance quality during decision-making processes.

The current study shows how HR efficiency improves through data analytics because it enables organizations to base decisions on data while planning their workforce and developing talent retention approaches. Organizations in Jordan that establish complete HR analytics frameworks achieve better service performance in HR, decreased administrative task loads, and superior performance management capabilities. The effective use of data analytics for HRM relies on obtaining reliable and complete HR-related data that can be effectively brought together. According to the study's findings, high information quality enhances the relationships between data analytics and HR efficiency, resulting in better accurate, evidence-based workforce decisions for HR professionals.

In addition, this study demonstrates how AI technology creates more efficient HR practices by managing HR administrative work and improving staff member retention and performance tracking processes. The drive for efficiency from AI systems depends on the precision and impartiality of the data processing. Further, AI systems that receive training data containing biases or errors within HR information will generate unfair hiring judgments while creating wrong employee evaluations and inaccurate workforce projections. Thus, organizations should implement ethical AI rules, maintain explicit AI-processed HR judgments, and periodically supply their AI algorithms with quality workforce information to maximize HR efficiency benefits.

Cloud computing supports HR efficiency through data accessibility and streamlined operation management, enabling organizations to function with remote employees. Moreover, HR staff achieve higher cooperative abilities through cloud-based systems, rapidly delivering essential HR analytics to increase organizational flexibility. Based on the study's findings, cloud computing increases HR operational efficiency by adequately implementing data security measures with operational compliance and standardized HR data management rules. Also, the failure to establish secure cloud infrastructure alongside effective data governance in organizations produces operational challenges that diminish HR performance levels.

Finally, the current study indicates that information quality is at the core of digital HR tool technology's relationship to HR efficiency enhancement. Organizations that maintain incorrect, non-updated, and non-integrated HR data automatically forfeit technological investment advantages, which lead to diminished capacity when improving workforce planning capabilities and HR efficiency levels. Successfully implementing digital tools and software efficiency requires strong dataset governance structures that use improved analytic algorithms alongside real-time HR data management systems.

Regardless of digital tools, HRM works optimally only through quality, well-structured, reliable HR data systems. Organizations in Jordan can maximize their productivity by combining good data handling practices with modern technological implementation; therefore, they retain their talents and improve HR practices. Thereby, the failure to address information quality problems leads organizations to face difficulties when implementing AI-driven HR automation, cloud-based workforce management, and data-driven HR strategies.

This study provides necessary data for HR professionals, executive managers, and government officials to optimize their HR digital transformation strategy of public and private organizations in Jordan. Accordingly, future studies should examine different business industries within digital HR to evaluate the long-term impact of digital tools on decision systems and analyze how organizational cultures affect the adoption of digital HR systems. Future studies also need to investigate how Jordanian HR practitioners deal with digital transformation barriers regarding regulatory compliance requirements and staff's digital skill development, and organizational change execution methods. The continuous improvement of human capital data quality, digital competency development, and digital technology strategic HRM implementation alignment will enable Jordanian organizations to build an adaptable workforce that meets future requirements.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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Author contributions

Dirar Abdelaziz Al-Maaitah: Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision. Khaled Mohammad Alghraibeh: Data curation, Investigation, Writing - review & editing. Mo'men Hani Mahmoud: Methodology, Software, Validation, Writing - review & editing. Ahmad Rajaa Albatayneh: Resources, Visualization, Project administration.

Ethical approval statement

Our institutions do not require research ethics approval for reporting survey-based HR research.

Informed consent

Informed consent was obtained from all individual participants involved in the study prior to data collection.

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