(RESEARCH ARTICLE)

The challenges of digitalizing human resources management in sudan at the ministry of higher education and scientific research

Eltom Ishaq Osman Musa *, Hardi Warsono and Budi Puspo Priyadi

Faculty of Social and Political Sciences, Department of Public Administration, University of Diponegoro-UNDIP, Semarang, Indonesia.

Abstract

This research investigates the challenges encountered by the Ministry of Higher Education in Sudan as it digitalizes its human resources management processes. The study identifies significant obstacles, such as limited technological infrastructure, insufficient digital literacy among staff, and inadequate training programs. Adopting a quantitative descriptive approach, primary data was collected through a questionnaire distributed to the entire employee population, with 150 out of 201 respondents participating. Data analysis was conducted using SPSS 20.0 software, incorporating validity and reliability tests and content validation by a panel of 20 experts. The instrument's validity was confirmed using Cronbach's alpha-split-half method, with Aiken's V indicating that all items were valid (not less than 0.64 at a 0.05 significance level). The findings reveal a strong consensus among respondents regarding the challenges of digitalizing HRM within the Ministry. The study's comprehensive coverage, demonstrated by the sample size and the range of recorded values (15.00 to 75.00), highlights the diversity and extent of these challenges.

Keywords: Challenges; Digitalization; Resources Management; Sudan; Ministry of Higher Education and Scientific Research

1   Introduction

In the contemporary landscape of organizational management, human resources (HR) are increasingly recognized as pivotal contributors to the long-term strategic interests of institutions. Human resource management (HRM) is defined as the strategic and purposeful structuring, regulation, and development of all facets influencing human resources within an organization [1]. This study focuses on HRM within Sudan's public sector, specifically the Ministry of Higher Education (MOHE), aiming to oversee the digitalization of the workforce and promote optimal utilization of digital HRM practices [2]. As the ministry seeks to modernize its HRM processes, it faces numerous obstacles, including limited technological infrastructure, resistance to change among employees, and a lack of digital skills. These challenges hinder the efficient adoption and integration of digital HRM systems, impacting overall productivity and effectiveness. Digitalization has revolutionized various aspects of public sector operations globally, including HRM, offering opportunities to enhance service delivery, efficiency, and transparency. However, Sudan's Ministry of Higher Education faces unique challenges during digital changes, such as limited resources, bureaucratic structures, and resistance to change.[3] the MOHE serves as a compelling case study for exploring the complexities associated with digitizing HR management.

 The primary objectives of this study are threefold: (1) to evaluate the effectiveness of HRM in Sudan at the Ministry of Higher Education and Scientific Research and its alignment with digitalization goals; (2) to align HRM objectives with strategies that enhance employee potential and improve organizational performance; and (3) to assess the effectiveness of HRM in achieving both traditional administrative functions and strategic HRM goals (Sharma & Vyas, 2012). The

* Corresponding author: Eltom Ishaq Osman Musa

substantial influence of digitalization has revolutionized various aspects of public sector operations globally, including HRM (Foresight and STI, 2022). In this context, digitalization offers opportunities to enhance service delivery, efficiency, and transparency, particularly within the MOHE.

This study delves into the intricate domain of HRM within Sudan's higher education, specifically focusing on the Ministry of Higher Education (MOHE). It aims to oversee the digitalization of the workforce efficiently and promote the optimal utilization of digital HRM practices. The ministry's efforts to improve administrative efficiency also affect the overall productivity and effectiveness of higher education institutions in Sudan [4], additionally, there is a notable resistance to change among employees who are accustomed to traditional methods, coupled with a general lack of digital literacy and skills necessary for operating new systems. The domain of human resource management encompasses a comprehensive array of philosophies, policies, systems, and practices that influence employee behaviour, and attitudes in the public sector at the Ministry of Higher Education (MOHE) [5]. It explores the obstacles and issues that emerge during the transition from conventional HR management methods to digital services within Sudan's governmental organizations. [6], In addition, the HRM in Sudan often grapples with unique challenges during the implementation of these changes, such as restricted resources, bureaucratic structures, and resistance to change. The Ministry of Higher Education (MOHE) serves as a compelling case study for exploring the complexities associated with digitizing HR management.

The Republic of Sudan, located in Northern Africa, is the continent's third-largest country, covering an area of approximately 1,882,000 km2. Sudan's population is culturally and historically diverse, reflecting a complex heritage (Republic of Sudan,1989). Emerging from British rule, the country achieved independence on January 1, 1956, yet its history has been tumultuous, marked by political instability. In 1955, the first Sudanese civil war erupted as southern rebel groups clashed with the northern government's Sudanese Armed Forces (SAF) in pursuit of independence. After six years of conflict, Sudan and South Sudan eventually gained independence through a popular vote on July 9, 2011[7].

Higher education in Sudan encompasses the evaluation of administrative procedures within government institutions. This evaluation is essential for securing resources to support organisational objectives, including citizen services services [8]. The study's shift towards public management has led to significant changes in (1) traditional practices, and (2) offering new opportunities for transparency and digital advancements, particularly in developed nations [9]. This absence of digital adaptation and the related challenges can impede organizational efficacy and innovation, as employees may encounter difficulties in adjusting to evolving requirements or leveraging digital technologies and processes proficiently [10]. The struggles associated with digital integration can further amplify issues in public institutions and employee motivation within the Ministry of Higher Education and Scientific Research. Factors such as limited interaction, inadequate digital implementation, and inconsistent governmental policies can lead to disengagement and discontent among employees in Sudan's public sector. Tackling these obstacles necessitates a comprehensive approach, encompassing investment in employee development initiatives, cultivation of a favourable work environment, the establishment of explicit objectives and standards, and enhancement of human resource management competencies within Sudan's public sector 11].

Therefore, this research examines the impact of digitalization on HRM in the Sudanese public sector. It aims to understand how organizational traits influence digital HRM implementation and to address the challenges facing Sudanese citizens in the digitalization of human resources management in the public sector. The structure of the study aims to convey the focus of the research and provide a clear indication of the subject matter, scope, and geographic location of the study. Higher education in Sudan has encountered challenges in implementing digital processes, requiring gradual reforms in various government institutions, including the Ministry of Higher Education [12]. These challenges are crucial and must be addressed to enhance HRM digitalization, especially within the Ministry of Higher Education and Scientific Research. This study aims to provide valuable insights into the technological challenges that need to be addressed to advance the effective digitalization of HRM processes by identifying the Ministry of Higher Education and Scientific Research in Sudan.

2   Material and methods

2.1   Research Design and Approach

This study employed a quantitative research design to explore the challenges associated with implementing digital HR management in Sudan's public sector. The design includes descriptive and correlational techniques to provide a comprehensive framework for the study. This approach aligns with the research objectives and addresses the specific research questions, as suggested by Cooper and Schindler [13].

2.1.1   Type and Sources of Data

The study utilizes both primary and secondary data. Primary data were collected directly from employees of Sudan's higher education institutions, including the Ministry of Higher Education and Scientific Research, through questionnaires. Secondary data were sourced from government documents, books, and relevant research materials to provide a robust context for the study.

Data Collection Method

Data were gathered using a structured questionnaire designed to assess the impact of various factors on digital HR management. The questionnaire included detailed instructions to ensure accurate responses and was distributed through multiple channels, including online surveys, WhatsApp, and mail-in surveys. The study employed a 5-point Likert scale to measure respondents' attitudes, beliefs, and opinions on digital HR management challenges [14].

2.2   Population and Sample

The population for this study consists of employees from the Ministry of Higher Education and Scientific Research in Sudan. A sample size of 150 employees was selected to ensure a representative and comprehensive analysis. The sample size determination was guided by the need to minimize sampling errors and control costs, as outlined by [15].

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3   Results and discussion

3.1   Description of Research Questions

The following section provides an overview of the data collected from respondents at the Ministry of Higher Education (MOHE), focusing on several significant challenges. The primary issues identified were inadequate digital training, a lack of technological infrastructure, insufficient funding for public sector training, and constraints related to policy and regulatory issues. Data collection was conducted through the dissemination of both hard copy and online questionnaires via email and WhatsApp. The questionnaires were distributed to staff members, accompanied by a letter outlining the research. The analysis was based solely on complete data sets gleaned from 150 responses from Sudanese public sector employees.

The survey results highlight a consensus among respondents regarding the significant challenges at the Ministry of Higher Education and Scientific Research.

- Digital HR tools have reduced the administrative burden on employees. A significant majority (84.6%) of respondents either strongly agree or agree that innovative skills demand a distinct digitalization process compared to traditional approaches. This high agreement suggests a clear recognition among respondents of the unique requirements for succeeding in digitalization process ventures.
- The Ministry of Higher Education is committed to implementing digital solutions in HR. A majority (76%) of respondents indicate their willingness to take calculated digitalizing Human Resources Management to enhance the Ministry of Higher Education and Scientific Research skills. This positive response highlights a readiness among respondents to embrace the requirements of government policies to influence the digitalization processes to develop the empolyees capabilities.
- Digitalization can help reduce administrative burdens in HR processes. The sixty-point-seven percent (60.7%) of respondents believe that they possess the necessary digital to promote innovative Higher Education institutions. However, nearly a third (29.3%) are neutral, indicating a significant portion may be uncertain about their readiness in this aspect.
- The adoption of digital HRM will improve employee satisfaction. The majority (84%) strongly agree or agree that adaptation is crucial for the higher education ministry, emphasizing the importance of flexibility and adaptability in a digitalizing context, signifying a substantial segment of the workforce environment.
- I think there is a clear policy plan for digitalizing HR management at the Ministry. Eighty-two percent (82%) of respondents recognize the critical importance of identifying opportunities for policies to implement digital HRM. This high agreement underscores the consensus on the significance of opportunity recognition in digitalizing the Ministry of Higher Education.

Table 1 Description of Respondents' Characteristics

No	Indicators	Respondent Answer										Total of Responde nt
		Strongly Agree		Agree		Neutral		Do not Agree		Strongly do not agree		
		Frequeny	%	Frequeny	%	Frequency	%	Frequeny	%	Frequeny	%	
1	Digital HR tools have reduced the administrative burden on employees	62	41.30%	65	43.30%	14	9,3%	5	3.30%	4	2.70%	150
2	The Ministry of Higher Education is committed to implementing digital solutions in HR	40	26.70%	74	49.30%	26	17.30%	5	3.30%	5	3.30%	150
3	Digitalization can help reduce administrative burdens in HR processes	34	22.70%	57	38%	44	29.30%	12	8%	3	2%	150
4	The adoption of digital HR systems will improve employee satisfaction	90	60%	36	24%	17	11.30%	3	2%	4	2.70%	150
5	I think there is a clear policy plan for digitalizing HR management at the Ministry	67	44.70%	56	37.30%	18	12%	4	2.70%	5	3.30%	150
6	The current technological infrastructure supports digitalization in HR management	35	23.30%	66	44%	41	27.30%	6	4%	2	1.30%	150
7	There is adequate IT support for HR digitalization initiatives within the ministry	83	55.30%	45	30%	16	10.70%	4	2.70%	2	1.30%	150
8	The Ministry has insufficient financial resources for digitalization projects	66	44%	61	40.70%	16	10.70%	6	4%	1	0.70%	150
9	Training programs are effective in improving digital literacy among employees	50	33.30%	63	42%	30	20%	3	2%	4	2.70%	150
10	There is a positive attitude towards digitalization within the Ministry	54	36%	66	44%	23	15.30%	2	1.30%	5	3.30%	150
11	Employee performance has increased due to digital HR tools	57	38%	61	40.70%	24	16%	4	2.70%	4	2.70%	150
12	Digital HR initiatives are aligned with the Ministry's strategic goals	37	24.70%	54	36%	43	28.70%	13	8.70%	3	2%	150

13	The Ministry encourages innovation in digital HR practices	26	17.30%	58	38.70%	40	26.70%	19	12.70%	7	4.70%	150
14	Funding for digital HR initiatives is prioritized by the Ministry	39	26%	69	46%	26	17.30%	9	6%	7	4.70%	150
15	The Ministry has clear policies supporting digital HR practices	74	49.30%	51	34%	12	8%	10	6.70%	3	2%	150

- The current technological infrastructure supports digitalization in HR management. Sixty-seven point three percent (67.3%) agree that they can adapt to changing technological infrastructure supports conditions using innovative skills. However, a notable proportion (31.3%) remains neutral, suggesting mixed perceptions or uncertainty about their adaptability in Higher Education institutions.
- I recognize the importance of networking as one of the essential elements of support for HR digitalization initiatives within the ministry. A significant majority (85.3%) acknowledge the importance of networking as a crucial element of HR digitalization, highlighting its role in building relationships and opportunities.
- The Ministry has insufficient financial resources for digitalization projects in higher education institutions. Eighty-four point seven (84.7%) agree that Reflecting on the impact of insufficient funding on the digitalization process in higher education reinforces the belief in networking's significance for uncertainty, such as the availability of continuous training programs.
- Training programs are effective in improving digital literacy among employees. Seventy-five point three (75.3%) express willingness to adjust digitizing HRM within Sudan's Ministry of Higher Education, indicating the public sector is dependent on adaptation digital services.
- There is a positive attitude towards digitalization within the Ministry. 80% of the respondents affirm their commitment to digitalization, as they believe it is valuable in understanding and addressing the challenges of HR management in the Ministry of Higher Education in Sudan.
- Employee performance has increased due to digital HR tools. A significant majority (78.7%) perceive innovation as fundamental to digitalization within the Ministry, underscoring the belief in the pivotal role of innovation in higher education and Scientific Research in digitalizing MRM.
- Digital HR initiatives are aligned with the Ministry's strategic goals. (60.7%) express confidence in digitalizing MRM's ability to generate innovative processes within higher education settings. However, a significant percentage (28.7%) expresses doubt or neutrality, indicating the potential digitalization needed to support or develop within the Ministry.
- The Ministry encourages innovation in digital HR practices. (55%) believe they possess the necessary experience to identify and evaluate digitalization growth in the Ministry of Higher Education in Sudan. However, a significant portion (32.3%) does not share this belief, indicating differing levels of confidence or experience among respondents.
- Funding for digital HR initiatives is prioritized by the Ministry. A majority (72.3%) indicate they have had the opportunity as technology continues to advance in management, highlighting the perceived value and resistance to change. The Ministry of Higher Education and Scientific Research serves as an intriguing case study to explore.
- The Ministry has clear policies supporting digital HR practices. Eighty-three point three percent (83.3%) agree on the essential role of policies emphasized within the Ministry of Higher Education (MOHE).

The survey results indicate a strong consensus among respondents on the challenges of digitalizing Human Resources Management (HRM) within the Ministry of Higher Education and Scientific Research in Sudan. These challenges include a lack of technological infrastructure, insufficient funding for HRM, inadequate training, and limited financial resources, which hinder investment in necessary technology and networking. However, there are notable areas of uncertainty or differing perceptions, especially regarding employees' confidence in digital skills such as idea generation and opportunity evaluation. These insights offer valuable guidance for educators and policymakers in creating a supportive environment for the development of robust digital HRM in the Ministry.

 The survey results reveal a consensus among respondents on the need to digitalize human resources management in the Ministry of Higher Education and Scientific Research in Sudan. There is widespread recognition that digitalizing HR management presents new perspectives compared to traditional approaches. A substantial majority express readiness to take calculated risks (76%) and acknowledge the importance of adaptation (84%) and opportunity identification within traditional management (82%) concerning the Ministry. Digitalization is perceived as essential by 85.3% of respondents, reflecting its role in fostering effective training programs that improve digital literacy among employees. However, respondents show varying levels of confidence or uncertainty in dealing with administrative burdens in HR processes (60.7%), their capabilities in digitalizing HR practices (60.7%) and evaluating the growth of Sudan's public sector (55%). Despite these nuances, there is strong support for the Ministry's commitment to implementing digital solutions in HR (83.3%) and achieving its goals (80%), underscoring a collective aspiration to develop comprehensive educational competencies. These findings provide valuable insights for educators and stakeholders aiming to cultivate a supportive environment for the Ministry of Higher Education and Scientific Research in Sudan.

3.2 Descriptive Statistic

The table presents descriptive statistics on the challenges of digitalizing Human Resources Management in the Ministry of Higher Education and Scientific Research in Sudan, based on data from 150 higher education institutions. The descriptive statistics offer a comprehensive overview of how the Ministry of Higher Education institutions assess the difficulties associated with digitalizing Human Resources Management.

Table 2 Descriptive Statistics

Descriptive Statistics					
Title	N	Minimum	Maximum	Mean	Std. Deviation
The Challenges of Digitalization Human Resources Management in Sudan at the Ministry of Higher Education	150	15.00	75.00	60.2467	10.21509
Valid N (listwise)	150				

The sample size of 150 public employees indicates the breadth of the study's coverage, encompassing a diverse range of challenges. The minimum and maximum values recorded—15.00 and 75.00, respectively—highlight the spectrum of digitalization among the participants. This range suggests that while some respondents have relatively low perceptions of digitalizing Human Resources Management (as indicated by scores closer to 15.00), others perceive themselves quite highly, with scores approaching 75.00.

The mean score of 60.2467 serves as a central measure of the challenges associated with digitalizing Human Resources Management in the Ministry of Higher Education in Sudan. On average, respondents rate this digitalization effort around the public level, suggesting a generally positive outlook among the surveyed participants. However, the standard deviation of 10.21509 indicates significant variability in opinions. This variability implies that, while the average perception is positive, individual opinions vary widely. Some respondents view the digitalization efforts much more favorably than the mean, while others have greater concerns, contributing to the high standard deviation.

Analyzing the statistics provides valuable insights into the challenges, readiness, and proficiency of digitalization efforts within Sudan's Ministry of Higher Education and Scientific Research. Several key factors contribute to these challenges: the lack of technological infrastructure, insufficient public funding for human resource management (HRM) activities, and inadequate training programs. Recognizing these issues is essential for educators and policymakers who aim to enhance digital HRM education initiatives at the Ministry. By addressing these diverse challenges and building on positive assessments, the Ministry can better design its programs to nurture and develop a more innovative public sector in higher education among Sudanese institutions.

3.2.1 Reliability Test

Reliability testing is a method used to measure the consistency of a questionnaire, which serves as an indicator of a variable or construct. A questionnaire is considered reliable if an individual's responses to its questions are consistent and dependable over time. One common statistical test used to measure reliability is Cronbach's Alpha [13]. The questionnaire is deemed reliable if the Cronbach's Alpha value is greater than 0.60.

Reliability testing evaluates how well software operates under specific conditions for a set duration. This process identifies any design flaws that need to be corrected to ensure the software works properly [15]. In the context of questionnaires, a variable or construct is considered reliable if it achieves a Cronbach's Alpha value of over 0.64.

To ensure data reliability, we utilized the split-half reliability method during data collection. Experts communicated through emails and WhatsApp chats with Sudanese employees from various higher educational institutions. This approach helped us ask relevant questions and discuss the data collection process effectively. The researcher assessed the reliability of both independent and dependent research variables using the Split-Half method, which is recommended for evaluating internal consistency reliability.

Table 3 Results tested from the Total Variance (V-Aikan Index**)**

Source: Reliability Test Cronbach's Alpha Nunnally (1978)

Total s	71	68	53	73	72	73	73	65	64	73	73	71
n (number of experts)	20	20	20	20	20	20	20	20	20	20	20	20
c (number of categories)	5	5	5	5	5	5	5	5	5	5	5	5
c - 1	4	4	4	4	4	4	4	4	4	4	4	4
V = Total s/(n(c - 1))	0,888	0,85	0,663	0,913	0,9	0,913	0,913	0,813	0,8	0,9125	0,9125	0,888
The item is said to be valid when V is not less than 0.69 (for a significant level of 1%)	V	V	Not-V	V	V	V	V	V	V	V	V	V
The item is said to be valid when V is not less than 0.64 (for a significant level of 5%)	V	V	V	V	V	V	V	V	V	V	V	V

3.3   Reliability of the Instrument

After undergoing content validation by a panel of 20 experts, all items in the instrument were deemed valid and feasible for collecting data on the challenges of digitalizing human resource management in Sudan, particularly at the Ministry of Higher Education. In simpler terms, all items demonstrated good content validity and were deemed appropriate based on the specified indicators. Aiken's V was used to support this validity, with each item achieving a score of at least 0.64 at a significance level of 0.05. The Aiken content validity test in the index involves gathering results from multiple experts (n) who assess the items based on the opinions of twenty other experts, using the Aiken content validity index (Aiken, 1985). The validation process of the index begins with rating each item, either by N raters or a single rater, M. In the case of V, the scales of c were successfully assigned integer scores (e.g., 1, 2, 3, 4, 5). The validity data is obtained from the questionnaire items and relies on the honesty and responsibility of the respondents.

This method, as outlined by Nunnally (1978), measures the internal consistency of a research test and is widely used to assess variability in studies. The following formula was used based on the variance explained (V-Aikan Index Technique).

$V = \dfrac{S}{n(c-1)}$ 04, (Aiken, 1985)

$n(c-1)$: Information V = indeks validitas isi; S = the score assigned by each rater minus the lowest score in the category used. (S = r-l_o, where r = rater choice score and lo = lowest score in the scoring category.) n = number of raters c = the number of ratings or criteria V= s $\underline{0.64,}$ N (c-1), (Aiken index, 1985).

The researcher employed the V-Aiken index sampling technique to determine the sample size. This method involves a formula that considers several factors: the variance (V) of the population, the number of categories (c) being studied, the validity of the items (V-valid), and the desired confidence level. These components are integrated into a specific formula to accurately calculate the appropriate sample size for the research. Use the provided formula to calculate the descriptive statistics for each independent variable. Next, refer to the distribution table and select a significance level (α). Determine the degrees of descriptive statistics and then identify the critical value. Check if the absolute value of the calculated descriptive statistic is greater than the critical value. The formula to use is n=(c−1)^2 * V * S * 1+(0.642*Vvalid) / 0.642*Vvalid.

4   Conclusion

The digitalization of Human Resources Management (HRM) within the Ministry of Higher Education and Scientific Research in Sudan presents both transformative opportunities and significant challenges. This study has meticulously examined the multifaceted aspects of digitalizing HRM, focusing on the Ministry's efforts to modernize its processes amidst various obstacles.

The research highlights that while there is a strong consensus among respondents on the potential benefits of digital HR tools in reducing administrative burdens and enhancing employee satisfaction, several critical challenges persist. These include limited technological infrastructure, insufficient funding, inadequate training programs, and resistance to change among employees. The variability in respondents' perceptions, as indicated by the descriptive statistics, underscores the diverse experiences and readiness levels within the Ministry.

The study's objectives were to evaluate the effectiveness of HRM in Sudan's public sector, align HRM objectives with strategies that enhance employee potential, and assess the impact of digitalization on traditional and strategic HRM functions. The findings reveal that despite the positive outlook towards digitalization, significant efforts are required to address the infrastructural and educational gaps that hinder the effective implementation of digital HRM systems.

The survey results further emphasize the importance of a clear policy framework and sufficient financial resources to support digital HR initiatives. The high level of agreement among respondents on the need for digital skills and the recognition of networking as a crucial element for HR digitalization highlight the Ministry's commitment to fostering a digitally adept workforce. However, the notable proportion of neutral responses indicates areas where further clarity and support are needed.

In conclusion, the digitalization of HRM in Sudan's Ministry of Higher Education and Scientific Research is a complex yet essential endeavour. Addressing the identified challenges through targeted investments in technology, training, and policy development will be crucial for the Ministry to fully realize the benefits of digital HRM. By leveraging these insights, educators and policymakers can create a supportive environment that enhances the Ministry's capacity to innovate and improve its HRM practices, ultimately contributing to the broader goal of advancing higher education in Sudan.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest.

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