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Case of Moroccan Human Resources Management in the Digital Era: Bibliometric data and systematic review of digital capital, application domains, positive impacts, limits, and perspectives.

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Abstract

This systematic review and bibliometric analysis aims to synthesize findings on digital transformation within the Moroccan human resources landscape. A comprehensive literature review (2010-2025) was conducted, focusing on the intersection of human resources and digital technologies in Morocco. Data were extracted from databases, official government websites, and published documents using relevant search keywords. In total, 3294 documents were recorded, including 28 from Morocco. The analysis reveals a widespread integration of digital technologies across diverse Moroccan sectors, including administration, education, finance, healthcare, agriculture, climatology, and urban development. Notably, the administration sector exhibits a prominent adoption of digital tools for HRM. These technologies, encompassing enterprise resource planning, big data analytics, data security measures, mobile technology, and social networks, have demonstrated positive impacts. Furthermore, digital technologies have streamlined recruitment processes, career management, training programs, and skill development. However, the implementation of dematerialization can induce anxiety among employees who perceive changes and potential job displacement. Consequently, organizations must proactively address change resistance during the planning stages of digitalization. Active employee participation is essential to mitigate adaptation and learning costs, thereby preserving the value generated by the transformation. We emphasize the necessity of adopting an integrated and holistic approach that considers both technological and human factors, effectively aligning the drive for change with the execution of digital transformation. The findings reveal that digital capital is a key driver for modernizing HRM in Morocco, offering significant gains in operational efficiency and employee engagement. However, the study also highlights that technological barriers and the need for cultural adaptation remain major challenges. Ultimately, this research provides a roadmap for Moroccan organizations to successfully integrate digital tools while overcoming current structural limits.

Keywords: Application, digital technologies, human resources, improvement of management, Morocco.

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1. Introduction

The contemporary era, often designated the "digital age," has underscored the critical imperative of digital transformation for organizations worldwide (Khanom, 2023). Emerging technologies, including cloud computing, 5G networks, blockchain, artificial intelligence, big data analytics, and the Internet of Things (IoT), are fundamentally reshaping and driving contemporary work practices (Yu & Chi, 2020). To navigate and adapt to the rapidly evolving landscape precipitated by the full maturation of the digital era, businesses must strategically recalibrate their operational models (Bagnoli et al., 2022).

Digital transformation has compelled a fundamental shift in organizational processes, elevating it to an indispensable component of strategic corporate planning (Ghosh et al., 2022). Empirical research indicates that the ramifications of digital transformation significantly influence consumer expectations, behavior, and evaluations of products and services (Verhoef et al., 2021). Consequently, numerous enterprises recognize the necessity to revise their business strategies to sustain a competitive advantage, accommodate dynamic market conditions, and proactively manage the digital transformation within their respective industries (Agustian et al., 2023).

The COVID-19 pandemic catalyzed a profound reassessment of organizational claims regarding digital transformation (Stalmachova et al., 2022). While pre-pandemic discourse may have emphasized rapid expansion, the pandemic starkly illustrated the existential necessity of digital integration, specifically the convergence of online and offline operations (Yu & Chi, 2020). Failure to effectively implement such digital strategies now poses a significant threat to business viability.

Digital transformation has permeated all facets of contemporary life, significantly impacting Human Resource Management (HRM) responsibilities and practices (Chen & Zhang, 2024; Schmid & Pscherer, 2021). The continuous evolution of digital technologies has fundamentally altered the interaction between human resources and data/information (Vahdat, 2021). Notably, core HRM processes, including recruitment, performance evaluation, and human resource development, have undergone substantial transformations, enhancing stakeholder service delivery through the strategic application of digital tools (Vrontis et al., 2023).

Digital HRM has demonstrated the capacity to enhance productivity and streamline operational efficiency (Mosca, 2020). (Démeijer, 2017) posits that the digital revolution has expedited and optimized HRM processes, enabling HR professionals to focus on strategic initiatives within their functional domains (Geethanjali et al., 2024). Consequently, digital HRM methodologies

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are gaining prominence, becoming essential for informing HR strategy and overall organizational direction (da Silva et al., 2022).

However, scholars such as (Strohmeier, 2014) have highlighted the challenges that HRM will confront in the wake of digital transformation, focusing on the implications of these changes. In light of recent technological advancements, a comprehensive understanding of the concept, drivers, transformation trajectories, and implications of digital HRM is imperative (Bansal et al., 2023). Nevertheless, contemporary research indicates a relative paucity of literature specifically addressing advancements in digital HRM, with a predominant focus on digital innovation in sales, business, industry, and general organizational management (Vardarlier & Ozsahin, 2021). The perceived marginality of HRM within organizational management may contribute to challenges in attracting leadership attention (Budhwar et al., 2023). Furthermore, innovative business interests rarely intersect with HRM discourse.

In the context of Morocco, research on Human Resource Development (HRD) and HRM practices remains limited, both domestically and internationally (Hassi, 2016). Researchers from Western nations often encounter difficulties accessing studies documenting Moroccan HR practices, which are predominantly recent and conducted by consulting firms (P. G. Benson & Al Arkoubi, 2006; Cox et al., 2005; Forster, 2014; Hassi, 2016). The historical prevalence of small businesses and the nation's significant industrial base have contributed to a slower evolution of HR practices compared to those in the USA and Europe (El Baz et al., 2016). Consequently, the literature on the history of digital technologies in Moroccan HR is sparse, with limited sources addressing specific HR functions, such as the evolution of labor laws (Hassi, 2016; Latif, 2023). The limited empirical research on applied digital technologies in Moroccan HR restricts the scope of conclusive findings. The majority of reliable information on professional HR practices in Morocco is derived from recent, unpublished consulting reports (Moustaghfir et al., 2020). Similarly, the available information on the digitization of HRM remains incomplete. Therefore, a comprehensive review study is warranted to synthesize existing data, experiences, and applied digital technologies within this domain.

This study aimed to review existing data on human resources and the integration of digital technologies in Morocco during the last decade. A literature review on human resources and their management in Morocco was presented, discussing the digital technologies applied in this field. Current data on human resources, their management in Morocco, and the integration of digital technologies were also presented. The impacts of digital technologies on the management and performance of human resources were evaluated. Finally, the challenges,

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limits, and perspectives of digital technologies in the management of human resources were discussed. This study is suggested to clarify the integration level of digital technologies for the management of human resources in Morocco, which is capable of orienting future research and applications in the same field.

This research focuses on Human Resources Management (HRM) in Morocco within the context of the digital era, a field that is currently undergoing significant transformation. The main objective of this study is to provide a comprehensive bibliometric analysis and a systematic review of digital capital, exploring its application domains, positive impacts, existing limits, and future perspectives. To achieve this, the paper is organized as follows: first, it presents the methodology used for the bibliometric data collection; second, it discusses the various application domains and impacts of digital HRM in the Moroccan context; third, it highlights the current challenges and limits; and finally, it concludes by offering strategic perspectives for future research and practice.

2. Literature review

2.1.Digital technology

It's important to distinguish between digitalization and digital transformation. Digitalization refers to the process of converting analog information into a digital format, enabling it to be processed by computer systems (Murphy, 2018). (Zaki, 2019) defines digital transformation more broadly as the strategic shift towards digital variants of products and services, offering significant advantages over their tangible counterparts. Implementing digital tools within an organization is one aspect of digitalization, while developing innovative business models and long-term corporate strategies constitutes a more comprehensive approach (Bican & Brem, 2020).

Digital technologies encompass a wide range of tools, including the Internet of Things (IoT), blockchain, big data analytics, artificial intelligence (AI), cloud computing, additive manufacturing, and augmented/virtual reality (AR/VR) (Rindfleisch et al., 2017). While some of these technologies, such as cloud computing, are already widely adopted, others may remain niche or evolve into unforeseen combinations. Digitalization, as defined by (Verhoef et al., 2021), involves leveraging digital technology to reshape existing organizational practices. This transformation necessitates the integration of digital technology, as it catalyzes the establishment of a new, digitally enabled organizational structure. Information technology plays a crucial role in HRM operations, facilitating innovation and streamlining business process relationship management within the digital sphere, thereby enhancing organizational

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efficiency (Leviäkangas, 2016). (Pagani & Pardo, 2017) further highlight that digitalization improves customer experience and optimizes business processes. Consequently, digital technologies not only reduce operational costs but also enhance the internal service customer experience.

Digital transformation is defined as a fundamental organizational shift, propelled, implemented, or sustained by digital technologies, that restructures core business operations (Bilgeri et al., 2017; Heilig et al., 2017). This process ultimately involves the strategic deployment of digital initiatives to enact significant business management reforms, resulting in substantial transformations across the organization or sector (Figure 2). Digital transformation fundamentally alters the entirety of organizational operations, particularly business processes and activities (Amit & Zott, 2001). Furthermore, this transformation enables organizations to enhance their engagement with external stakeholders through the strategic application of advanced technologies (Singh et al., 2020). Consequently, digital technologies can catalyze achieving competitive advantage by leveraging existing core competencies or fostering the development of new capabilities. The integration of digital technologies has forged a strong correlation between digital transformation and strategic business model evolution (Sebastian et al., 2020).

In essence, the concept of digital transformation is widely embraced by organizations aiming to fundamentally reshape their business models through the implementation of cutting-edge digital technologies. Businesses must carefully balance the integration of novel business models with their existing operational frameworks to achieve successful digital transformation. As digital transformation progresses, existing business models may become outdated (Teece, 2010). Organizations must therefore strategically transition from incremental digital implementations to the adoption of entirely new digital business models, necessitating a comprehensive transformation of current operations.

Digitization, digital innovation, and digital transformation are interrelated and closely intertwined concepts, all fundamentally reliant on digital technology. [1] Specifically, the outcomes of digital innovation, during their diffusion phase, can lead to digitalization through widespread adoption (Fichman et al., 2014). Moreover, it is posited that digital innovation and digitalization can precipitate significant alterations in established business practices (Osmundsen et al., 2018).

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2.2.Digitalization of Human Capital

"Using computer systems, telecommunication networks, and interactive electronic media" to perform human resource tasks is the definition of digital human resources given by (Vardarlier, 2020) (Figure 3). Digital transformation should be seen as a process, agrees (Ketolainen, 2018) "A process of change in which human resources transforms to digital to be data-driven and automated" is how he characterizes the transition to digital HR. The evolution of human resource operations is made feasible by digital technology (Chen & Zhang, 2024).

A digital human resource management (HRM) strategy, as defined by (Bharadwaj et al., 2013), represents a human capital plan designed and executed to maximize an organization's digital capabilities and generate value. This can be understood as the integration of technological resources with HRM practices, encompassing the development and implementation of HRM strategies that are firmly rooted in digital potential and deliver strategic advantages to the organization.

(Zhang et al., 2022) identify "drivers" as external or internal factors that motivate an organization to pursue digital transformation. These drivers are essential prerequisites for the effective digital transformation of HRM, significantly influencing the outcome of this process (Mosca, 2020). In the contemporary digital age, characterized by increasing environmental instability, organizations face growing pressure to enhance service delivery to their internal stakeholders (Schmidt et al., 2017). To effectively capitalize on the benefits of digital transformation, a strategic approach to HRM digitalization is imperative (Osmundsen et al., 2018). Therefore, a thorough examination of the drivers propelling the digital transformation of HRM is warranted.

3. Materials and methods

3.1.Design and materials

The selected applied research methods, Systematic Literature Review (SLR) and Bibliometric Analysis, are in line with the stated goal of this study. Quantitative information about publications, sources, authors, organizations, nations, keywords, topics, and trends is generated by them. This methodology, which is thought to be appropriate for collecting complex academic data, supports the state and trends of digital transformation of Moroccan human resources.

The Systematic Literature Review (SLR) process is "structured, reproducible, transparent, and iterative in nature," according to Abdullah and Naved Khan (2021). For this reason, we have selected a few specialized works and carried out an SLR. Additionally, it provides an impartial basis for eliminating irrelevant studies. The whole texts and abstracts of the products that are

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the focus of this scientific inquiry have been reviewed. The idea that traditional literature evaluations are defective because of the subjectivity of the writers is another argument in support of SLR (Tranfield et al. 2003). Because the classification and summary of the material were done with a clear objective, research questions, search methodologies, and inclusion and exclusion criteria in the search, the scientific publications can be given a high rating.

Defining the keywords, phrases, and search box for the database. Keywords and terms for searching the databases were defined following a panel discussion between the research authors and specialists in the field of medicinal plants. Throughout the data collection phase, a variety of search techniques are used for searching and extraction, such as Booleans, the usage of quote marks and parentheses, and truncations. The medicinal plants are connected to the keywords that were selected. The proper use of the Boolean operators AND and OR has been made. In 2025, a database query based on these keywords was executed in a specific field (titles, abstracts, and keywords).

3.2.Research method

This study focused on the digital transformation of Moroccan human resources, specifically examining the integration of digital technologies to enhance human capital and associated services. A comprehensive literature review was conducted, utilizing electronic databases and search engines including Scopus, ScienceDirect, PubMed, Public Library of Science (PLOS), JSTOR, Google Scholar, Web of Science, and the Washington State University (WSU) online database (PubChem) (Figure 4). To achieve the study's objectives, a combination of relevant keywords was employed, focusing on digital transformation within the Moroccan context, particularly its application in human resource management. Keywords related to digital transformation, technologies, computer systems, telecommunication networks, interactive electronic media, artificial intelligence, machine learning, applications, case studies, Morocco, impacts, limitations, and perspectives were utilized, both individually and in combination. The literature search encompassed publications from 2010 to 2025, with articles in both English and French.

3.3.Selection and exclusion standards

Retrieved research documents underwent a thorough screening process, with relevant information extracted from titles, abstracts, conclusions, results, and introductions. The collected documents were systematically organized based on language (English and French), publication year, and geographical focus, reflecting the principal languages of scientific research and official publications within Morocco. The selection criteria emphasized rigorous

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peer review, verified content, source quality, and relevance to the study's objectives. Conversely, publications outside the designated timeframe of 2010–2025, as well as those lacking sufficient content, verification, or peer review, were excluded. Following this meticulous evaluation, 28 papers were deemed suitable for inclusion, reflecting the stringent application of the research approach. Conversely, 3266 documents were excluded due to their irrelevance. First, 3294 were recorded at the beginning of the research. Second, only 3239 documents were found in 2010-2025. When related to keywords, 1667 documents were found (related to digital transformation and human resources). At the end, 28 documents were found when limited to Morocco.

In this study, we selected the criteria using the search filters suggested by the Scopus database. The following are the alternatives for the chosen criteria that restrict the sample (Figure x):

1. Type of Access: All (open access and non-open access);
2. Year: we have selected a period of published documents between 2010 and 2025;
3. Subject area: We have selected all subject areas;
4. Document Type: We are interested in all documents;
5. Publication Stage: only complete documents with the option Final are selected;
6. Source Type: We have selected documents published in journals and databases;
7. Language: The research encompasses documents in all languages.

Table 1: Selection criteria

Category	**Description / Criteria**	**Details / Results**
Initial Records Retrieved	Total documents identified at the beginning of the search	3,294
Documents within 2010–2025	Filtered by publication year	3,239
Keyword Filtering	Related to *digital transformation* and *human resources*	1,667
Final Selection (Focused on Morocco)	After applying the inclusion criteria	28
Excluded Documents	Not relevant or not meeting inclusion criteria	3,266

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Data Extraction Sources	Information gathered from	Titles, abstracts, results, introductions, and conclusions
Organization Criteria	Documents classified by	Language (English/French), year, geographical focus
Inclusion Criteria	Based on	Peer-reviewed quality, verified content, source reliability, relevance to objectives
Exclusion Criteria	Based on	Out of 2010–2025 range, insufficient content, unverified or non-peer-reviewed
Database Used	Main source of documents	Databases and research engines
Search Filters Applied	Access type, year, subject area, document type, publication stage, source type, language	- All access types
		- 2010–2025
		- All subject areas
		- All document types
		- Final publication stage
		- Journal and database sources
		- All languages

4. Results

4.1.Bibliometric data

Documents

The data indicate a progressive increase in the number of documents published over recent years, reflecting a growing research interest in the topic (Figure A). From only one publication in 2018, the output rose steadily to 11 in 2025, showing a notable acceleration after 2022. The absence of publications in 2019 and low counts before 2023 suggest limited early engagement.

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However, the sharp rise in 2024–2025 highlights a recent intensification of scholarly activity and expanding recognition of the field's importance.

The results show that conference papers dominate the recorded documents with 15 publications (Figure B), indicating a preference for presenting preliminary or ongoing research at academic events. Articles follow eight publications, reflecting peer-reviewed dissemination of more mature studies. Book chapters (four) and books (one) are less frequent, suggesting limited synthesis or comprehensive coverage of the topic. Overall, the data highlight that research in this field is primarily shared through conferences rather than extended academic formats.

The analysis reveals a clear dominance of English as the primary language of publication, accounting for 27 of 28 documents (Figure C). This strong prevalence reflects the global trend toward English as the main medium for scientific communication and dissemination. In contrast, only one document is published in French, indicating limited use of national or regional languages in academic outputs. Such linguistic concentration enhances international visibility but may restrict accessibility for local researchers and communities.

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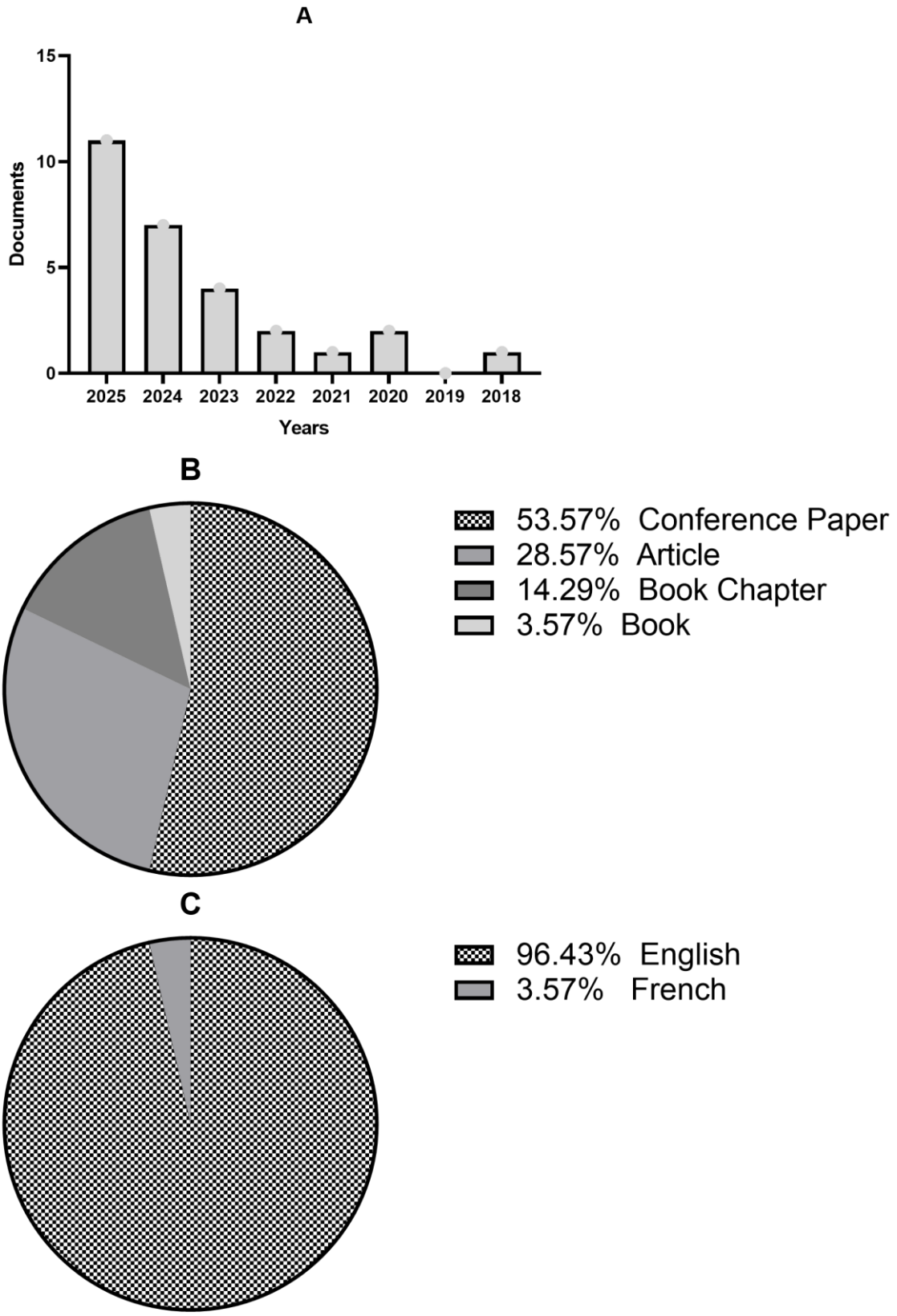

Figure: Bibliometric data on the digital transformation of human resources in Morocco from 2010 to 2025 (A: Recorded documents; B: Type of documents; C: Languages of document)

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Research area

The distribution of documents by subject area shows a clear predominance of Computer Science with 20 publications, followed by Decision Sciences (10) and Engineering (9), indicating a strong focus on technological and analytical disciplines (Figure). Mathematics and Business, Management and Accounting also contribute notably, reflecting interdisciplinary links between computation, modeling, and management. Fewer studies appear in fields such as Medicine, Social Sciences, and Environmental Science, suggesting limited integration of applied or human-centered perspectives. Overall, research activity is concentrated in technical domains, highlighting a technology-driven research orientation.

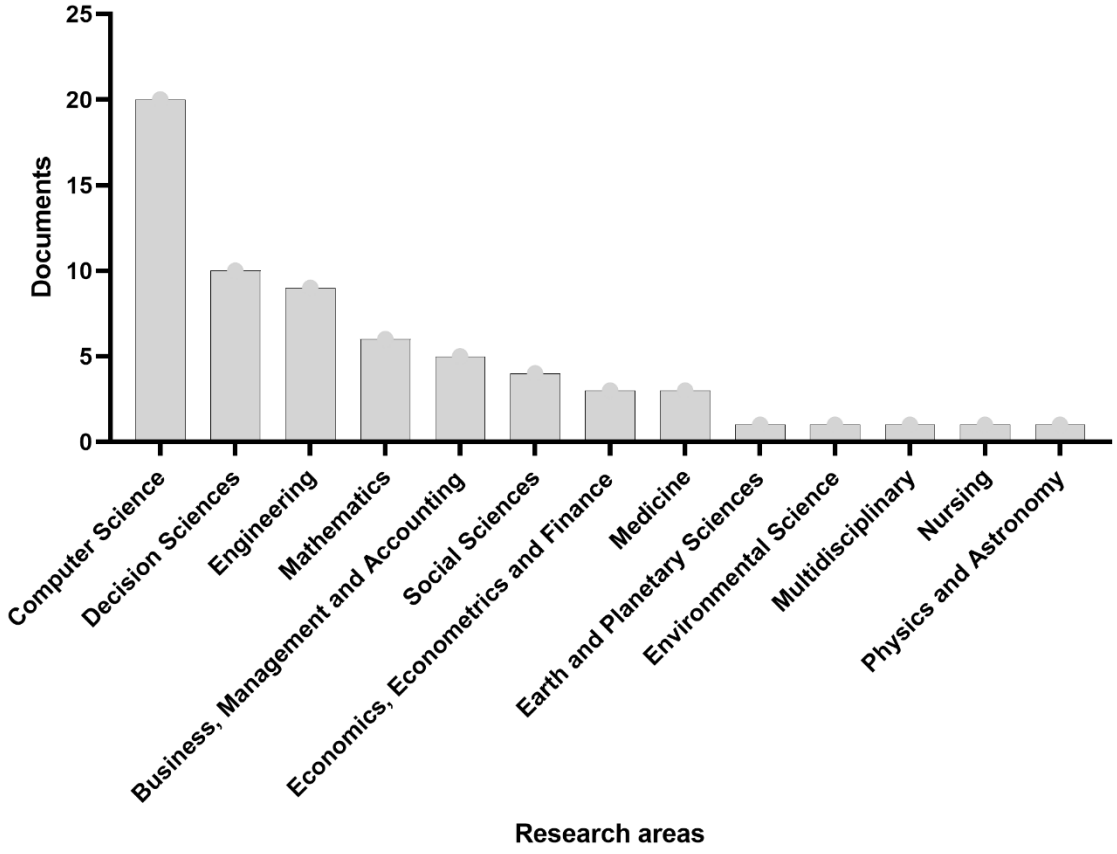

Figure: Research areas

Authors and affiliations

The authorship data show that El Hammoumi, A. is the most productive contributor with three documents, indicating a leading role in this research field. Khanboubi, F. and Manal, B.A. follow with two publications each, suggesting consistent engagement and collaboration (Figure). The remaining authors, each with one publication, reflect a broader but less frequent participation. Overall, the distribution points to a small core of active researchers supported by a wider network of occasional contributors.

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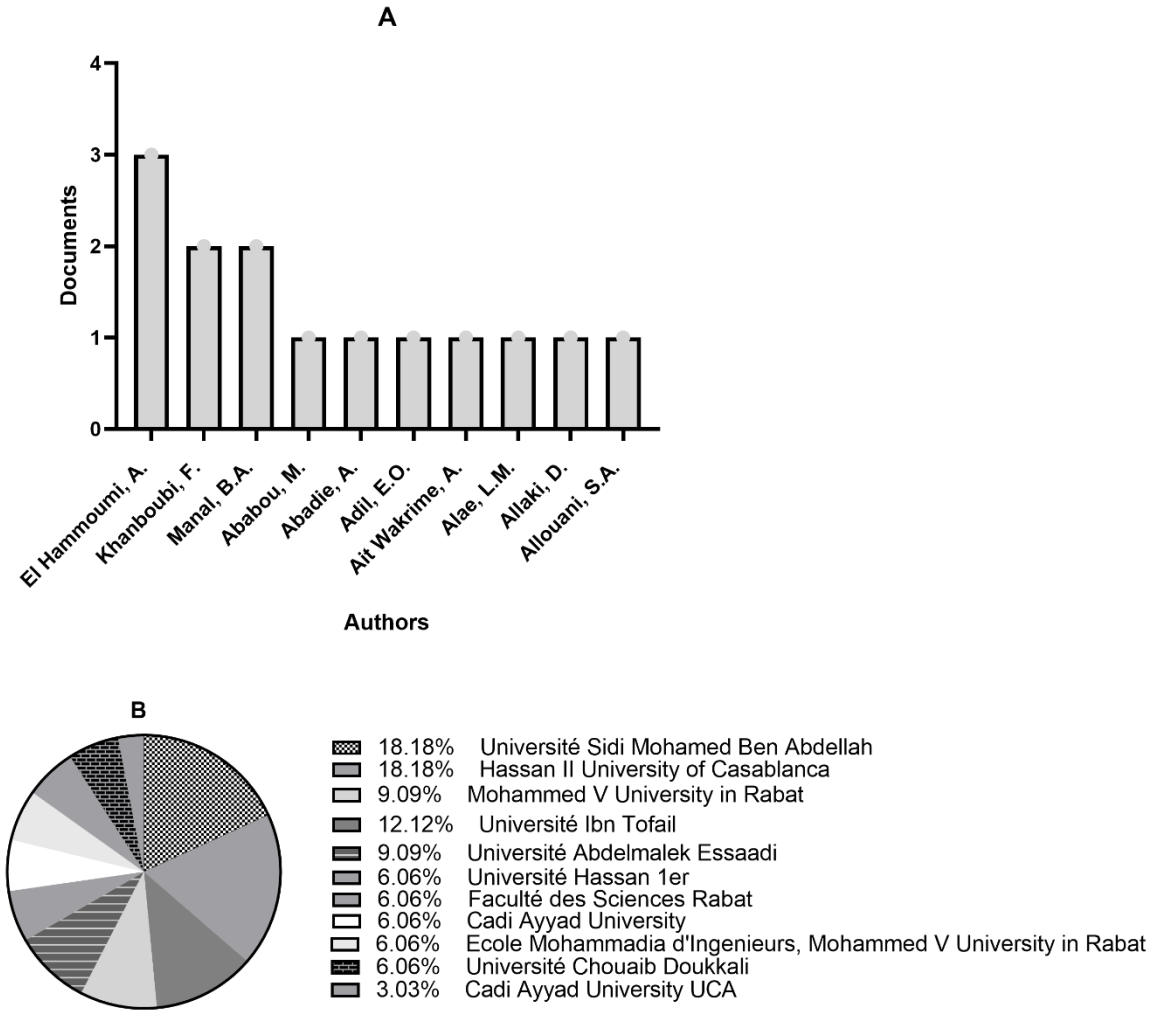

Figure: Authors (A) and affiliations (B)

The affiliation analysis indicates that Université Sidi Mohamed Ben Abdellah and Hassan II University of Casablanca are the most productive institutions, each contributing six documents, highlighting their leadership in this field of research. They are followed by Université Ibn Tofail (4) and Mohammed V University in Rabat (3), reflecting their active involvement in scientific production. Several other Moroccan universities, such as Abdelmalek Essaadi, Hassan 1er, and Cadi Ayyad, show moderate participation, while international collaborations remain limited. Overall, Moroccan universities dominate the research landscape, underscoring national academic engagement and institutional diversity.

3.1.Human resources in Morocco

Research on Human Resource Development (HRD) and Human Resource Management (HRM) activities in Morocco remains limited, both domestically and internationally, highlighting a

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significant gap in professional literature (Hassi, 2016). Studies on Moroccan HR practices are often conducted by consulting firms, are relatively recent, and pose challenges for Western scholars to access (P. G. Benson & Al Arkoubi, 2006). Furthermore, the evolution of HR practices in Morocco has lagged behind those in the United States and Europe, potentially due to the country's substantial industrial base and the historical prevalence of small and medium-sized enterprises (SMEs) (El Baz et al., 2016). While a comprehensive historical documentation of Moroccan HRM/HRD is lacking, some studies have explored the development of specific HR functions, such as labor regulations (Ashford, 2015; Hassi, 2016). The paucity of empirical research on contemporary HR practices in Morocco further limits the scope of definitive conclusions.

Despite these limitations, certain contextual factors are noteworthy. While the professionalization of HR has a long-established history in the United States (Goldin, 2024), the field is relatively nascent in Morocco (Bouhazzama & Mssassi, 2022). In contrast to the long-standing organizations in developed countries, such as the Society for Human Resource Management (SHRM) in the US (Kadam et al., 2022), the primary HR professional association in Morocco, l'Association des Gestionnaires et Formateurs du Personnel (AGEF), was formally established in 1971. However, despite its relatively recent formation, AGEF demonstrates a keen awareness of industry advancements through its annual events.

Morocco's political and economic openness has fostered increased competitiveness through the adoption of improved human resource practices. Multinational corporations have played a leading role in introducing and demonstrating Western HR practices. The shift from "Personnel Manager" to "Human Resource Manager" in the 1990s signaled a willingness among many Moroccan public and private companies to embrace modern HR concepts. However, the extent to which these Western practices have been fully integrated remains unclear. The majority of reliable information on professional HR practices in Morocco is derived from recent, unpublished consulting reports (Andersen, 2000; DIORH, 2002, p. 4).

The structure and sophistication of HR departments in Moroccan firms vary significantly with company size. SMEs typically operate with rudimentary HR functions, primarily at the administrative level. Drawing on the Western context, Mathis & Jackson (2010) distinguish between administrative, employee advocacy, operational, and strategic HR roles. The analysis suggests that Moroccan SMEs primarily focus on administrative (and to some extent, operational) functions. This aligns with Tyson's (1995) characterization of this role as "clerk of works" rather than the strategic "architect role." In traditional Moroccan organizations, HR

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functions, if present, are often limited to day-to-day management, frequently overseen by the finance manager or accountant. This dual responsibility reflects a perception of HR as a cost center, leading to a focus on cost-saving measures, particularly in compensation management. The strategic potential of HRM in performance management and organizational adaptation to market demands, where human capital can provide a competitive advantage (Porter, 2001), is often overlooked. Consequently, there is a lack of strategic, forward-thinking HR practices, raising concerns about these organizations' capacity to effectively address environmental challenges and opportunities.

A significant challenge in Moroccan small and medium-sized enterprises (SMEs) stems from the lack of formal managerial training among their leadership. These enterprises are predominantly family-owned and operated, with managers often lacking formal education or university experience and demonstrating a limited appreciation for strategic planning. Consequently, even when the importance of strategic HR thinking is recognized, SMEs face challenges in acquiring the necessary expertise. The cost of hiring qualified professionals in the short term is often prohibitive and may not yield immediate results, as organizational restructuring and HR policy development are long-term endeavors. The "upgrading policy" (la mise à niveau) has been implemented to address some of these issues, with gradual progress observed.

Key Factors Influencing HRM Practices in the Moroccan Context:

National Culture:

Understanding the political dynamics of Moroccan institutions is essential for comprehending the prevalent administrative practices within the nation. The political influence on organizational life is particularly evident in the public sector, where the organization reflects the monarchical structure. The King's perceived "baraka," roughly translated as charisma, shapes organizational culture (P. Benson, 2004; Munson, 1993). (Al-Arkoubi & McCourt, 2004) emphasize that the palace remains the central locus of authority within the Moroccan political system.

Institutions:

A robust legal system is indispensable for a functional institutional framework. In Morocco, the labor law, known as the "Loi du Travail," is relatively recent. While a comprehensive analysis of this legislation is beyond the scope of this paper, a general overview is pertinent. (Al Arkoubi

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& Benson, 2005) provide a detailed examination of this law. A pivotal development occurred in December 2003 with the promulgation of the Moroccan Labor Code, following 25 years of legislative debate. This law, which came into effect on June 7, 2004, offers several advantages. Firstly, it establishes a clear legal framework, which is expected to attract international investors who previously perceived Morocco's legal ambiguity as a significant barrier to investment. Secondly, it fosters opportunities for stakeholder engagement in social discourse and introduces innovative approaches to managing social relationships. The code is also notable for its alignment with human rights declarations, constitutional law, and international labor conventions ratified by Morocco. The legal framework significantly reinforces the protection of human rights in the workplace. The Labor Code, comprising 589 articles, addresses seven primary areas: workplace conditions, intermediation (employment agencies), control mechanisms, collective conflict resolution, trade unions and employee representation, individual and collective labor relations, and other regulatory provisions. While the majority of workers are covered, government employees, military personnel, mine workers, film industry workers, journalists, domestic workers, and concierges are excluded. Sixteen implementing decrees have been issued, with over thirty more anticipated.

3.2.Integration of Digital Technologies in Morocco

The Moroccan administrative systems' digital transformation has evolved steadily on both a structural and functional level. Comparing public administration to traditional administration, several initiatives have produced notable qualitative improvements, such as better governance metrics and better public services for professionals and users.

4.2.1.Digital HRM Processes

Contemporary organizations must establish comprehensive, integrated HRM processes and redefine the role of HRM operations through the strategic implementation of digital technology and digital operational frameworks. Digital transformation is expected to yield significant enhancements in HRM performance, training and development, selection processes, and overall service quality (Betchoo, 2016).

4.2.2.Talent Selection

Digital HRM methodologies have significantly streamlined the candidate selection process, facilitating the assessment of required skill sets and the identification of suitable hires. (DiRomualdo et al., 2018) observe that the integration of digital technologies in HRM is currently most prevalent in recruitment and staffing.

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The pervasive adoption of the internet has profoundly transformed recruitment practices (Vardarlier, 2020). Traditional recruitment channels, such as newspaper advertisements and job postings, have been largely supplanted by online platforms, including professional networking and employment websites.

Social networking platforms, such as Facebook, Glassdoor, and LinkedIn, have emerged as indispensable recruitment tools for organizations and job seekers alike (Tripathi & Kushwaha, 2017). These platforms enable recruiters to expand their reach to a wider pool of potential candidates, increasing the likelihood of identifying qualified individuals. Social media facilitates efficient and cost-effective access to skilled talent.

Furthermore, artificial intelligence (AI) is increasingly integrated into the recruitment process. Big data analytics and intelligent technologies, employing precise profiling and sophisticated algorithms, are widely utilized for candidate sourcing and selection. Predictive models for job compatibility and organizational fit are also becoming more refined (Yu & Chi, 2020). Online, video, and voice interviews, facilitated by various algorithms, are now commonplace. Voice and expression analysis algorithms can even be used to predict candidate adaptability (A. D. Benson et al., 2002). However, advancements in digital technologies have enabled greater flexibility and integration, fundamentally transforming the future landscape of training and development.

The evolution of digital technology has propelled the prominence of e-learning. Electronic media, particularly computers, are now the dominant platforms for e-learning delivery (Vardarlier, 2020). Moreover, adaptive learning, integrated with artificial intelligence (AI), represents the emerging trend in digital learning. AI-driven individualized training, employing tailored learning pathways and development strategies, fosters a high-performance learning environment while promoting creativity (Evseeva et al., 2019).

Corporate digital training programs typically comprise a suite of interconnected systems (Vardarlier, 2020). Implementing such systems allows organizations to establish a diverse training repository, enabling employees to select personalized training modules, schedule training sessions at their convenience, and access localized training materials. This facilitates more efficient onboarding and training of new personnel (Nawaz, 2017). Remote access to organizational data and training resources reduces the need for one-on-one training sessions for every new hire. Furthermore, organizations can establish comprehensive databases encompassing employee turnover, financial performance, employee performance metrics, and absenteeism rates (Vardarlier, 2020).

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4..2.3. Evaluative Functions

Talent inventory, assessment, and motivation are integral evaluative functions within HRM. The increasing reliance on data platforms for employee behavior tracking enhances the accuracy of these evaluations. This trend signifies a shift towards data-driven documentation and analysis of employee behavior and performance (Yu & Chi, 2020). Effective data utilization is crucial for the development and implementation of informed decisions. The integration of operational data into the digital environment facilitates this process (Vardarlier, 2020). This integration often involves creating personalized data accounts for employees, encompassing information such as attendance records, attitude surveys, competency assessments, and workplace conduct (Yu & Chi, 2020).

The era of "big data" presents numerous opportunities for HRM (Vardarlier, 2020). Big data analysis transforms raw information into actionable and valuable insights. When integrating digital systems, it is essential to define the specific data required for big data objectives and to select appropriate technologies for data collection and analysis. Comparing the continuously expanding volume of data with historical data facilitates the generation of relevant insights for HRM policymaking. The collection and analysis of employee data are gaining increasing prominence among HR managers and CEOs globally. By leveraging big data and data mining techniques within the HRM domain, organizations can utilize evidence-based information, conduct predictive analysis, and enhance the return on HR investment, transforming HR data into operationally profitable solutions (Evseeva et al., 2019).

4.2.4. Digital Employee Services

The primary objective of HRM extends beyond administrative tasks, focusing on ensuring that employees contribute effectively to organizational success (Thite, 2022). In the current era of digital innovation, HRM departments globally are leveraging digital applications, artificial intelligence, and chatbots to create "employee experience platforms" that cater to evolving employee expectations.

The strategic deployment of digital technologies across all HRM functions enables organizations to meet employee needs effectively, offering advantages in terms of cost efficiency, service quality, and response timeliness. Digital service centers facilitate the delivery of efficient, high-quality, and diverse employee services, aligning with the objectives of cost reduction, enhanced employee experience, and increased commitment (Ladkin & Buhalis, 2016).

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Organizations are utilizing digital technologies to provide comprehensive lifecycle support and a wealth of employee service resources. This entails the development of advanced digital service systems that encompass the entire employee journey, from onboarding to offboarding. These systems automate HRM tasks, enabling faster and more accurate data input and output compared to manual processes (Yu & Chi, 2020). As the boundaries between work and personal life become increasingly blurred, forward-thinking organizations are expanding their employee service offerings to include aspects of employees' personal lives, such as travel, housing, and marriage, aiming to enhance employee satisfaction and engagement.

To deliver optimal digital experiences, organizations are adopting omnichannel and intelligent service approaches. These approaches leverage digital technologies to provide seamless and accessible services. Through careful analysis of employee service scenarios, organizations are implementing web portals, mobile applications, social media platforms, self-service kiosks, and call centers, enabling employees to access services anytime, anywhere. Intelligent services, powered by technologies such as smart robotics and semantic analysis, facilitate highly personalized and efficient digital service delivery.

4.3. Application of DT in the management of HR

4.3.1. Cases

4.3.1.1. Public services

The digitization of human resource management has consistently been a strategic priority for public administrations (El Ouaghlidi et al., 2024). [1] It has now emerged as a critical strategic imperative, necessitating a fundamental shift in working methodologies and the skillsets of HR professionals. [2] This transition represents a significant technological transformation for Moroccan public administrations (Brahim, 2024), challenging traditional approaches to HR-related responsibilities. Despite facing various challenges, the HR department is striving to function as both an administrative expert and a strategic partner. The implementation of a human resources information system (HRIS) is perceived as the most effective digital solution to facilitate this transformation (El Ouaghlidi et al., 2024). This strategic approach is viewed as a means to overcome past obstacles and enhance the overall performance of HR services.

4.3.2.2. Finance Sector

The service sector, a driving force behind the digital revolution, is witnessing an accelerated adoption of digitalization (Gupchup, 2024). [1] Financial institutions, in particular, are at the forefront of this transformation due to their extensive reliance on technology. [2] However, while these digital tools offer numerous advantages, credit institutions are disproportionately

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vulnerable to technological disruptions. (Seghyar et al., 2024) conducted a quantitative study to evaluate the impact of digitalization on human resources within the Moroccan banking sector. Utilizing descriptive statistical analysis, the study analyzed 228 of the 345 distributed questionnaires.

4.3.2. Impacts

4.3.2.1. Impact on Performance

A digitally transformed HRM framework is equipped to leverage digital technologies more effectively, driving enhanced organizational performance (Manoharan, 2024). Digital integration of HRM business processes leads to improved transparency, cost tracking, and information systems activity performance (Osmundsen et al., 2018). It facilitates the implementation of digital HRM strategies that promote modularity and process optimization, while also fostering the adoption of innovative ideas and novel approaches. Digital HRM offers several advantages, including reduced bureaucratic overhead, cost savings, enhanced value creation, and increased productivity through organizational efficiency (Vardarlier, 2020). It elevates HRM output, streamlines repetitive operational processes, and allows HR professionals to focus on strategic initiatives that contribute to organizational growth. The speed and accessibility of digital HRM systems make them the preferred choice for organizations and their management, empowering employees to improve their performance and skill sets (Öğe, 2004).

However, the challenge of envisioning digital HRM and the necessity of adopting a long-term perspective when evaluating the outcomes of digital transformation are critical considerations (Bondarouk & Brewster, 2016). The authors argue that "good digital HRM includes actions and policies that are conducive to the long-term success and survival of a company, not just generating shorter-term returns for shareholders." Therefore, the performance outcomes of HRM digital transformation must be assessed through the lens of sustained, long-term benefits.

5.3.2.2.*Public administrations*

The digitization of human resource management (HRM) has become a strategic priority for public governments (Brahim, 2024). This technological revolution in Moroccan public administrations necessitates a shift in HR working methods and competencies (Seghyar et al., 2024). It challenges traditional HR practices, requiring HR to function as both a strategic partner and an administrative expert. The implementation of a human resources information system (HRIS) is considered the optimal digital approach to overcome obstacles and improve HR service performance.

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5.2.2.3. Banking Sector

The service sector, particularly financial institutions, is driving digitalization (BinSaeed et al., 2023). While technology offers numerous benefits, credit institutions are vulnerable to computer failures. Seghyar et al., (2024) assessed digitalization's impact on Moroccan banking sector human resources, using quantitative analysis. Their findings reveal that excessive technology use risks employee health, and that system failures, network issues, and connectivity problems negatively affect employee mental health. The study emphasizes the need for banks to implement policies to mitigate these risks and protect employee well-being.

5.3.2.4. Digital Ethics

As organizations advance towards digital HRM, they must address the ethical considerations arising from digital technologies (Thite, 2020). Corporate Digital Responsibility (CDR), defined as a set of guiding values and standards for an organization's data and IT activities (Lobschat et al., 2021), encompasses interrelated processes such as operations, decision-making, technology and data access, impact evaluation, and data refinement. The CDR approach emphasizes stakeholder perspectives, enabling the development of shared operational principles that stakeholders can collaboratively implement during digital HRM transformation.

Table: Application of Digital Transformation (DT) in the management of Human Resources (HR) IN Morocco

Section	Focus Area	Highlights	References
Public Services	Digitalization of HRM in Moroccan public administrations	Public administrations are prioritizing HR digitalization to modernize management practices. The shift requires new competencies and the adoption of HRIS systems to improve efficiency and overcome traditional challenges. HR departments are evolving into both administrative experts and strategic partners.	El Ouaghlidi et al. (2024); Brahim (2024)
Finance Sector	Digitalization in the financial sector (banking)	Financial institutions are leading DT adoption due to high technological dependence. However, they face increased vulnerability to disruptions. A quantitative study of Moroccan banks found significant impacts of digitalization on HR, based on 228 analyzed responses.	Gupchup (2024); Seghyar et al. (2024)

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Impact on Performance	Organizational and employee performance	Digital HRM enhances efficiency, transparency, and innovation while reducing costs and bureaucracy. It promotes long-term sustainability and productivity, empowering employees through technology. However, success depends on a strategic, long-term perspective rather than short-term gains.	Manoharan (2024); Osmundsen et al. (2018); Vardarlier (2020); Öğe (2004); Bondarouk & Brewster (2016)
Public Administrations	HR transformation in government institutions	The Moroccan public sector is undergoing a technological revolution in HRM. HRIS implementation is key to improving administrative and strategic HR functions, though challenges persist in adapting to new competencies and practices.	Brahim (2024); Seghyar et al. (2024)
Banking Sector	HR digitalization and employee well-being	While DT improves banking efficiency, over-reliance on technology can harm employee health. Studies highlight stress from system failures and connectivity issues, calling for better digital risk management policies to safeguard mental well-being.	BinSaeed et al. (2023); Seghyar et al. (2024)
Digital Ethics	Corporate Digital Responsibility (CDR) and ethics	Organizations must adopt ethical frameworks such as CDR to ensure responsible data and IT practices. CDR emphasizes stakeholder involvement and ethical governance in digital HRM processes, promoting sustainable and transparent transformation.	Thite (2020); Lobschat et al. (2021)

4.4. Challenges and limits

Digital transformation is compelling organizations to prioritize flexible work arrangements, impacting organizational culture and necessitating its renewal (Demartini et al., 2018; Nivlouei, 2014). A significant challenge for contemporary HRM is the cultural transformation driven by digitalization, requiring the development of policies and guidelines that facilitate employee adaptation to evolving customer demands and work environments, alongside the alignment of HRM strategy with overall organizational goals (Branca et al., 2020; Marler & Parry, 2016).

The transition to hybrid work models, combining office and remote work, necessitates adjustments to existing corporate cultures (Am et al., 2020; Ancarani & Di Mauro, 2018). Shifting work conditions, characterized by reduced in-person interaction and a dispersed

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workforce, alter employee social dynamics (Götz & Jankowska, 2020). Remote work implementation may require additional training to maintain productivity levels. Furthermore, digital transformation enables the implementation of results-based performance management systems, where employee performance is evaluated based on output rather than time spent at work (Demartini et al., 2018; Ulrich et al., 2013). Digital tools facilitate performance monitoring and productivity tracking (Li, 2020; Nivlouei, 2014).

New technologies enhance succession planning strategies by facilitating the identification and reassessment of key positions and the development of contingency plans through scenario-based planning (Bajer, 2017). Effective communication is crucial for ensuring workforce preparedness.

Learning and development are integral to modern HRM's strategic function, focusing on enhancing employee knowledge and skills to provide a competitive advantage and foster adaptability to change (Ancarani & Di Mauro, 2018; Kurek, 2021).

Workforce analysis, facilitated by digital technologies, enables HRM to monitor employee experience, engagement, and satisfaction (Fenech et al., 2019). Analytics facilitate performance and productivity monitoring, revenue optimization, cost reduction, and labor requirement analysis (Li, 2020; Marler & Parry, 2016). Moreover, analytics support talent acquisition strategies and the redesign of hiring processes for efficiency (Horváth & Szabó, 2019).

The rise of remote work has led to the development of virtual talent acquisition strategies, encompassing planning, sourcing, evaluation, and selection (Cortellazzo et al., 2019). Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), and Blockchain, coupled with data science, are driving the digital transformation of HRM functions, enabling impartial decision-making (Kurek, 2021). These technologies enhance all HR functions. AI-powered CV screening streamlines recruitment, saving time and resources (Demartini et al., 2018; Götz & Jankowska, 2020). Big data and analytics improve talent identification and workforce capacity planning (Am et al., 2020). AR/VR virtual office tours improve onboarding. Virtual and digital learning platforms enhance reskilling and upskilling efficiency (Sankar et al., 2021).

Research indicates that digital transformation can have negative impacts, particularly on repetitive and low-skilled tasks (Fenech et al., 2019). While digital transformation offers numerous benefits, it cannot replace human interaction. Organizations must invest in employee (Fenech et al., 2019; Marler & Parry, 2016)competitiveness (Am et al., 2020; Demartini et al., 2018). Skill enhancement facilitates workforce adaptation to the demands of digital technologies (Marler & Parry, 2016; Sankar et al., 2021).

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Aligning roles and individuals, redesigning processes, and integrating digital technologies contribute to organizational success (Ancarani & Di Mauro, 2018; Kurek, 2021). HRM can influence cultural change, strengthen employee-organization bonds, and foster a positive work environment (Cortellazzo et al., 2019). However, changes in employee behavior, attitudes, and expectations due to digitalization pose challenges for HRM in meeting operational and strategic adjustment requirements (Sankar et al., 2021). Addressing the needs of "digital employees" is a key area of intervention for HR professionals (Marler et al., 2016; Fenech et al., 2019).

4.5. Perspectives

Future research on the transformation of digital human resource management (HRM) should prioritize the following areas. Specifically, the exploration of digital hiring practices warrants careful consideration. Digital hiring encompasses the use of advanced technologies, such as blockchain and AI-powered chatbots, for job postings, candidate profile evaluation, interview processes, and employee onboarding. Artificial intelligence can facilitate rapid and accurate candidate profile assessments through the analysis of historical data, optimizing cost-efficiency. Blockchain technology offers secure and privacy-preserving peer-to-peer sharing of employment-related information.

The application of advanced technologies in digital hiring and related ethical considerations, such as discrimination, fairness, and data confidentiality, presents a fruitful avenue for future research. Similarly, digital training, encompassing knowledge base development, training needs assessment, training implementation, and feedback evaluation using technologies like artificial intelligence (AI) and the metaverse, warrants further investigation. AI can intelligently retrieve relevant knowledge and construct tailored knowledge bases. Future research could explore AI-driven information gathering and personalized instruction. The metaverse, leveraging 3D technology, offers immersive virtual learning environments. Researchers should investigate the potential applications of metaverse technology in digital training, the development of privacy safeguards for virtual training environments, and the potential negative impacts of excessive virtual world engagement, such as the use of gamified modules within the metaverse.

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Conclusion

This study offers several recommendations for Moroccan academic researchers and HR practitioners. By analyzing the drivers of HR digital transformation in Morocco, this research provides organizational managers with a deeper understanding of the underlying factors influencing this process. Organizations are encouraged to reassess the necessity and urgency of HR digital transformation in light of their specific internal and external environments.

The study's findings reveal a widespread integration of digital technologies across various Moroccan sectors, including administration, education, finance, healthcare, agriculture, climatology, and urban development. Notably, the administration sector has significantly adopted digital technologies for HRM. These technologies, encompassing enterprise resource planning (ERP), big data analytics, data security, mobile technology, and social networks, have demonstrated positive impacts, leading to reduced file processing times, lower complaint rates, improved service quality, enhanced user satisfaction, and more precise performance measurement. Furthermore, digital technologies have streamlined recruitment, career management, training, and skill development. The Ministry of Higher Education, Scientific Research, and Innovation has also witnessed improvements in its HR department through the application of digital tools.

However, the implementation of dematerialization can induce anxiety among employees who perceive changes and potential job displacement. This prompts them to re-evaluate their contributions in relation to automated systems. Therefore, organizations must proactively address change resistance during the initial planning stages of digitalization. Active employee participation is crucial to mitigate adaptation and learning costs, thereby preserving the value generated by the transformation. [1] This study underscores the importance of adopting an integrated and holistic approach that aligns technological advancements with human factors, effectively connecting the impetus for change with the successful execution of digital transformation.

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