

REDEFINING HUMAN RESOURCE MANAGEMENT IN THE HEALTHCARE SECTOR THROUGH ARTIFICIAL INTELLIGENCE

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Abstract

We are living in a new era dominated by technological transformations designed for contributing to the efficiency of work through intelligent automation processes of certain activities in a wide range of industries. The implementation of artificial intelligence in human resource management had a major transformational impact by creating new and innovative processes in branches such as employee recruitment, employee evaluation, employee development, managerial decision-making. One of the sectors of activity in which artificial intelligence can have a crucial role is that of healthcare. The integration of artificial intelligence into the human resource management of healthcare system can lead to a major transformation with impact in improving the quality of healthcare services delivered to patients. The purpose of this study is to highlight the way in which implementation of artificial intelligence within human resources from various sectors, but especially in the healthcare sector, can lead to a transformation of human resource management. This article is a review of current empirical works that refer to the transformation of human resource management through new technologies based on artificial intelligence and discusses some implications for future studies in this field.

Keywords: Human resource management, Artificial Intelligence, Healthcare, Quality.

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1. INTRODUCTION

Although the concept of artificial intelligence (AI) is relatively new, discussions surrounding its application in the healthcare sector have been present in the specialized literature as early as 1971. These discussions have emerged both from researchers in the field and from the medical community, which began utilizing computerized systems. AI has been perceived as an intersection between technological advancements and medical objectives. In the context of medicine, it is viewed as a hybrid between classical medical practice and intelligent systems, developed through the construction of coded computational languages designed for various models. The purpose of such systems is to apply accumulated medical knowledge to real-world scenarios (Coiera, 1996).

The foundational idea behind AI is to enable machines to learn, primarily through neural network models capable of predicting outcomes. This learning process involves the use of various applications such as DataRobot, SAS, and Google's AutoML, as well as different algorithms, all aimed at identifying the most effective AI-generated outcomes suitable for specific objectives. Organizations that adopt AI technologies are often driven by financial incentives, seeking to reduce operational costs and increase profitability. For instance, General Electric (GE) reported savings of \$80 million in the first year of AI implementation, achieved through the renegotiation of contracts previously managed internally by employees (Davenport, 2018).

2. INTEGRATING ARTIFICIAL INTELLIGENCE TO OPTIMIZE HUMAN RESOURCE MANAGEMENT

According to recent studies conducted by the World Health Organization (WHO), there are currently approximately 29 million nurses worldwide. However, projections for 2030 indicate a potential shortfall of nearly 4.5 million nurses, representing about 15% of the total global nursing workforce. The most significant reductions are expected in Africa and Southeast Asia. One potential application of artificial intelligence (AI) in addressing this challenge is the development of software capable of learning from extensive datasets. For example, in the field of radiology, AI systems can be trained using vast numbers of diagnostic images to detect recurring patterns and support clinical decision-making (WHO, 2024).

IBM has introduced an AI program that assists physicians by providing treatment options based on advanced analysis of clinical reports. In the Netherlands, AI systems have been implemented to reduce unnecessary hospitalizations by analyzing patient data derived from insurance billing records. Another initiative, the Medical Sieve project, aims to develop a "cognitive assistant" in radiology that analyzes medical imaging and helps identify patient diagnoses using AI (Mesko et al., 2018).

Further research has demonstrated AI's potential to enhance healthcare organizations' service quality and cost-efficiency. Precision in medicine is critical — particularly in the development of new treatments and preventive strategies — which increasingly depends on substantial computational power. In this context, AI enables the creation of self-learning algorithms that mimic cognitive functions. As a result, the capacity and sophistication of AI systems have become strategic assets, with nations leveraging technological advancement as a form of global influence (Mesko, 2017).

The projected loss of a substantial portion of the nursing workforce is particularly concerning, given the essential role nurses play in both delivering direct patient care and supporting the implementation of public healthcare policies. Nurses often serve as the first point of contact in emergency care, and in many cases, they are the only healthcare providers available to patients. Therefore, the quality of nursing services is a

fundamental determinant of patient outcomes and the sustainability of healthcare systems worldwide (WHO, 2024).

Beyond nursing, the WHO also estimates a broader workforce crisis, with a projected global shortage of up to 10 million healthcare workers by 2030. This will likely affect employee retention, service delivery capacity, and the maintenance of healthcare quality and performance standards (WHO, 2024). Human resource management in the healthcare sector is increasingly facing a profound crisis, raising important questions about how AI might mitigate the decline in the healthcare workforce and support systemic resilience.

A 2018 study identified key questions regarding the integration of AI in healthcare: To what extent can AI support or potentially replace clinicians? How can medical education prepare future professionals to effectively utilize AI tools? And how might AI address complex challenges in healthcare human resource management? These questions stem from an understanding that the healthcare workforce crisis is influenced by multiple factors, including a global shortage of physicians, an aging workforce, high levels of burnout and the rising demand for services caused by inadequate implementation of preventive healthcare systems. AI is being explored as a means of addressing these systemic gaps (Mesko et al., 2018).

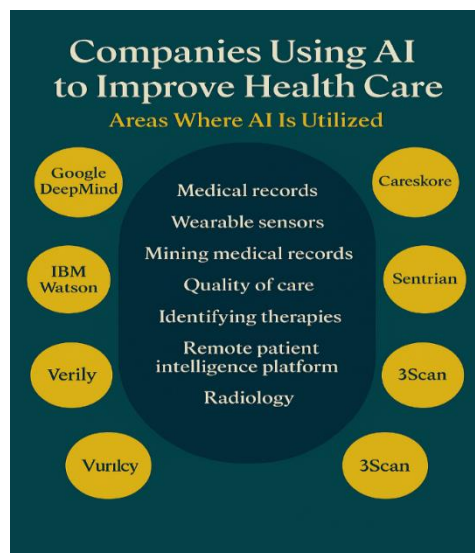


FIGURE 1. COMPANIES WHERE AI IS UTILIZED
Source: Adapted from www.blogs.Microsoft.com, 2024

Major technology companies, such as Microsoft, have announced initiatives to support the implementation of AI in healthcare through strategic collaborations aimed at improving patient outcomes, supporting medical professionals, and enhancing healthcare systems and the broader medical science ecosystem. Leading institutions like Stanford Medicine and WellSpan Health have already integrated AI into their healthcare systems. According to Microsoft, healthcare organizations that have adopted AI report high returns on investment, achieving ROI within approximately 14 months and generating an estimated long-term return of \$3 for every \$1 invested (Microsoft, 2024).

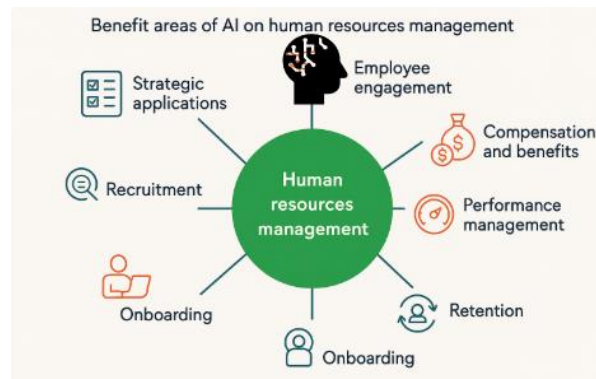


FIGURE 2. POTENTIAL IMPACT OF AI ON HUMAN RESOURCE MANAGEMENT
Source: Adapted from Vishwanath & Vaddepalli, 2023

Artificial Intelligence has been implemented across numerous sectors, including human resource management (HRM). The primary objective of integrating AI into HRM is to enhance the efficiency of human capital, optimize recruitment and employee retention strategies, and support various functions such as performance evaluation and compensation planning. As a rapidly evolving technological engine, AI — when combined with the Internet and big data — ushers in a new revolutionary era driven by intelligent solutions.

HRM stands to benefit significantly from AI through the automation of routine administrative tasks, therefore reducing the department's operational burden and enabling data-driven decision-making (Vishwanath & Vaddepalli, 2023).

One essential application of AI in human resource (HR) is identifying high-potential employees, such as those with strong leadership skills or critical organizational capabilities. AI can also facilitate the design of personalized development plans and deliver tailored training to support employee transformation.

AI's predictive and analytical capabilities enable HR departments to support strategic decision-making, grounded in relevant data patterns. Effective implementation of AI in HR requires the establishment of clear priorities, development of a comprehensive digital knowledge base, proficiency in data analysis, and a thorough understanding of how AI functions within the HR context (Albert, 2019).

Another valuable application of AI is the automation of repetitive and time-consuming standardized tasks. For example, HR departments can use intelligent software such as chatbots, which rely on natural language processing (NLP) to simulate human conversations and provide automated responses to users (Bhardwaj et al., 2020).

Recruitment, a fundamental human resource management function, can be significantly transformed through AI implementation. AI can analyze large volumes of data, recognize patterns and support evidence-based decision-making, therefore increasing the productivity and quality of the recruitment process. Machine learning algorithms can identify the most suitable candidates for vacant positions by

matching job requirements with applicant skill sets. AI-powered chatbots can assist candidates and automate interview scheduling (Faligka et al., 2012).

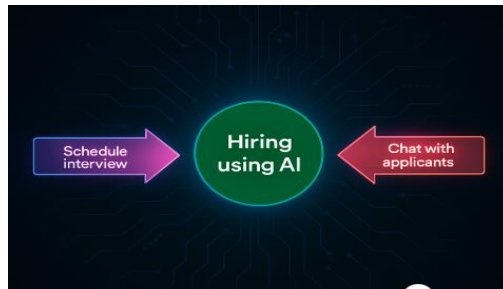


FIGURE 3. THE USE OF AI IN HUMAN RESOURCE MANAGEMENT
Source: Adapted from Faligka et al., 2012

Furthermore, AI applications can support employee development post-hiring. Predictive analytics can monitor employee emotional states to improve key HR performance indicators, such as turnover rate and employee engagement (Chakraborty et al., 2019).

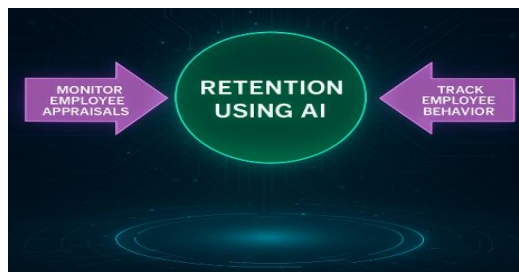


FIGURE 4. THE USE OF AI IN HUMAN RESOURCE MANAGEMENT
Source: Adapted from (Vishwanath & Vaddepalli, 2023)

Human resources are the most critical asset in any organization, and transforming human resource management is essential for ensuring access to the human and financial capital needed for sustained performance. AI-driven technology presents a viable path towards achieving this transformation.

Historically, large organizations have competed to harness human potential through innovative HR practices, which have laid the foundation of contemporary HRM frameworks (Cascio, 1995; Lapina et al., 2014). Today, the integration of modern HRM practices grounded in strategic decision-making — where all people-related processes are interconnected — has become common among organizations (Gilmore et al., 2013; Yabanci, 2019).

Recent literature identifies a new stage in HRM development in which the core mechanism of HR systems focuses on analyzing employee competencies and workplace behavior, and aligning these factors with organizational objectives (Mathis & Jackson, 2008). Technological advances, including the development of specialized software and the widespread use of the Internet, have enabled HR departments to align their systems with organizational goals (Armstrong, 2009).

Over the last decade, the concept of electronic human resource management (e-HRM) has become widespread, reflecting the growing use of IT across nearly all HR processes (Strohmeier, 2007). The evolution of computerized technologies, the Internet and information systems has had a profound impact on HR departments, a process now widely recognized as e-HRM (Marler & Parry, 2016; Zhang & Wang, 2006; Ma & Ye, 2015). Since 2011, many organizations have integrated AI technologies into their IT systems to enhance capabilities through cognitive computing and intelligent automation (Pan, 2016).

In HRM, AI combined with cognitive computing can enable proactive, targeted and personalized recruitment, significantly reducing the time required for candidate selection (Bokelberg et al., 2017). Nonetheless, concerns regarding the security of AI systems persist. Ensuring computer security is critical to protecting confidential data, individuals and organizational processes, and to preventing unauthorized access or data manipulation (Pfleeger et al., 2015). As with all software-based systems, vulnerabilities to misuse or technical failure pose ongoing risks, including data loss and system interruptions (Illankoon et al., 2019).

The primary aim of this research is to explore the extent to which AI can influence HRM processes, with a focus on its crucial role in enhancing HR practices through strategic commitment. It also examines the application of AI in healthcare HRM, where the demand for support in recruitment and staff retention is especially acute.

By analyzing various contexts of AI implementation, this study seeks to identify key factors influencing the transformation of human resource management in the digital age. Future research could focus on the critical perspectives surrounding AI adoption in HRM, particularly among entrepreneurs and practitioners operating in the healthcare domain (Whelan, 2018; Mearian, 2018).

3. RESEARCH MODEL

Drawing upon insights derived from a comprehensive review of the literature, a theoretical model has been conceptualized to illustrate the potential impact of artificial intelligence on human resource management within the healthcare sector. This model is grounded not only in the existing theoretical frameworks, but also in the practical realities of organizational contexts, which provide critical information regarding the ways in which AI integration into HR departments can serve as a catalyst for the progressive transformation of HRM practices.

The principal aim of this AI-based model is to contribute to the enhancement of healthcare service quality through the optimization of key human resources processes. These processes include but are not limited to: the recruitment and selection of personnel, the design and implementation of structured employee training programs, strategies aimed at improving staff retention, and the facilitation of data-informed decision-making mechanisms. By leveraging AI technologies, the model seeks to support healthcare

institutions in aligning human capital management with strategic organizational goals, ultimately fostering a more efficient, adaptive and patient-centered healthcare delivery system.

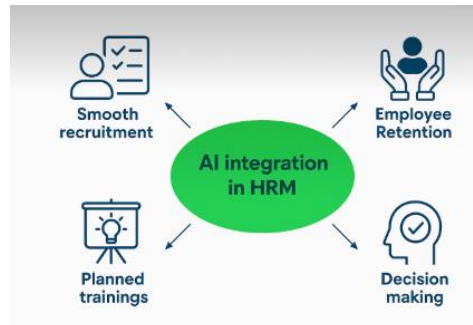


FIGURE 5. THEORETICAL MODEL OF AI INTEGRATION IN HUMAN RESOURCE MANAGEMENT

Source: author's compilation

The integration of artificial intelligence - based technologies into human resource management processes within the healthcare sector can be conceptualized as a dynamic and innovative journey — one that initiates a profound transformation of HR functions with the overarching aim of enhancing the quality of healthcare services delivered to patients.

4. DATA AND METHODOLOGY

This article includes a comprehensive analysis of specialized publications and peer-reviewed scientific literature, aiming to elucidate the potential benefits of implementing artificial intelligence in human resource management. Accordingly, the research draws on a wide array of secondary data sources, including academic articles, policy reports and scholarly books that explore themes such as HRM in healthcare, electronic HRM, and the broader impact of AI integration on traditional human resource processes.

To support the study, electronic academic databases such as PubMed, Academia.edu, BRILL and the Wiley Online Library were utilized. Additional sources included archives from leading academic journals in the fields of management and healthcare systems.

The methodology employed is primarily descriptive and quantitative, given the broad scope and interdisciplinary interest surrounding the topic. This approach allows for a structured exploration of how AI is currently being integrated into HRM and what implications this may hold for the healthcare sector moving forward.

5. CONCLUSIONS

We are living in a period characterized by rapid, continuous change. Organizations and institutions must therefore remain agile, adapting swiftly to emerging trends while developing innovative solutions to maintain relevance and competitiveness in the services they offer. Among the most vital — and simultaneously most sensitive — resources within any organization is its human capital. Human resource management is charged with ensuring that this resource is effectively maintained, aligned and supported in pursuit of the institution's strategic objectives.

To fulfill this role, HRM has had to evolve through multiple paradigms. Today, it finds itself at the threshold of a new phase — the era of artificial intelligence. In the healthcare sector, where the quality of service is inextricably linked to the well-being and performance of its workforce, HRM takes on an especially critical role. Here, human resources are not only essential to the functioning of institutions but are also central to delivering high-quality care and improving patient outcomes.

The transformation of HRM through AI within healthcare is not simply a matter of adopting a new technological tool; rather, it represents the development of a synergistic relationship between machine intelligence and human empathy. The goal of this integration is to foster a healthcare system that is more efficient, responsive and focused on delivering consistent, high-quality care.

As this transformation progresses, it is crucial to foreground the human element. AI is not intended to replace human workers but to augment and support them. The intrinsic value of human contribution — characterized by compassion, critical thinking, and adaptability — remains irreplaceable, especially in healthcare settings.

The convergence of Artificial Intelligence and Human Resource Management represents a transformative shift in how organizations manage talent, optimize operations, and enhance employee engagement. AI-driven tools — such as predictive analytics, intelligent recruitment systems, and automated performance tracking — are reshaping traditional HR functions by introducing data-driven precision and scalability.

While the benefits of AI in HRM are increasingly evident, this study also recognizes its current limitations and proposes directions for future inquiry. Emerging challenges — particularly those related to data privacy, implementation costs, ethical concerns and workforce readiness — warrant further exploration.

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