

## THE EFFECT OF HUMAN RESOURCE DIGITAL APPLICATIONS FOR HEALTHCARE INDUSTRY: A LITERATURE REVIEW

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### ABSTRACT

Digital transformation has significantly reshaped human resource management (HRM) practices in the healthcare sector. This study aims to systematically review the literature on the adoption of digital applications in healthcare HRM and their implications for organizational performance and service quality. The research method applied is a literature review of articles published between 2020 and 2025 retrieved from Scopus, PubMed, Web of Science, and Google Scholar. Findings indicate that digital HR applications, including e-recruitment, digital attendance systems, HR analytics, and e-learning platforms, enhance operational efficiency, administrative transparency, workforce competency development, and evidence-based workforce planning. Moreover, HR digitalization indirectly improves patient care quality through better staff retention, job satisfaction, and the promotion of a continuous learning culture. Nevertheless, this review also highlights challenges such as limited infrastructure, healthcare workers' resistance to technology adoption, data security issues, and digital literacy gaps. Therefore, successful implementation of HR digitalization requires supportive policies, targeted training strategies, and system integration to maximize its benefits for the healthcare sector.

**Key words:** human resource; digital application; healthcare industry; digital transformation; information system

### INTRODUCTION

Digital transformation has become a major driving force of change across various sectors, particularly in the healthcare industry.<sup>14</sup> The limitations of mobility, high workload pressures, and the need for operational efficiency during the COVID-19 pandemic compelled hospitals and healthcare institutions to rapidly adopt a range of digital systems, including *electronic human resource management systems (e-HRM)*, *teleworking tools*, and *digital scheduling and training platforms*.<sup>13</sup> The digitalization of the healthcare sector continues to advance, as the utilization of technology offers significant benefits for patients, healthcare professionals, and organizations by enhancing efficiency and effectiveness.<sup>6,14</sup> Within the context of human resource management (HRM), technology plays an essential role in automating, recording, processing, and facilitating communication that was previously conducted manually. Human resources (HR) are a crucial component of the healthcare sector, serving as the primary driver for ensuring that medical services are delivered efficiently, effectively, and with high quality. HRM in healthcare is not merely an administrative function; rather, it serves as a strategic component that supports the achievement of organizational goals.<sup>15</sup> The strategic dimensions of HRM encompass workforce planning, recruitment and selection, competency development through training, performance management, and the establishment of a productive and healthy work environment.<sup>16</sup> The digitalization of HR in healthcare is not solely about technology adoption is fundamentally about how HR applications can enhance staff performance, organizational efficiency, and the overall quality of patient care.

Recent bibliometric studies indicate that research on HRM in the healthcare sector remains dominated by classical themes such as job satisfaction, burnout, retention, and motivation, while the issue of HR digitalization has received relatively limited scholarly attention. Qin et al. (2023) emphasize that topics such as HR information systems, HR analytics, and digital transformation are emerging as developing research themes, though they have yet to become mainstream in healthcare HRM literature.<sup>15</sup> This research gap highlights the importance of studies that specifically explore the role of digital HR applications in managing healthcare personnel, as digital transformation has the potential to strengthen evidence-based workforce planning and improve organizational efficiency. Accordingly, this literature review is both relevant and strategic, as it seeks to address this research gap by mapping existing evidence on the impact of digital HR applications within the healthcare industry.

### METHOD

This study employed a literature review approach by systematically examining scholarly publications that discuss the implementation of human resource digitalization in the healthcare sector. The search process was conducted across several reputable online databases, including Scopus, PubMed, Web of Science, and Google Scholar. The articles included in this review were those published between 2020 and 2025, focusing on the context of healthcare organizations both hospitals and public or private health institutions. The selection process was guided by inclusion criteria encompassing studies related to the use of Human Resource Information Systems (HRIS), HR analytics, and digital applications in healthcare workforce management. The keywords used in the search included "*HR digital application*", "*healthcare HRM*", and "*HRIS in healthcare*." Data extracted from each selected article were then analyzed thematically to identify emerging patterns concerning the functions of digital HR, their impact on organizational efficiency, and trends in recent research.

## RESULTS AND DISCUSSION

### Effect on HR Functions

1. Recruitment and Selection of Healthcare Personnel (E-recruitment and Talent Acquisition).  
Recruitment processes in healthcare organizations are often slow, as they traditionally rely on print media, personal recommendations, or manual selection mechanisms that require significant time to validate candidates' qualifications.<sup>16</sup> Before the adoption of digital systems, healthcare organizations faced difficulties in conducting in-depth analyses of workload, productivity, or workforce forecasting. Strategic decisions were often based on managerial intuition rather than accurate and real-time data, thereby reducing the effectiveness of HR planning.<sup>15</sup> The use of HR analytics (HRA) has great potential in supporting data-driven decision-making in human resource management, including workforce planning, staff demand prediction, and performance evaluation.<sup>2</sup>
2. Attendance, Work Scheduling, and Staff Rotation (Time Management and Scheduling Applications).  
Attendance and working-hour records for healthcare personnel have traditionally been maintained manually using signatures or physical attendance cards. This method is not only time-consuming but also prone to fraud and administrative errors.<sup>15</sup> The adoption of automated scheduling systems enables hospitals to create fairer shift schedules by considering nurses' preferences, skills, and availability. Such implementation has been shown to reduce overtime costs and staff dissatisfaction.<sup>9</sup>
3. Payroll and Compensation (Administrative Efficiency and Transparency).  
The digitalization of payroll and compensation systems has a significant impact on administrative efficiency and organizational transparency, including within healthcare institutions. A study by Arifin et al. in Indonesia demonstrated that the implementation of digital payroll systems reduces human errors in salary computation, accelerates payroll processing, and ensures timely payments, thereby contributing to employee well-being.<sup>4</sup>
4. Training and Human Resource Development (E-learning and Knowledge Management Systems).  
Digital health technologies have proven effective in improving healthcare workers' competencies through digital training platforms and real-time information access. Digitalization supports inclusive workplace learning, enabling organizations to foster a continuous learning culture, which is essential in the healthcare sector where professionals must constantly adapt to advances in medical technology and evolving regulations.<sup>6</sup>
5. Performance Management Systems.  
Digital evaluation systems allow real-time monitoring of healthcare personnel performance through integrated dashboards that combine productivity indicators, protocol compliance, and patient satisfaction metrics.<sup>14</sup> With access to such data, performance evaluations become less dependent on subjective managerial perceptions and are instead based on measurable evidence that can inform career development and staff planning.

### Effect on Organizational Performance

1. Operational Efficiency in Hospitals.  
Digital health technologies enhance workplace efficiency by improving workload management, coordination, and error reduction.<sup>6</sup> Jeilani et al. (2025) found that the implementation of digital health technologies (DHTs) significantly improves organizational efficiency, particularly in service coordination, speed of patient information access, and clinical decision-making. Digital tools such as electronic medical records (EMR), workforce management applications, and internal communication platforms help reduce administrative time and accelerate information flow across departments.<sup>12</sup>
2. Improved Staff Satisfaction and Retention.  
Artificial Intelligence (AI) provides predictive analytics that support workforce planning, identify risks of fatigue or burnout, and assist in workload adjustments.<sup>3,7</sup> Job satisfaction, managerial support, and job stress significantly influence turnover intention in hospitals.<sup>11</sup> Predictive HR analytics powered by machine learning (ML) and AI have enabled organizations to shift from reactive to proactive and data-driven decision-making. Key applications include attrition prediction, recruitment optimization, and employee engagement modeling.<sup>7</sup>
3. Indirect Effects on Patient Care Quality.  
Hospitals with adequate nurse staffing levels report better patient experience scores. Patients note clearer communication, more thorough explanations, and greater attentiveness from nurses when workloads are balanced.<sup>10</sup> The integration of HRIS with clinical and administrative systems facilitates smoother communication among medical staff, management, and finance departments. This integration reduces task duplication and accelerates organizational decision-making.<sup>16</sup>
4. Reduction of Administrative Costs and Human Errors.  
Empirical evidence suggests that integrated HRIS systems combining attendance and payroll modules minimize duplicate data entries and inconsistencies, leading to fewer payroll calculation errors and faster approval processes ultimately improving administrative cost efficiency.<sup>1</sup> More broadly, reviews of digital automation in clinical domains have shown reductions in medical errors through automated validation and

verification mechanisms. These automation principles support the argument that digital automation in administrative processes similarly reduces human error and enhances overall organizational performance.<sup>8</sup>

**Challenges and Barriers**

1. **Technological Infrastructure Readiness.**  
 Inadequate information technology infrastructure such as slow network connections, insufficient hardware, and unstable power supply remains a major obstacle to effective HRIS implementation.<sup>2,5</sup>
2. **Resistance Among Healthcare Workers Toward Digital Adoption.**  
 Resistance often arises from employees who are more comfortable with manual workflows. The transition to data-driven systems is sometimes perceived as an additional burden, accompanied by fears of losing professional autonomy. Such perceptions may result in covert or overt resistance to the use of HR analytics in daily work processes.<sup>2,3</sup>
3. **Data Security and Privacy Issues (Employee and Patient Data).**  
 Concerns about employee data privacy, particularly health and performance data, often generate resistance from staff and labor unions. There is apprehension that analytical results may be misused for purposes such as unjustified termination or unfair evaluations.<sup>2,3</sup> Consequently, ethical considerations in employee data management have become a crucial issue that must be addressed through transparent policies, robust data protection measures, and clear communication with all stakeholders.<sup>2,3,13</sup>
4. **Digital Literacy Gaps Among Healthcare Workers.**  
 Healthcare staff and HR managers often lack adequate digital skills or experience managing complex information systems.<sup>5</sup> Limited digital literacy and analytical competence among healthcare professionals, HR personnel, and leadership hinder the optimal utilization of technology. Many users feel unconfident when interpreting analytical reports or complex data visualizations. Moreover, generational gaps in digital adoption persist: senior staff tend to adapt more slowly to HRIS platforms compared to younger healthcare workers, underscoring the need for mentorship programs and differentiated training strategies.<sup>2</sup>

**Table 1. Digital HR Applications and Their Impacts in Healthcare Industry**

<b>Study</b>	<b>Setting</b>	<b>Digital HR Application</b>	<b>Outcomes Reported</b>	<b>Key Limitations</b>
Bhattacharyya et al. (2021)	Government health sector, Bangladesh	Digital HRM tool (HRIS for workforce tracking)	Improved workforce allocation; reduced administrative delays	Limited infrastructure; staff resistance
Qin et al. (2023)	Global bibliometric study	HR analytics & HRIS	Identified trends in HR digitalization; potential for workforce planning	Adoption still limited in healthcare
Mauro et al. (2024)	European hospitals	Performance management dashboards	Real-time productivity monitoring; better decision-making	Data fragmentation; lack of system integration
Borges do Nascimento et al. (2023)	Global healthcare workforce	E-learning & knowledge management platforms	Enhanced staff competencies; continuous learning culture	Gaps in digital literacy; unequal access
Ayorinde et al. (2024)	Healthcare professionals	AI-driven HR analytics	Predictive workload management; burnout risk detection	Ethical issues; privacy & data protection concerns
Jeilani et al. (2025)	Healthcare facilities	Adoption of digital health technologies (DHTs)	Improved efficiency & coordination; workload trade-offs	Adaptation burden; uneven impact on staff performance
Căvescu et al. (2025)	Global HRM literature (SLR)	Predictive analytics in HRM (AI/ML)	Supports proactive workforce planning, attrition prediction, and performance evaluation	Need for contextual validation; ethical & trust issues

Arifin, Wirahadiyono, & Sugiharto (2024)	Indonesian healthcare institutions	Digital payroll & compensation systems	Increased efficiency, transparency, and timely salary payments	Dependence on system reliability; digital skills gaps
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(Source: compiled from reviewed articles (Bhattacharyya et al., 2021; Qin et al., 2023; Mauro et al., 2024; Borges do Nascimento et al., 2023; Ayorinde et al., 2024; Jeilani et al. 2025; Căvescu et al. 2025; Arifin, Wirahadiyono, & Sugiharto 2024).

## CONCLUSION

This literature review demonstrates that the implementation of digital applications in human resource management (HRM) within the healthcare sector significantly contributes to enhancing operational efficiency, administrative transparency, workforce competency development, and data-driven decision-making quality. The digitalization of HRM enables healthcare organizations to strengthen workforce planning, minimize administrative burdens, and foster a culture of continuous learning—an essential capability in navigating the evolving landscape of medical technology. However, challenges related to infrastructure readiness, user resistance, data privacy concerns, and digital literacy gaps remain significant barriers that must be addressed to ensure the optimal implementation of digital HR systems. Accordingly, this study underscores that digital transformation is not merely a matter of technology adoption, but a strategic shift in human resource management that fundamentally shapes the success of healthcare organizations in the modern era. Future research is recommended to explore the effectiveness of digital HR implementation in Indonesian hospital settings, particularly regarding the integration of HRIS with clinical and financial systems. Empirical studies using primary data are also needed to measure the direct impact of HR digitalization on organizational performance and healthcare workforce retention.

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