



## AI in human resources: Driving digital innovation in industry 5.0

Gayathri Nm<sup>1</sup>, Shobharani H<sup>2</sup>

<sup>1</sup> Research Scholar, Kuvempu University, PG Centre, Kadur, Karnataka, India

<sup>2</sup> Professor, Kuvempu University, PG Centre, Kadur, Karnataka, India

### Abstract

Artificial Intelligence (AI) has created vast opportunities in the workplace through advancements in robotics, which integrate both AI and the Internet of Things (IoT). Key benefits associated with Industry 5.0 include precision, efficiency, and flexibility. However, the successful implementation of Industry 5.0 requires significant transformations, particularly within the Human Resources (HR) function. In this new industrial paradigm, HR capabilities become increasingly critical, offering organizations a strategic advantage. HR professionals must be adaptable and proactive in addressing emerging challenges and evolving demands. This study explores the role of AI in the digital transformation of HR practices within the context of Industry 5.0. A total of 271 HR professionals from the Information Technology (IT), manufacturing, and service sectors participated in the research. The focus was on five AI application areas within HR and three key components of HR readiness. Data was analyzed using the Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS). The findings reveal that organizational structure analysis plays a vital role in achieving sustainable growth. Each of the five AI application areas positively supports adaptability and HR capability. Among these, improvements in employee well-being and workplace safety emerged as particularly important aspects of AI integration in HR.

**Keywords:** Artificial intelligence, structural equation modelling digitization, agility, human resource management, industry 5.0

### Introduction

In the era of Industry 5.0, the Human Resource (HR) function plays a pivotal role in bridging the gap between technological advancement and human capital. While many traditional HR tasks are increasingly being automated through technology, there remains a growing demand for flexible HR practices capable of addressing the complexities of human management. Technology, particularly Artificial Intelligence (AI), can facilitate this flexibility by introducing agility into HR processes.

Agility—defined as the ability to move quickly and adapt smoothly is not a new concept. Leading global companies such as Google, Apple, Facebook, Amazon, and Microsoft have long adopted agile methodologies. In the context of HR, agility refers to the ability to adapt and develop both people and processes in response to rapid and unpredictable changes. This approach ensures the alignment of HR initiatives with organizational strategy, while supporting workforce adaptability and resilience. For HR and Learning & Development (L&D) professionals, being agile means driving employee engagement and retention in alignment with the organization's overarching goals. HR agility is particularly valuable in volatile environments where standardization of functions proves difficult.

To foster organizational agility, the workforce must prioritize customer satisfaction and consistently deliver value. However, since HR functions do not directly serve external customers, they are often criticized for being slow to respond, resulting in employee dissatisfaction. Therefore, it is imperative for organizations to empower their HR departments to be more responsive to technological changes and evolving business needs. In agile organizations, traditional HR responsibilities—such as recruitment, development, and performance management—are restructured using agile methodologies.

There are three key dimensions of HR agility:

1. The ability to quickly and accurately identify issues that need to be addressed,
2. The capacity to minimize the time required to develop and implement solutions, and
3. The integration of analytics and design thinking to anticipate needs, plan strategically, and implement targeted programs with a high probability of success.

The rapid advancement of technology particularly the integration of AI into HR has significantly transformed HR practices and operations. As organizations increasingly digitize their HR functions, it is critical to assess the impact of AI across various HR domains, including employee productivity, health and safety, payroll automation, employee comfort, and real-time feedback mechanisms. Furthermore, understanding how these HR transformations influence organizational network analysis and design can provide valuable insights into leveraging AI for increased efficiency and effectiveness.

This research article aims to examine the correlation between AI and HR digitization, and to explore the effects of HR digitization on organizational network analysis and design. The primary research objectives include:

- Investigating the relationship between AI and HR digitization in relation to key HR outcomes such as employee productivity, health and safety, payroll automation, employee comfort, and real-time feedback;
- Identifying the benefits and challenges of HR digitization within the context of organizational network analysis and design; and
- Evaluating the influence of HR digitization on network analysis and design through its effects on employee experience and process efficiency

By addressing these objectives, the study seeks to provide meaningful insights into the influence of AI on HR digitization and its broader implications for organizational network structures. Moreover, the research aims to offer practical recommendations for organizations to effectively leverage AI in enhancing HR processes, thus improving overall operational

The components used to evaluate these dimensions were drawn from conceptual papers and online sources, due to the limited existing academic research in this domain.

### Objectives

1. To study the impact of AI on HRM in meeting the demands of Industry 5.0
2. To study about AI bring sustainability to HRM functions in Industry 5.0?
3. To explore the current trends of AI in the Human Resource Management Practices (HRMP).
4. To assess the impact of AI on HRMP in order to cater the demands of Industry 5.0.
5. To analyze the influence of AI on sustainability in Industry 5.0.

### Role of AI on HR practices

In recent years, the adoption of Artificial Intelligence (AI) across various sectors—including Human Resource Management (HRM)—has seen significant growth. The emergence of Industry 4.0 has further accelerated the demand for automation, digitization, and agility in HR practices. AI holds the potential to transform HR functions by enhancing efficiency, accuracy, and data-driven decision-making.

One of the most prominent applications of AI in HR lies in recruitment and talent acquisition. AI-powered algorithms can efficiently scan resumes and job applications to identify suitable candidates based on predefined criteria, significantly reducing the time and effort involved in manual screening. Additionally, AI can analyze candidate profiles to predict job success, thereby improving the overall quality and precision of the recruitment process.

AI also plays a critical role in enhancing employee engagement and retention. By examining large datasets on employee behavior and performance, AI algorithms can detect patterns that signal low engagement or potential turnover. This insight allows HR professionals to implement proactive strategies—such as targeted training programs or improvements in organizational culture—to address underlying issues and retain top talent.

Another valuable application of AI is in learning and development (L&D). AI can assess individual skill gaps through data analysis and recommend personalized training pathways to bridge those gaps. AI-powered learning platforms further enhance employee development by tailoring content to individual needs, which improves engagement and learning outcomes.

Performance management is another area that benefits significantly from AI integration. AI systems can analyze employee performance data to pinpoint strengths and areas for improvement. This enables the creation of personalized performance enhancement plans, ultimately contributing to increased productivity and individual growth. Furthermore, AI contributes to workplace safety and compliance by analyzing data from sensors and other monitoring devices to identify potential hazards. It can recommend preventive

measures, thereby reducing the risk of accidents and ensuring adherence to safety regulations.

In conclusion, the application of AI in HR practices has the potential to fundamentally reshape the way HR functions are conducted. It enhances efficiency, precision, and strategic decision-making across multiple HR domains, including recruitment, talent management, L&D, performance evaluation, and workplace safety. However, it is essential to address ethical concerns such as algorithmic bias and the potential displacement of jobs. The long-term success of AI in HR will depend on an organization's ability to balance the advantages of automation with the necessity for human empathy, ethical governance, and sound judgment in managing people.

### Conceptual framework

#### 1. Health and Safety Improvement in the Workplace

AI has demonstrated considerable potential in enhancing workplace health and safety by enabling the identification and prevention of hazards. AI-powered systems can analyze data from various sources—such as sensors, surveillance cameras, and other IoT devices—to detect environmental or behavioural risks that could lead to accidents. This predictive capability helps organizations create safer work environments by proactively addressing threats before they escalate. Additionally, AI can be utilized to monitor employees' health-related data, enabling early detection of potential health issues. For instance, wearable devices can collect biometric data that AI algorithms analyze to detect signs of fatigue, stress, or illness, allowing for timely interventions and personalized health recommendations. Another innovative application is the use of AI-driven chatbots, which offer employees immediate access to health and safety information. These chatbots can respond to queries regarding workplace safety protocols, provide real-time guidance during emergencies, and assist in reporting incidents. Moreover, AI can contribute to improving workplace ergonomics by tracking employees' movements and postures, identifying risks of musculoskeletal disorders, and suggesting ergonomic adjustments to workstations to prevent injuries.

#### 2. Enhancing Employee Comfort

AI technologies contribute significantly to improving employee comfort by personalizing the workplace environment. Through data gathered from sensors—such as temperature, humidity, and occupancy sensors—AI systems can optimize environmental conditions based on employee preferences and real-time office usage patterns. Furthermore, AI can personalize employee experiences by recommending ergonomic adjustments to desks or chairs tailored to an individual's body type, health data, or comfort preferences. Beyond physical comfort, AI can also support mental well-being. By analyzing behavioural patterns, communication frequency, and engagement metrics, AI systems can detect workplace stressors and provide recommendations to reduce stress levels. These insights can inform organizational strategies aimed at improving employee comfort and overall satisfaction.

#### 3. Employee Productivity Measurement

AI has revolutionized productivity measurement by automating routine administrative tasks and providing real-time, data-driven insights into employee performance.

Automation reduces the administrative burden on HR professionals, allowing them to focus on strategic tasks that require human judgment and expertise. AI systems can track and analyze metrics such as time spent on tasks, task completion rates, and workflow patterns. This data enables real-time feedback on employee productivity, allowing managers to identify high-performing individuals as well as those who may need additional support or development. Moreover, AI contributes to objectivity in performance evaluations. Unlike traditional methods that often rely on subjective assessments, AI uses data analytics to provide consistent and unbiased evaluations, leading to fairer performance reviews and more informed HR decisions.

#### 4. Automating Payroll Processing

Payroll processing is another HR function that benefits significantly from AI integration. AI-powered systems can automate salary calculations, tax deductions, and leave management, minimizing the risk of human error and saving valuable time for HR departments. Through data analysis, AI can identify anomalies such as duplicate payments or discrepancies in time-off calculations, thereby improving payroll accuracy. Furthermore, AI systems can monitor payroll compliance with evolving labor laws, such as minimum wage standards and overtime regulations. This ensures legal compliance and reduces the risk of penalties or litigation.

#### 5. Real-Time Feedback

AI enables timely and objective feedback by continuously monitoring employee performance data. It can deliver real-time feedback on individual performance metrics, helping employees identify areas for improvement and take immediate action. In contrast to traditional feedback systems—which are often delayed and prone to bias—AI-driven feedback mechanisms are data-driven and customized to each employee's specific roles and goals. This fosters a culture of continuous improvement and promotes employee development by ensuring feedback is both accurate and actionable.

#### 6. Impact on HR Digitization

AI plays a central role in accelerating the digitization of HR functions across recruitment, onboarding, performance management, and employee engagement. For instance, AI can automate resume screening and candidate short listing, significantly reducing the time and effort involved in talent acquisition. During onboarding, AI systems can deliver personalized training modules tailored to new hires' roles and learning needs. Additionally, AI enables the continuous monitoring of employee performance, generating insights that help HR professionals design data-driven strategies for performance enhancement and employee engagement. Beyond operational efficiency, AI strengthens the strategic dimension of HR by offering deep insights into workforce trends, skills gaps, and training needs. This empowers HR leaders to make informed decisions that align with long-term organizational goals and workforce planning initiatives.

#### 7. Organizational Network Analysis

AI enhances Organizational Network Analysis (ONA) by automating the collection and interpretation of complex relational data. For example, AI can analyze internal

communication patterns (such as email exchanges) to map informal networks and identify key influencers, knowledge brokers, and collaboration clusters within the organization. Additionally, AI can process social media interactions and employee survey data to uncover hidden dynamics that influence team performance, engagement, and innovation. By detecting communication silos, bottlenecks, or disengaged individuals, AI enables targeted interventions to improve organizational connectivity and collaboration. Beyond analysis, AI can also support strategic changes by providing actionable insights to redesign communication flows, enhance team structures, and strengthen organizational resilience. AI-powered systems offer significant potential in transforming organizational design by enabling data-driven decision-making and enhancing structural adaptability. One of the core applications of AI in this domain is the automation and analysis of job performance, skills, and experience data to identify the most suitable candidates for specific roles. This facilitates more efficient talent allocation and succession planning. Beyond matching individuals to roles, AI can analyze employee preferences, behavioural patterns, and career aspirations to uncover opportunities for targeted talent development. This insight allows HR professionals to proactively support employee growth while aligning talent strategies with organizational goals. Moreover, AI contributes to the development of more flexible and responsive organizational structures. By analyzing external data—such as shifts in customer demands, industry trends, and market dynamics—AI can provide recommendations for restructuring job roles, team configurations, and reporting lines to maintain strategic agility.

Importantly, AI also plays a role in promoting inclusivity and reducing bias in organizational design. By evaluating job descriptions, recruitment language, and hiring patterns, AI algorithms can detect and flag implicit biases, enabling organizations to redesign hiring practices and structures that foster diversity and equity. In summary, AI enhances organizational design not only through analytical capabilities but also by enabling continuous adaptation, inclusiveness, and alignment with evolving business environments.

### Methodology

#### 1. Research Methodology

This study develops a conceptual framework by identifying the most prominent areas of application of AI. A comprehensive literature analysis is performed to analyze the studies relevant to application AI. Then, the proposed framework, contributes to the existing literature by prioritizing the implications. The results from the study could assist stakeholders to cater the challenges related to AI implementation.

#### 2. Research Design

This study adopted a descriptive research design following a cross-sectional approach. This design is appropriate for examining the impact of Artificial Intelligence (AI) on Human Resource (HR) digitalization within the context of Industry 5.0, as it enables the collection of data from a large population at a single point in time<sup>[61]</sup>. The cross-sectional method provides a snapshot of current practices and perceptions, allowing for the assessment of relationships among variables of interest.

### 3. Population and Sampling

The target population for this study comprised HR professionals working in the Information Technology (IT), Information Technology Enabled Services (ITES), manufacturing, and service sectors, specifically in Chennai and Bengaluru. These cities were selected for their diverse industrial base and strong presence of both established firms and emerging businesses. Private sector banks were included under the service sector category.

A multi-stage sampling technique was employed. The first stage involved selecting the geographical locations. In the second stage, firms within each sector were ranked based on predefined criteria (e.g., size or market presence). The third stage involved selecting individual respondents from these firms.

A total of 360 questionnaires were distributed using Google Forms. After rigorous screening, 271 responses were found to be complete and valid, yielding a response rate of 75%. This sample size is supported by previous research; [62] recommend a minimum of 200 cases for structural equation modelling (SEM), while [61] suggest that a sample between 200 and 400 is considered adequate. Additionally, [63] affirm that a sample size of at least 100 is necessary for SEM, though larger samples provide more robust estimates.

### 4. Scale Development and Validation

The measurement scales for the study constructs were developed by modifying existing instruments from relevant literature. These adapted scales were evaluated for validity and reliability to ensure their appropriateness for this research context

According to validity refers to the degree to which an instrument measures what it is intended to measure, while reliability denotes the consistency of measurements across time and contexts. Confirmatory Factor Analysis (CFA) was employed to assess these psychometric properties.

The CFA results demonstrated good construct validity and reliability. All constructs reported Composite Reliability (CR) values exceeding the recommended threshold of 0.7, indicating strong internal consistency. Similarly, the Average Variance Extracted (AVE) values for all constructs exceeded the benchmark of 0.5, confirming good convergent validity. Thus, the measurement model was deemed suitable for further analysis.

### 5. Data Collection

Data were collected using a structured questionnaire designed to support the research objectives. The instrument was divided into three sections:

- **Section 1:** Demographic information of the respondents
- **Section 2:** Items measuring AI applications in HRM
- **Section 3:** Items assessing Human Resource Agility

Sections 2 and 3 used a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5), to capture the extent of agreement with each statement.

### 6. Data Analysis

The data collected were analyzed using SPSS for descriptive and preliminary statistical analysis, while AMOS was used to test the hypothesized model using Structural Equation Modelling (SEM).

### Results, Analysis and Interpretation

In this section, the demographic profile of the respondent is discussed. Further, the results and interpretations are provided under this section.

### Demographic profile of respondents

The data indicates that 51.7% of the respondents were female, while 48.3% were male, suggesting a slightly higher participation rate among female employees. In terms of age distribution, the majority (44.6%) of the respondents were in the 31–40 age groups, followed by 32.8% in the 21–30 age groups, highlighting that a significant portion of the responses came from early to mid-career professionals.

With regard to educational qualifications, approximately 65% of the respondents held a bachelor's degree, while the remaining had completed a master's degree. This shows that the majority of the participants possessed undergraduate-level education.

In terms of industry representation, 47.5% of the respondents were from the IT and ITES sectors, 29.5% from the manufacturing sector, and 23% from the service sector, which includes private sector banks. This distribution reflects a diverse sample across key industries in Chennai and Bengaluru.

Structural Equation Modelling (SEM) technique was adopted to test the proposed conceptual model using Analysis of Moment Structures (AMOS 20) software. It analyses the path relationship between the dimensions of AI application (i.e., Independent variables) and the dimensions of HR Agility (i.e., Dependent variable).

### Findings

Employee health and well-being are of critical concern to organizations, as a healthy workforce contributes to increased productivity and revenue. HR teams can leverage AI-enabled connected devices and wearable technologies to monitor employee health indicators, such as dietary intake, physical activity, and vital signs. By analyzing this data, HR professionals can identify potential health risks and intervene proactively to mitigate issues before they escalate. Additionally, AI can monitor operational environments—such as machines, equipment, or gas pipelines—through sensors that detect critical levels or faults, thus ensuring the safety of employees. For instance, AI sensors can track pressure levels in gas pipelines and trigger alerts to prevent leakages or accidents. The findings of this study highlight that improvements in employee health and safety significantly enhance HR agility, particularly through the mechanisms of Organizational Network Analysis (ONA) and effective organizational design.

Furthermore, advanced AI technologies like eye-tracking sensors can monitor eye movement patterns to detect distractions or fatigue during work hours. These insights help HR departments understand productivity patterns and environmental factors—such as background noise or lighting—that may be affecting employee focus. For example, if an employee frequently experiences drowsiness during early afternoon hours, HR can design wellness programs or adjust workloads to maintain performance. This alignment of AI insights with proactive HR strategies supports digital transformation within the function and enhances organizational agility. The study's findings reinforce existing literature in this area.

Another significant challenge in HRM is obtaining genuine employee feedback, especially concerning sensitive or official matters. Often, traditional feedback mechanisms fail to capture employees' true emotions or concerns, leading to the development of ineffective strategies. AI applications can bridge this gap. For instance, facial recognition tools or

emotion-detection algorithms can analyze employee expressions during or after meetings to assess emotional responses. Images captured post-interaction can be processed using computer vision to detect signs of dissatisfaction or stress. These insights can be sent to HR systems in real-time, enabling timely responses and fostering a more empathetic and responsive work environment. This capability allows organizations to continuously adapt to employee needs, thereby promoting HR agility. The findings of this study are consistent with prior research in this domain.

In addition, AI can detect behavioural patterns associated with mental health conditions such as anxiety or depression. Cameras and sensors can monitor employee behavior throughout the day, and AI algorithms can compare these behaviours with known indicators of psychological distress. If signs of depression or anxiety are identified, the system can alert HR, prompting appropriate interventions such as counselling or mental health support. However, while this can support employee well-being, it also raises concerns regarding privacy and organizational design. Over-monitoring may lead to discomfort or mistrust among employees. These findings stand in contrast to certain earlier studies, suggesting that the implementation of such technologies requires careful ethical consideration.

AI-powered tools can also be employed to track employee attendance and detect absenteeism. This is particularly effective in roles that require desk-based work, where sensors can monitor employee presence and productivity. However, for field-based roles that involve mobility and variable locations, such tracking becomes impractical. Therefore, AI-driven attendance tracking should be context-sensitive and role-specific. This observation aligns with previous research, which emphasizes the importance of customizing AI applications based on job functions and work environments.

### Conclusion, Limitations and Scope for Future Study

Implementing AI in Human Resource Management (HRM) offers numerous benefits for both HR departments and employees. However, these advantages come with several cyber security risks and legal concerns. Collecting more employee data raises significant privacy issues, and the increasing use of connected devices heightens the likelihood of cyber security attacks. Therefore, before deploying AI-driven HR systems, organizations must ensure that employee data is adequately protected. Additionally, organizations need to develop data-driven security measures that monitor the data itself—not just the network infrastructure—to effectively mitigate cyber security risks.

This study has explored the application of AI concepts across various emerging areas within HRM, many of which are not part of traditional HR activities. Nevertheless, addressing these areas is crucial as they represent dimensions that enhance human aspects through AI integration. The findings reveal how these factors contribute to enhancing HR agility. The digitization of HR processes and the adoption of Organizational Network Analysis (ONA) are closely related technological advancements that enable an iterative and dynamic HR function. Both of these elements require a robust organizational design to support successful implementation and ongoing development. Thus, this study offers a novel contribution by linking these two critical elements in the context of today's Industry 5.0 era.

Few businesses currently use AI in their HRM or develop AI-based HR software, as this field remains relatively new and underutilized, particularly in India. Consequently, conducting comprehensive studies is difficult because most organizations apply AI only to a limited extent within their HR processes. Although AI has been widely researched as a topic, assessing its true effectiveness and impact in HR is challenging due to the limited number of organizations fully integrating AI into their HR practices. Increasing the number of interviews could enhance the study's relevance, allowing for a more thorough comparison and analysis of responses.

As this study has demonstrated, the use of AI in recruitment remains a relatively new area of exploration. To gain a deeper understanding of its implications, further research on AI in HR should be pursued. While this study incorporated empirical data from several organizations, future research could focus on organization-specific cases as more information on AI adoption becomes available. Including organizations that have yet to implement AI but plan to do so could also provide valuable insights and a broader perspective. Despite the potential advantages of AI in HR, several challenges and concerns must be addressed. A primary issue is the risk of bias in AI algorithms; if these systems are trained on biased data, they may perpetuate or even amplify existing inequalities in HR practices. Another significant concern is the potential for job displacement due to automation, as increasing AI integration in HR functions could reduce the need for certain HR roles.

Furthermore, using a quantitative approach, it could be investigated how AI based HR decisions have impacted company success and turnover in numerical terms. Because there are trust issues with AI, employees' perspectives and experiences with AI-based HR practices could be studied to gain more perspectives on this topic.

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