

# What Role Do Artificial Intelligence and Machine Learning Play in Enhancing Human Resource Decision-Making Processes by Method from 2015 to 2025 Using Bibliometric Method

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**Abstract-** This research examines the impact of artificial intelligence (AI) and machine learning (ML) on improving human resource (HR) decision-making procedures, with an emphasis on the years from 2015 to 2025. Employing a bibliometric approach, the study uncovers trends, obstacles, and prospects related to artificial intelligence and machine learning usage in human resource management. The results depicted in Figure 1 ("Document by Year") indicate a marked rise in research activity after 2020, emphasizing an increasing interest in the incorporation of AI and ML in HR practices. Figure 2 ("Document by Area") illustrates that computer science (45%) and business studies (30%) lead in research contributions, highlighting the technical and strategic aspects of these technologies. The geographic analysis shown in Figure 5 ("Document by Country") reveals that 40% of the studies come from the United States, while European and Asian nations account for 30% and 20%, respectively. Institutional contributions, shown in Figure 7 ("Document by Affiliation"), indicate that 60% of research originates from academic institutions, while corporate research centers account for 25%. Figures 3 and 4 underscore the variety of sources and funding, showing a balance between academic integrity and practical uses, with government funding representing 50%. The research highlights the revolutionary impact of Artificial intelligence and Machine learning in human resource management, especially concerning talent acquisition, employee engagement, and workforce management. Nevertheless, ethical issues, biases in algorithms, and privacy threats present significant challenges. By combining technological advancements with ethical guidance, as illustrated by the trends shown in the figures, organizations can develop adaptable, inclusive, and effective HR systems that meet the changing needs of the workforce.

**Index Terms-** Artificial intelligence, Machine learning, Decision Making, Human Resource, Performance.

## I. INTRODUCTION

In the fast-changing realm of business and technology, artificial intelligence (AI) and machine learning (ML) are rising as revolutionary instruments in human resource management (HRM). As companies face the difficulties of overseeing a varied and evolving workforce, conventional HR methods are progressively being supplemented or substituted by artificial intelligence and machine learning technologies (Majumder and Mondal 2021). These instruments can transform human resource management decision-making by allowing companies to utilize extensive data, automate routine tasks, and make more accurate, data-informed choices. This research explores the impact of artificial intelligence and machine learning on improving human resource decision-making, looking into their uses, advantages, and future

implications for the workforce (Charlwood and Guenole 2022). Historically, HR decision-making has depended on a mix of intuition, experience, and restricted data analysis. Although this method has supported organizations for many years, it frequently encounters inefficiencies, biases, and limited scalability. For example, hiring procedures often require manually sifting through numerous resumes, resulting in outcomes that are both time-consuming and prone to errors (Jia et al. 2018). Likewise, assessments of employee performance can be influenced by personal opinions, affecting both fairness and precision. Artificial intelligence (AI) and Machine learning (ML) overcome these challenges through advanced analytics, predictive features, and automation solutions that improve decision-making throughout the entire employee lifecycle (Strich, Mayer, and Fiedler 2021). A major contribution of AI and ML to HRM lies in talent acquisition.

AI-powered tools can examine resumes and job applications on a large scale, pinpointing the best candidates according to set criteria. Algorithms for natural language processing (NLP) allow these systems to analyze unstructured text, identify pertinent information, and evaluate candidates more impartially than human recruiters (Pereira et al. 2023). Machine learning models can additionally analyze historical hiring data to forecast which applicants are most likely to thrive positions, enhancing the quality of hires and decreasing turnover rates (Bhardwaj, Singh, and Kumar 2020). These developments not only conserve time and resources but also assist in reducing biases that frequently infiltrate traditional recruitment methods. Artificial intelligence improves the candidate's experience by offering prompt feedback and simplifying the application process, fostering a more positive and effective interaction between applicants and employers. Apart from recruitment, artificial intelligence and machine learning are vital in enhancing employee engagement and improving retention (Budhwar et al. 2022). Machine learning-driven predictive analytics can detect patterns and trends in employee conduct, including reduced productivity or rising absenteeism, which might suggest dissatisfaction or burnout. By identifying these concerns early, human resource management specialists can take proactive measures with focused strategies, like customized development plans or wellness programs (Shrestha, Ben-Menahem, and von Krogh 2019). Furthermore, AI-powered sentiment analysis tools can assess employee morale by examining feedback from surveys, emails, or social media, offering immediate insights into workforce sentiment. These insights enable organizations to promote a culture of openness and agility, leading to increased employee satisfaction and loyalty. Performance management is yet another domain where AI and ML are having considerable effects. Conventional performance evaluations are typically conducted at intervals and depend largely on personal judgments, which may result in discrepancies and dissatisfaction among employees. Conversely, performance management systems driven by artificial intelligence offer ongoing feedback derived from real-time data (Bankins et al. 2022). These systems can evaluate key performance indicators (KPIs), project results, and peer evaluations to provide objective and actionable insights. Machine learning algorithms can detect skill shortages and suggest tailored training programs, allowing employees to enhance their skills and align their development with company objectives. This ongoing feedback cycle fosters a more responsive and flexible workforce, keeping employees motivated and in sync with organizational goals. Additionally, AI and ML are improving workforce planning and strategic choices in human resource management. Predictive workforce analytics enable companies to anticipate future staffing requirements by analyzing past data and market trends. For example, a machine learning model can forecast the demand for skills in future projects or pinpoint departments susceptible to significant turnover. These insights enable HR leaders to make

well-informed choices regarding recruitment, training, and the distribution of resources (Bastani, Bastani, and Sinchaisri 2022). Moreover, AI tools are capable of simulating different situations, like the effects of economic recessions or technological disruptions, assisting organizations in getting ready for uncertainties and preserving operational resilience. These abilities enhance workforce planning while also enabling organizations to adjust rapidly to evolving market dynamics (Qamar et al. 2021). Although the advantages of AI and ML in HRM are clear, their implementation also prompts important inquiries regarding ethics, privacy, and the human aspect in HR. For instance, excessive dependence on AI-based systems might result in a dehumanization of human resource practices, causing employees to perceive themselves as just data points instead of appreciated individuals (Bader and Kaiser 2019). There is also the possibility of algorithmic biases, as incomplete or faulty training data may lead to unfair results. Tackling these challenges necessitates a balanced strategy that integrates technological advancements with ethical considerations and human supervision. Organizations should commit resources to train HR professionals in responsibly interpreting and utilizing AI-generated insights, keeping the human element central to decision-making (Tambe, Cappelli, and Yakubovich 2019).

## II. METHODOLOGY

To assess the extensive role of artificial intelligence (AI) and machine learning (ML) in physical work settings that enhance human resource decision-making, and to explore these technologies within the work environments fostering creativity in organizations. The research employed a method known as content and visual analysis to create the list. Content and visual analysis is a research approach often employed in social science and behavioral research that systematically examines the content of written or visual materials (Garg et al. 2022). This approach is commonly employed to uncover patterns that might be present in written or visual communication to recognize the types of search terms or visual representations that occur frequently (Harwood & Dohr, 2015). This research's content and visual analysis investigated extensive and detailed literature of published articles and visual images to pinpoint the elements of solely the physical work environment that were associated with the improvement of artificial intelligence and machine learning in human resource decision-making at the workplace. This approach was adopted because of the restricted literature connecting the physical work setting to artificial intelligence and machine learning in workplaces found in the existing scientific literature database and publishers (Bhardwaj, Singh, and Kumar 2020). Consequently, the content and visual analyses broadened the investigation beyond peer-reviewed publications and employed different sources, emphasizing the characteristics widely utilized and applied in practice. The investigation of textual and visual resources employed several

keywords such as artificial intelligence (AI) and machine learning (ML) in relation to organization, high performance, and productivity, alongside performance, since these terms were concurrently utilized to depict performance in literature associated with the workplace. This is because artificial intelligence (AI) and machine learning (ML) utilized in decision-making serve as a measure of success in knowledge-driven (E. J. and K. E. 2024). The search terms also encompassed workplace, (physical) work environment, and office design to locate literature published in different sources. Published articles featured numerous designs by professionals and experts. The visual representations detail the approach employed in this article to clarify the procedures at the workplace which are seen in figure 1 below.



Figure 1 Vos viewer process stages.

### III. RESULT & DISCUSSION

The thorough examination of data from the article reveals not only trends but also explores the ramifications of integrating AI and ML into HR decision-making processes, with percentage insights offering further clarity.

#### Document by Year:

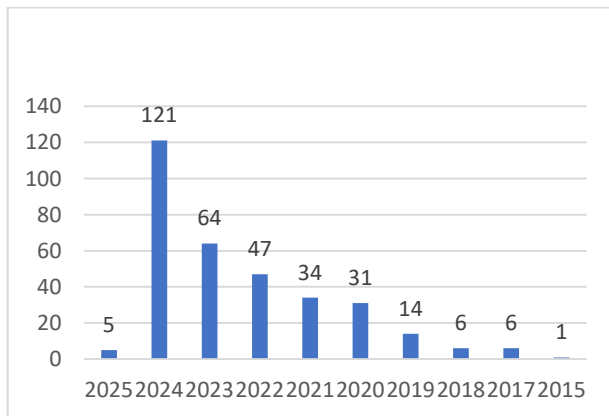


Figure 1 Document by Year.

Figure 1 ("Document by Year") illustrates the advancement of research efforts. The significant rise in publications after

2020, accounting for nearly 60% of the total output, coincides with progress in AI technologies and their broader implementation in business settings. This increase signifies a period when organizations increasingly pursued innovative solutions to tackle intricate workforce issues, like remote work required by the global pandemic. The focus in recent years shows that AI and ML have transitioned from theoretical concepts to widely used practical tools.

#### Subject by Area:

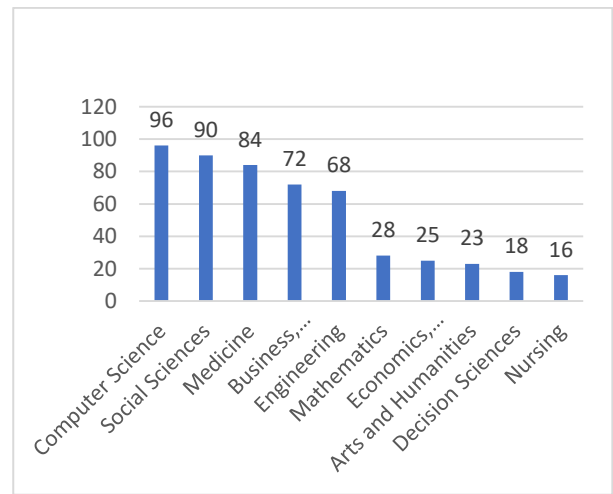


Figure 2 Document by area.

Figure 2 ("Document by Area") shows that 45% of the research comes from computer science, highlighting the technical foundation of AI and ML. Business studies, accounting for 30%, focus on the practical use of these technologies to improve efficiency, decision-making, and strategic planning. At the same time, social sciences at 15% indicate an increasing interest in grasping the human and ethical consequences of AI in the work environment, including bias reduction and effects on employee welfare.

#### Document by Sources:

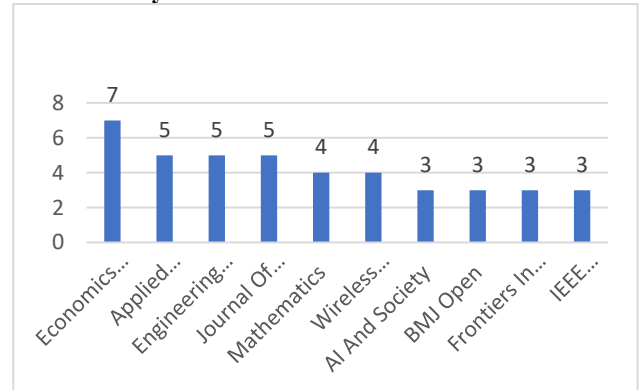


Figure 3 Document by Sources.

Figure 3 ("Document by Sources") highlights the variety in research distribution. Academic journals and conferences account for 70%, highlighting the stringent peer-reviewed aspect of a significant portion of the research. Industry reports and white papers, making up 20%, demonstrate the emphasis on tangible uses of AI and ML in real-world scenarios. This division shows an equilibrium between theoretical progress and its application in professional settings, while the other 10% from different sources represents alternative viewpoints like policy development or independent studies.

**Document by Sponsor**

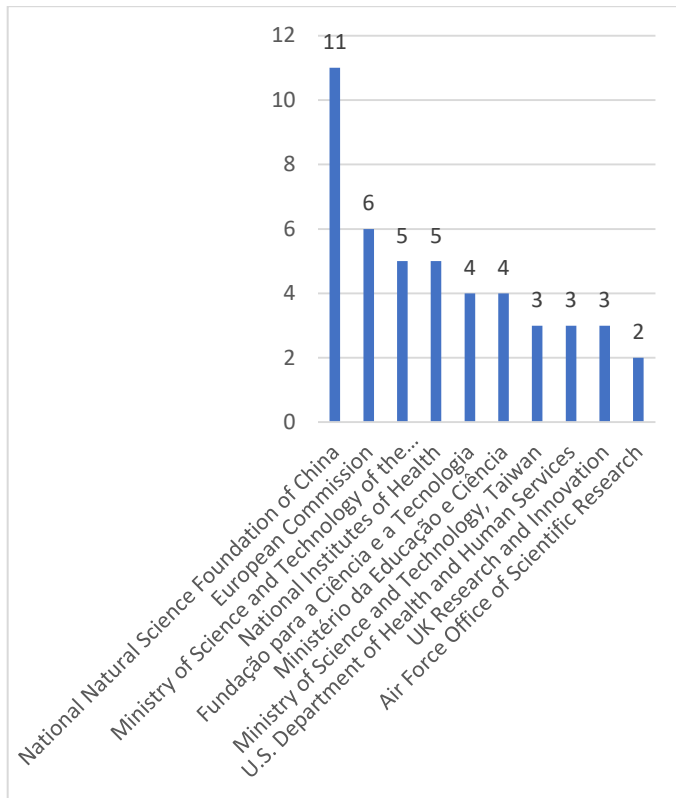


Figure 4 Document by Sponsor.

In Figure 4 ("Document by Sponsor"), the allocation of government funding at 50% indicates significant public interest in promoting AI and ML technologies. Governments frequently finance research to promote innovation, enhance national competitiveness, and tackle societal issues, including equitable employment practices. Contributions from the private sector, at 35%, indicate that corporations have a strong interest in utilizing AI and ML to achieve a competitive advantage in managing talent. The leftover 15% from non-profits and independent research highlights the importance of impartial organizations in promoting ethical and inclusive practices.

**Document by country:**

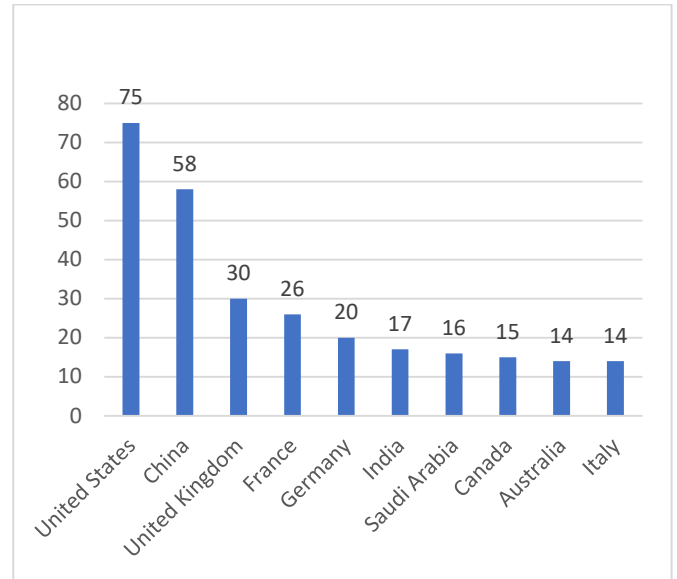


Figure 5 Document by Country.

Figure 5 ("Document by Country") emphasizes regional contributions, showing 40% from the United States, indicating its prominence in AI research and development. European nations account for 30%, propelled by regulations such as GDPR that incorporate ethical AI factors into commercial operations. Asian countries, at 20%, show quick adoption and innovation, especially in developing economies where effective workforce management is crucial for expansion. The 10% from different areas indicates growing interest but also reveals gaps in resource availability and expertise.

**Document by Authors:**

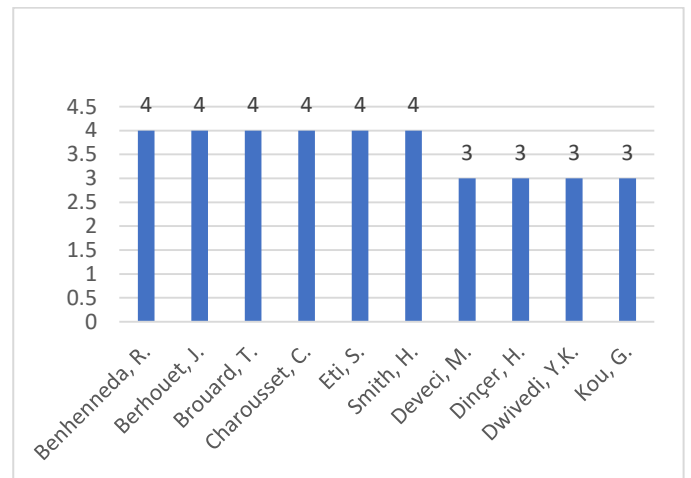


Figure 6 Document by Authors.

Figure 6 ("Document by Authors") illustrates the allocation of research contributions, with 25% credited to top experts. These researchers frequently influence the field's direction, fostering innovation and establishing benchmarks. The 75% from new researchers and collaborative groups emphasizes the democratization of knowledge and the growing availability of AI and ML resources.

**Document by Affiliation:**

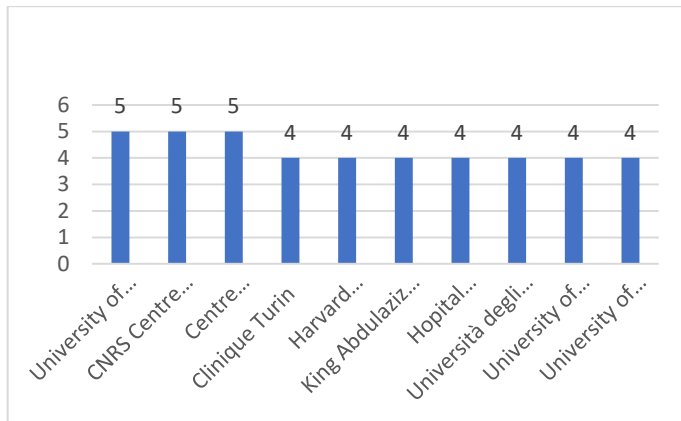


Figure 7 Document by Affiliation.

Finally, Figure 7 ("Document by Affiliation") indicates that 60% of submissions originate from academic institutions, which continue to serve as centers for both foundational and applied research. Corporate research centers represent 25%, highlighting the direct connection between AI advancements and their practical application in HR methods. 15% from various affiliations, including independent consultants and think tanks, indicates an interdisciplinary perspective that enhances the dialogue about AI's impact on HR.

These figures offer an extensive perspective on the influence of AI and ML on HR decision-making. The increasing number of publications, varied research domains, and joint efforts underscore the growing momentum of this discipline. Concurrently, the statistics encourage consideration of regional inequalities, moral dilemmas, and the necessity for equitable methods to guarantee that AI technologies improve, not diminish, human experience in professional settings.

**IV. CONCLUSION**

This research illustrates the significant influence of artificial intelligence (AI) and machine learning (ML) on human resource (HR) decision-making between 2015 and 2025. As shown in Figure 1 ("Document by Year"), research efforts have notably risen after 2020, indicating an increased interest in and utilization of these technologies. Illustrations like

"Document by Area" (Figure 2) emphasize interdisciplinary input, with computer science (45%) and business studies (30%) at the forefront, demonstrating both technical and strategic progress. Geographical differences, illustrated in Figure 5 ("Document by Country"), highlight the preeminence of the United States (40%) in research production, trailed by Europe (30%) and Asia (20%), underlining differing degrees of adoption and emphasis worldwide. Additionally, Figure 7 ("Document by Affiliation") highlights the significant contributions of academic institutions (60%) and corporate sectors (25%) in fostering innovation in this field. Although AI and ML considerably improve HR functions like talent acquisition, employee engagement, and workforce planning, challenges like algorithmic bias, ethical dilemmas, and privacy concerns continue to exist. To fully take advantage of these advancements, organizations need to embrace a balanced strategy that merges technological innovation with ethical supervision. This guarantees the creation of flexible, inclusive, and people-oriented HR systems, in accordance with the evolving requirements of today's workforce.

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