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Article

Innovating HRM recruitment : a comprehensive review of AI deployment

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INNOVATING HRM RECRUITMENT: A COMPREHENSIVE REVIEW OF AI DEPLOYMENT

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Abstract: *Recently, the integration of digitalization has led to the prevalence of artificial intelligence (AI) in human resource management (HRM), such as the utilization of artificial intelligence (AI)-based applications during the recruitment process. These AI-driven technologies have risen to prominence due to their ability to facilitate synergistic collaboration between humans and computer intelligence to effectively achieve desired goals. This paper reviews the research conducted on AI-based HRM and its consequences for recruiting outcomes. The systematic literature review is based on a search within the Web of Science and Scopus databases, which resulted in 46 peer-reviewed journal articles published from 2019 to 2023. The findings of the study were divided into five categories: (a) AI-based HRM, (b) ethics of AI in HRM, (c) benefits of AI-enabled selection tools, (d) risks of AI-enabled selection tools, and (d) usage of AI in recruitment in different country contexts. This paper provides a general overview of AI-based HRM management and its duality and complexity. One of the toughest challenges for HRM is to maintain a collaborative spirit when human workers are with AI-enabled robots' side by side. Organizations are required to perceive both the potential risk and the opportunities that AI recruiting tools may generate. From the perspective of article outcomes, the majority of related studies have been performed in African and Asian countries, which suggests that there is a lack of empirical studies in the European region. One of the major causes may be assumed to be legislation issues, precisely general data protection rules (GDPRs), which hinder the process of adopting technology-based recruiting tools. During AI decision making, fairness should be at the centre of the procedure. Despite some preferences for AI recruitment, such as streamlining HR tasks, this raises many ethical and legal issues that should be solved—at least balanced—not to leave feelings of unfairness among potential employees. AI-based technology solutions require significant time and effort to peacefully exist in the job market. HR managers should not have the feeling of danger of being replaced by AI recruiting tools. To combine best of both worlds, the collaboration of human resources and artificial intelligence is very prominent; however, surveillance of AI technologies should never be lost. This article sheds light on key trends in the literature and the main drivers and obstacles associated with the adoption of AI-enabled recruiting tools. There is growing academic interest in AI utilization in the HRM process, which has been discussed in the current paper. Additionally, future study recommendations are proposed.*

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1. Introduction. Currently, technology encompasses almost every field and shapes the way things work, thereby causing transformative disruptions (Stanley & Aggarwal, 2019). Through their innovative features, advanced technologies may cause radical changes in existing industries. Human resource management (HRM) has also been impacted by these advanced technologies, which are evident in the form of artificial intelligence (AI), networking, and robotics (Stanley & Aggarwal, 2019). HRM is the process of increasing the smart workforce to help companies achieve their goals, missions, and various objectives (Chilunjika et al., 2022). In different processes, such as recruitment, monitoring employees, coaching and performance management, AI is widely utilized in HRM (Stanley & Aggarwal, 2019). When AI technology is applied during recruitment, it will assist HR management in expanding the population (Nawaz, 2020). It will easily screen suitable candidates in a large pool of talent and neglect inappropriate candidates. Recruitment involves shortlisting and selecting appropriate candidates for an organization (Nawaz, 2020; Chakraborty et al., 2020). This is an area where companies can clearly see prominent and quantifiable outcomes, such as reducing hiring time, increasing recruiter productivity, and enhancing candidate experiences (Sithambaram & Tajudeen, 2022). Organizations and HR recruiters have moved from traditional selection methods to online-based recruitment. When the internet provides the application process, for example, LinkedIn textual profiles may be assumed to be resumes (Tian et al., 2022). AI has the possibility of simplifying important volumes of tasks in the recruitment process. For example, the AI has the capacity to scan, assess and neglect 75% of unqualified Curriculum Vitae (CVs) (Sithambaram & Tajudeen, 2022). AI-based applications are very prominent in terms of utilization during the recruitment process because human and computer intelligence collaborate to achieve the desired aim. Evaluating the application in every single stage is highly important for reaching the right applicant with the right skills, and this approach will empower the whole recruitment process. For instance, the U.S. organization Hirevue introduced advanced AI technology to analyse the language, appearance, and potential candidate response to every question to determine the style of communication. This mechanism will be helpful for choosing the right talent (Nawaz, 2020). In addition to streamlining the recruitment procedure, the system is facilitated to minimize human bias during the interview process (Michelotti et al., 2022). AI-based HRM tools are also efficient at reducing errors. Investments in AI may increase the productivity and performance of employees. AI can be considered an important force for attaining HRM goals, not only for attracting superior talent and enhancing retention but also for developing leadership opportunities (Kshetri, 2021). Moreover, hired employees are complicated to hire and retain.

Approximately 57 percent of companies perceive retention as one of the greatest challenges and concerns. In such instances, AI-equipped tools can assess the individual values of each employee, address prerequisites, pinpoint those warranting salary adjustments, and even potentially identify individuals dissatisfied with their work-life balance. This capacity empowers HR practitioners to proactively address and mitigate certain challenges, potentially preventing their occurrence (Sithambaram & Tajudeen, 2022).

However, AI-based recruitment tools may raise serious concerns about what typically society assumes ethical. This was clearly illustrated in the case of Amazon 2018, when the company abandoned its tested hiring algorithm without human surveillance, which turned out to be biased and discriminatory against women candidates. There are more ethical issues regarding AI recruitment tools, such as data privacy, transparency, and accountability. It is essential for company leaders to consider both the capabilities and risks that AI recruiting tools may generate (Hunkenschroer & Luetge, 2022). Since HR professionals have the opportunity to shape the future working environment, they need to develop skills to ensure that fairness and ethics are at the heart of AI development and HRM management. If we aim to avoid 'bad AI' in HR management, new laws to address the challenges that AI poses will be needed regardless of where we are in the world. Given the ethical values of the AI profession and the threat to these values posed by unscrupulous employers, logically, HR professional bodies should advocate for such regulation (Charlwood & Guenole, 2021). The ethics of AI-enabled selection tools is a very prominent issue. Fairness should be at the midpoint of the recruitment procedure; however, enforcing fairness and privacy issues prominently varies worldwide. In Europe, the existing General Data Protection Regulation (GDPR) supports transparency in AI decision-making and requires the limitation of automated decision-making (Franca et al., 2023). Based on the results of a systematic literature review (SLR), there is a lack of empirical studies in the European region regarding the AI recruitment process, which may be caused by ethical and legislative issues in Europe.

This review emphasizes the novelty of this topic by exploring beyond providing a general overview of AI deployment in HRM. It not only explores the landscape of AI-driven recruiting tools but also sheds light on the opportunities and obstacles encountered during their adoption. Additionally, the review provides a comprehensive summary of the various consequences of AI utilization in recruiting within different country contexts.

This paper reviews the research conducted on AI-based HRM and its impact on recruiting outcomes. Based on these findings, the following research questions are formulated:

1) Which topics have been studied regarding AI-based HRM, and what is its impact on recruiting outcomes?

2) What are the main findings and primary conclusions drawn from the studies?

3) What will be the future need for research regarding AI-based HRM?

2. Methodology and research methods The authors followed six essential stages of methodology for systematic literature review, as recommended by Lacey et al. (2011). This approach involved the use of multiple keywords and their combinations through titles or abstracts. Subsequently, the authors examined the abstracts and, in some cases, other sections of the articles to align them with the research questions posed in this paper. This process aimed to determine the relevance of the articles based on the established inclusion criteria. The following inclusion criteria were used: To identify AI utilization in HRM and recruitment from 2019 to 2023, specific keywords such as AI, artificial intelligence, human resource management, and recruitment were used. These keywords were paired with the Boolean operators "OR" and "AND". The search was conducted using the keywords "AI" OR "Artificial Intelligence" AND "Human Resource Management" AND "recruitment".

The exclusion criteria were as follows: articles, proceedings and conference papers, book chapters, papers published more than five years prior, languages other than English and categories other than business or management. In parallel, relevant data from the selected articles were compiled into a data extraction form (i.e., an Excel spreadsheet) consisting of criteria relevant for establishing the current body of knowledge. The Excel spreadsheet contains the following categories of article details: date of publication, author details, type of article, theoretical objectives, methodology, context, primary findings, and future research directions. A total of 864 articles were screened through databases: Scopus (61 articles) and Web of Science (803 articles). A secondary screening was conducted based on the review's inclusion and exclusion criteria. For a more detailed overview, please see Fig. 1, the flow diagram.

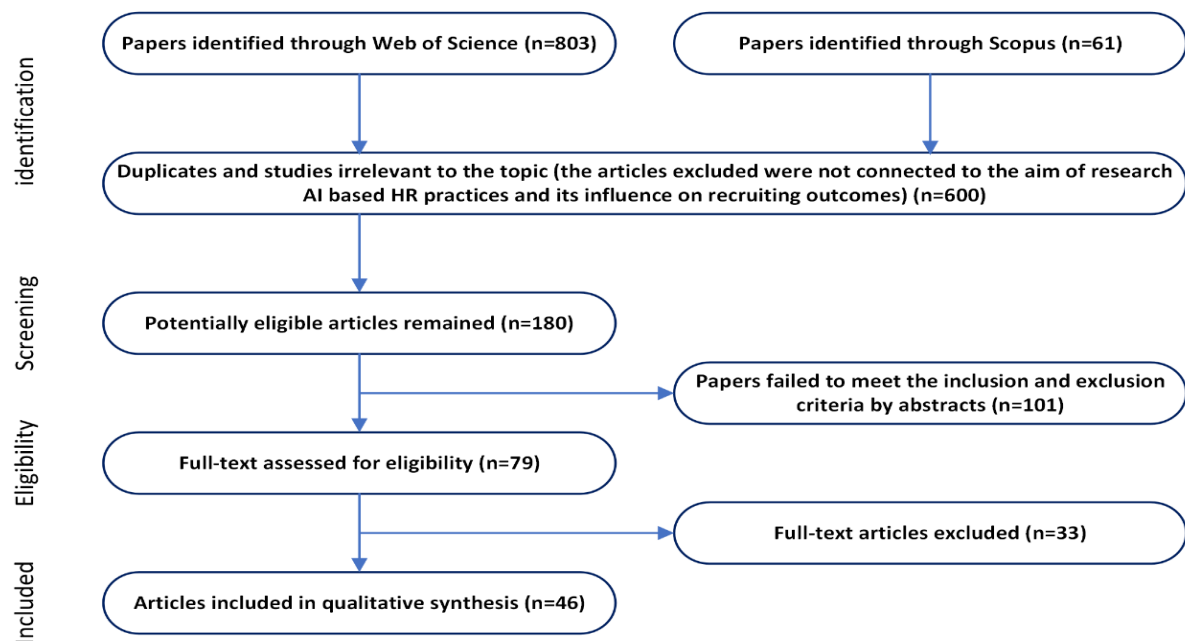


Figure 1. Description of the Systematic Literature Review

Source: Developed by the authors based on the years 2019-2023.

After an initial assessment of 79 papers, based on the inclusion and exclusion criteria and eliminating duplicates, a qualitative review of these articles was carried out by examining the full texts to further narrow the selection. Of the 79 papers reviewed, 33 were excluded after qualitative analysis because they did not address the primary question of this review. The final sample consisted of 46 papers.

After extraction and coding were completed, an in-depth thematic analysis was conducted to identify essential themes from the sample. A few common categories of articles indicating the impact of AI-based technology on HRM were identified.

3. Results. The study's results highlight that recent years have seen intense discussions regarding the implementation of AI and its impact on recruitment. The majority of all articles screened through the Scopus and Web of Science databases were published between 2023 and 2021, which significantly demonstrates that the topic has been highly prevalent and highly debated in recent years. (Figure 2).

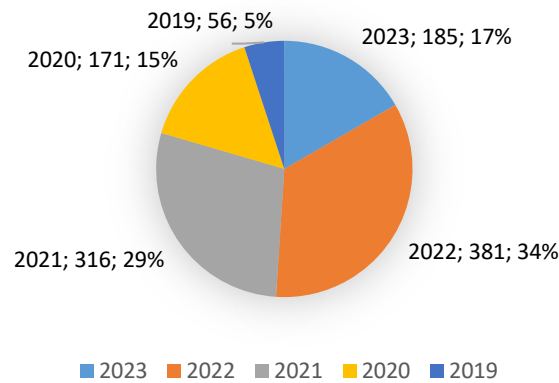


Figure 2. Frequency of articles per year
Sources: Developed by the authors based on the years 2019-2023

A large number and variety of journals contain published articles about AI implementation in HRM and its impacts on recruitment. The final sample consisted of 46 papers that were published in 31 journals, the details of which are presented in Table 1.

Table 1. List of journals and the frequencies of article publication

HRM Journals		OB Journals	
Human Resource Management	5	Career Development International	1
Human Resource Management Review	5	International Journal of Organizational Analysis	1
The International Journal of Human Resource Management	4	Annual review of Organizational Psychology and Organizational Behaviour	2
International Journal of Manpower	3	International Journal of Selection and Assessment	1
South Asian Journal of Human Resources Management	1	I&M Journals	
Asia Pacific Journal of Human Resources	1	Journal of Enterprise Information Management	1
BA Journals		International Journal of Information Management Data Insights	1
International Journal of Business Continuity and Risk Management	1	Journal of Management Information and Decision Science	1
Journal of Business Ethics	2	Management Research Review	1
Business Horizons	2	California Management Review	1
Journal of Business Economics and Management	1	Various Journals	
Business Process Management Journal	1	Journal of Tourism Futures	1
Review of Managerial Science	1	Transfer: European Review of Labour and Research	1
IT Journals		Heliyon	1
MIS Quarterly	2	Management Systems in Production Engineering	1
IEEE Transactions on Engineering Management	1	Technological Forecasting and Social Change	1
International Journal of Scientific & Technology Research Volume	1	Philosophy & Technology	1

Source: Developed by the authors based on the years 2019-2023.

The leading journals that feature such studies include Human Resource Management; however, the extensive range of journals has demonstrated growing interest in these topics across various domains, such as human resource management (HRM) themed journals, business administration (BA) journals, information technology (IT) journals, organizational behaviour (OB) journals, information and management (I&M) journals and the last group of journals.

The selected articles were classified into distinct research categories for analysis:

1. To provide a comprehensive overview of the deployment of AI in HR management.
2. Ethics of AI in HRM - To explore the ethical aspects of AI in HR management, discussing its impacts on the recruitment process.
3. The benefits of AI-enabled selection tools are that they emphasize the positive impacts of AI-based tools.
4. Risks of AI-enabled selection tools – to outline the potential negative aspects and downsides.
5. AI usage in recruitment in different country contexts - to summarize the utilization of AI in recruitment processes across various countries.

3.1. *AI-based HRM*

Considering a total of 18 articles, this category provides an overview of the deployment of AI in HRM. As anticipated, there is growing academic interest in AI utilization in the HRM process (Pan et al., 2021). The following different AI-based applications in HRM can be clustered: "In recruitment selection and onboarding, AI technologies, expert systems, data mining, big data analytics, and natural language processing (NLP)" (Kaushal et al., 2021). Digitalization has made AI prevalent in HRM systems and HR information systems (HRIS). A Tactical HRIS defines a procedure in which HR personnel technology is responsible for performing specific tasks to attain organizational goals and objectives. The tactical procedures of recruitment, employee performance evaluation and satisfaction, employee training and practice analyses have made progress in collaboration with AI (Votto et al., 2021). Scholars outline how technologies are altering HRM-related practices by adopting e-recruitment or e-training procedures that positively affect HRM service quality not only locally but also in international organizations (Vrontis et al., 2021). Generally, machine learning-based technologies are different from traditional knowledge-based systems. AI-based technologies promise to mitigate personal biases and provide more trustworthy information (Van den Broek et al., 2021). HRM departments must balance supervisors and employees in organizations and make jobs easier, including with the aid of AI adoption (Kambur & Yildirim, 2023). For this reason, human resource management has started to adopt AI advanced technologies in the workplace. The authors deemed using AI-enabled tools in organizations in HRM because recruiters cannot make appropriate decisions for the candidate selection procedure (Kambur & Akar, 2022). The main reason can be considered to be the initial preferences of HR recruiters for certain candidates. This is one of the clear examples of when AI-based technologies and human resources are struggling to create a working atmosphere for hybrid intelligence to combine the best of both worlds. The capacity for automated decision making, without human monitoring, can be assumed, as the last step, when artificial intelligence takes over HR tasks (Todolí-Signes, 2019). However, Todolí-Signes argues that whether decisions are made absolutely by HR managers or not, but based on AI-enabled data, increases the credibility of those decisions being discriminatory (Todolí-Signes, 2019). Study findings by Figueroa-Armijos et al., 2022, indicate that performance expectancy influences the ethical perceptions of employees, which in turn provides organizational trust (Figueroa-Armijos et al., 2022). Even if the best candidate is selected through an AI-enabled selection tool, employees may face complex problems, such as loss of performance, job dissatisfaction and low trust in the organization, when they do not feel as if they are part of the company. One of the prominent factors of this can be considered failure to implement successful training and development programs. To develop strong HRM, AI should be implemented; however, surveillance of AI technologies should never be limited (Kambur & Yildirim, 2022).

It was found that when AI was included in development procedures, HRMs and employees may assume that the time spent in training will decrease compared to traditional methods (Kambur & Yildirim, 2023). Additionally, adopting AI-based technologies during the recruitment process facilitates organizations with additional capabilities to hire the most talented employees who will be highly motivated to remain with the organization over time (Johnson et al., 2020). As the future of HR is predicted to be both digital and human, one of the toughest challenges for HRM is to maintain a collaborative spirit when human workers are with AI-enabled robots side by side. AI-driven robot colleagues must be carefully checked and managed by HRM staff to maintain future performance evaluations of employees (Arslan et al., 2021). Suseno et al. (2021) examine the role of cognitive, behavioral, and effective elements of HR managers to determine readiness for AI adoption. The author assumed that change readiness can be impacted by beliefs about AI. During the adoption process, high-performance work (HPW) systems support the procedure of management change, where HPWs provide collective learning, establish commitment, and enable employees to adapt to changes. In the present study, the author refers not only to individuals' personal factors, for instance, beliefs about AI and AI anxiety but also to HPW systems, as the environmental factor impacts individuals' change readiness for AI adoption procedures.

In addition, research (Black & van Esch, 2020) has shown that AI advance tools involve four general sets of activities: outreach, screening assessment and coordination. In the process of outreach, organizations strive to identify potential candidates to obtain job opportunities in ways conducive to promptly applying for a certain position. Once job seekers submit these applications, employers have many tasks to screen them. Generally, companies receive 20-200 applications for every vacancy, so screening them is no longer a mere task. For candidates who successfully pass the screening stage, employers must evaluate them to identify appropriate candidates for the job. This procedure may involve more than one round; however, the most prominent step is to find the best candidate who will receive a certain job offer. AI-enabled tools can be utilized to coordinate with candidates throughout the process. Another study (Sadler-Smith et al., 2022) utilized computerized text analysis to identify linguistic markers of intuition based on HR practices to determine what happens when they intuit. Generally, intuitions arise intentionally and automatically. Understanding when intuitive judgments are being used is also a very significant skill for both HR practitioners and managers. As mentioned above, the intuition process is involuntary and difficult to evaluate for control or monitoring; however, people can access intuitive judgments through spoken or written words. Identifying linguistic factors of intuitions in communications could help to enhance HR practices, such as recruitment and selection processes. Oswald et al. (2020) reported that research and practitioners in industrial-organizational psychology (IOP) and human resource management (HRM) can achieve prominent outcomes through the use of big data and AI to identify how workforce data are measured and analysed and how big data results are legally and ethically implemented by organizational decision makers, employees, and other stakeholders in the employment environment. If organizations incorporate talented IOP and experienced HR practitioners, they can effectively bridge their discipline and have valuable assets for all aspects of the organization. Pan et al. (2021) presented the technology, organization, and environment (TOE) model from information systems and integrated it with transaction cost theory to identify facilitators of and constraints on the adoption process of AI in recruitment. Generally, a company has two kinds of costs: transaction and production costs. The transaction cost is the total required cost for coordinating people and machines in production, and the production cost is defined as the overall cost for all physical processes necessary for production. Adopting AI may reduce the production cost of recruitment by saving human capital. However, if the transaction costs exceed the production costs, organizations are likely to neglect AI implementation. Specificity and uncertainty are the main limitations for transaction costs. Mainly, uncertainty defines an organization's beliefs that the future of technology is unpredictable. Therefore, according to the abovementioned factors, greater uncertainty in AI may reduce the chances that companies will implement AI technologies in the workplace. Tambe et al., 2019 emphasize the circumstances surrounding the AI path regarding employee management. The author identifies four basic reasons for this as follows: complexities in HR management; data challenges due to HR operations; fairness and legal constraints; and employee attitudes toward AI-based HR management. Park et al. (2021) considered employees' ambivalent attitudes toward AI-based management, shedding light on the complexities that organizations are facing in adopting AI-enabled tools. Providing transparency and interoperability may make sense of AI in the workplace. Human AI collaboration is a crucial issue, and emotional support is assumed to be a human element in the era of AI. Despite the duality and complexity of AI-based management, organizational support mechanisms, such as facilitating environments and educational training, can collaborate with human workers and AI-enabled technologies in teams (Arslan et al., 2021).

3.2. *Ethics of AI in HRM*

This section addresses only 3 articles. Generally, it is important for organizations to assess their employees; in this case, firms obtain essential information regarding their members' capabilities to perform and prevent dissatisfaction. Achievements in technology facilitate a new way of managing talent, which is called intelligent talent management. These tools may help companies find and hire the best candidate and provide ideas for HR managers on how to enhance their hiring procedures. However, fairness is a very important issue in intelligent decision making that raises many legal issues (Franca, et al., 2023). A society's objective must be to create algorithms that make fair decisions; however, the idea of fairness has various perceptions. Fairness should be mathematically facilitated and implemented in machine learning models, which are the basis of AI decision-making. The application environment can be directly explained by what fairness means when establishing AI decision-making. However, enforcing fairness and privacy issues prominently varies worldwide. In Europe, the existing General Data Protection Regulation (GDPR) supports transparency in AI decision-making and requires the limitation of automated decision-making. In all parts of the world, employees have different rights to privacy. Utilizing AI in HRM has the potential to be unethical. As AI becomes more common and prevalent in organizations, existing laws and regulations need to be altered to

protect employees' privacy. Artificial intelligence may perform some tasks more efficiently and innovatively; however, it can also cause privacy concerns (Franca, et al., 2023). Several researchers (Rodgers et al., 2023) suggest the need for a practical framework for HR managers to avoid neglecting ethics in favour of technical and commercial issues. The implemented framework proposes that HRM practitioners frame and evaluate decisions, performance measurements and reward systems as well. The six significant theories that are deployed in algorithmic functioning are "ethical egoism-preference based, deontology-rule based, utilitarianism (principle-based), relativism, virtue ethics, and the ethics of care" (Rodgers et al., 2023).

Hofeditz et al. (2022) suggested that discrimination of AI may result from algorithms, but AI-based decision tools can make visible and retrievable errors; therefore, they can lead to more successful hires and reduced costs, eliminating unethical features and providing diversity in recruitment. The author deems that AI is unlikely to replace humans in recruiting procedures but rather to increase the role of humans to augment human decision-making for better outcomes. Currently, many experts from various fields are striving to determine how to ensure that AI-based decisions are totally fair and unbiased (Franca, et al., 2023). To succeed, organizations are required to commit resources, mainly through AI-impacted cost predictions rather than purely through financing from the HR development perspective (Rodgers et al., 2023). Despite some attempts to discuss ethical issues related to AI in HRM and in recruitment, the question of how AI-based tools can be provided ethically and legally in various countries is still unanswered.

3.3. *Benefits of AI-enabled selection tools*

The current category included 9 articles regarding AI recruiting capabilities—its opportunities during the recruiting process. Notwithstanding the fact that human elements play a prominent role in the recruitment process, organizations are striving to digitize part of selection procedures and adopt artificial intelligence- and AI-based decision-making tools (Kochling et al., 2022). Artificial intelligence (AI) can be defined as any procedure that assists firms in recruitment and selection for appropriate candidates, whereas AI has the ability to interpret external data correctly, to learn from such data and to utilize learning benefits to attain specific goals (Hunkenschroer & Luetge, 2022). An AI recruitment tool can be defined as an opportunity for technology to improve the recruitment process. According to one of the authors (Qamar et al., 2021), seventy-seven percent of consumers intentionally or unintentionally utilize AI-based technologies, such as interactive chatbots, smart wearable technologies and digital assistants. Since the end of 1970, AI has demonstrated great potential for enhancing human decision-making procedures and various advantages in business settings. Employing AI in recruitment procedure job seekers is automatically assessed through the use of several factors, such as the university they attended and industry-wide experience. This sample AI-based algorithm allows organizations, such as Unilver and L'Oréal, to sort out applicants and save recruiters time and effort (Islam et al., 2022). The advantages of AI-enabled selection tools include increased efficiency in handling and screening applicants, time-saving procedures for hire and total recruitment costs (Kochling et al., 2022). Algorithmic decision making provides analytical capabilities, such as analysing candidates' personal features from applications and predicting their potential work performance (Kochling et al., 2022). Compared with traditional selection methods, AI advanced selection tools are assumed to be attractive for organizations due to their high speed and efficiency (Acikgoz et al., 2020). Stakeholders of AI-enabled recruiting systems argue that their hiring software not only makes the procedure efficient but also more accurate and less biased since these tools are free from human intuition (Trocin et al., 2021).

Kot et al. (2021) investigated the influence of AI to determine the implications for AI adoption and employer reputation. It was shown that AI mediates the relationship between AI-based recruitment tools and employer reputation through the same mediation function. AI-based recruiting tools aid organizations in accelerating the process at minimum expense, saving time and attracting potential employees worldwide. Corporate websites serve in the recruitment process and ensure the hiring of employees to disseminate information about available vacant positions in organizations. Additionally, advanced AI applications have created a mechanism through which employees share knowledge with and through machines through which employee AI enables technologies for AI-mediated knowledge sharing (AI-MKS). Employees share knowledge utilizing AI-mediated knowledge sharing through HRM-focused AI-based applications. AI-MKS provides several benefits, such as flexibility in knowledge sharing, without time or space limitations. This type of knowledge sharing is very beneficial in multinational organizations or when employees are geographically separated from each other (Malik et al., 2023).

Moreover, (Black & van Esch, 2021) emphasize that AI-enabled selection tools can drive competition for talent through net balances of supply and demand. This approach opens doors for passive job candidates (those who are not actively looking for a new job opportunity). Previously, passive jobseekers were visible only through executive search organizations. Currently, changes in the net balance between workforce supply and

demand can intensify competition for human capital. The authors argue that advanced AI selection tools will intensify the war for talent. However, managers should not consider that in times when supply exceeds demand, employees, who are passive candidates, are safe and secure. AI-capable recruiting tools can identify those employees, and their switching costs are much lower than they were before. This is the basic reason why 80% of employees consider an unsolicited job option. In this section, the positive consequences of AI recruiting tools are discussed. A summary of the results is presented in Table 2.

Table 2. Summary of the benefits of AI-enabled selection tools

Benefits	Main points of benefits
Enhanced efficiency and time savings (Islam et al., 2022; Kochling et al., 2022)	Streamlining applicant handling and screening processes for higher efficiency. Expedited hiring procedures leading to time savings. Reduced overall recruitment costs.
Accuracy and reduced bias (Kochling et al., 2022)	AI tools offer more accurate and less biased outcomes compared to human intuition. Facilitating fairer selection processes.
Knowledge sharing (Malik et al., 2022a)	AI enabled knowledge sharing benefiting from flexibility and overcoming geographical limitations.
Driving competition for talent (Black & van Esch, 2021)	AI enabled tools driving competition for talent by tapping into passive job candidates. Reducing transition expenses for passive candidates and increasing the competition for talented individuals.
Global attraction (Kot et al., 2021)	Attracting potential employees globally by utilizing AI based tools. Utilizing corporate websites for recruitment to disseminate information about vacant positions.
Advanced analytical capabilities (Kochling et al., 2022)	Leveraging algorithmic decision-making to analyse candidates' personal attributes and predict potential work performance. Utilizing AI to assess factors such as education and industry experience

Source: Developed by the authors based on the years 2021-2022.

These categories of benefits underscore the potential of AI-enabled selection tools to significantly enhance recruitment processes; contribute to efficiency, accuracy, and global outreach; and improve decision-making while creating new dynamics in talent acquisition and competition. Despite the fact that there are several opportunities addressed, this field still needs to be carefully investigated since the continuous development of AI.

3.4. Risks of AI-enabled selection tools

In this cluster, 5 articles were identified. Along with the positive aspects of AI tools in the recruitment process, they may also generate serious ethical conflicts. This was clearly the case for Amazon in 2018, when the company abandoned its testing algorithm without human monitoring, and it was biased and discriminatory against female applicants (Hunkenschroer & Luetge, 2022). Utilizing AI in activities such as analysing employees' performance data, predicting future performance, and inferring employees' satisfaction can cause unethical features, such as biases and unfairness. For example, the expert system for selecting potential applicants may be biased by expert knowledge, which may further provide intentional preferences for a certain gender, specific skills, backgrounds, and ethnic traits (Qamar et al., 2021).

Another crucial concern regarding algorithmic decision-making is employees' acceptance. However, human decisions are perceived to be more trustworthy and fairer and evoke more positive emotions than AI-based decisions in hiring procedures. In the study, the author offered those effective responses (i.e., capability to perform, emotional difficulties) that mediate the environment between AI-based recruitment and organizational attractiveness. Additionally, at later stages, it was discovered that AI advance tools for selection procedures decreased the opportunity to perform and increased emotional complexities (Kochling et al., 2022). A positive outcome of AI was the ability to share information and knowledge through HR management; however, there is risk that poorly equipped AI-based technology may cause cognitive overload for employees. Additionally, this approach may raise the issue of emotional complexities, such as misunderstandings and anxiety (Malik et al., 2022b). Additionally, the increased reliance on AI-based systems has led to the exploration of various challenges in organizations with HRM professionals. The use of AI-enabled tools may cause techno-stress due to a lack of knowledge, and there is an increased chance of mistreatment. Even though AI-based HRM enhances workers' performance and productivity, it also raises the issue of ethical concerns. The author emphasizes the responsibility of stakeholders and describes 11 ethical principles for AI-augmented HRM. These principles are as follows: "The data protection principle, principle of informed consent and

confidentiality, the principle of ownership, the principle of reliability and validity, the principle of predictability, the principle of explainability, principles of intersectionality analysis and impact assessments, the principle of accuracy, the affordances principle" (Prikshtat et al., 2021).

This section provides an overview of the negative aspects of AI recruiting tools. A summary of the results is presented in Table 3.

Table 3. Summary of the risks of AI-enabled selection tools

Risks	Main points of risks
Ethical biases and conflicts (Hunkenschroer & Luetge, 2022)	The potential for AI algorithms to generate biases and unfairness, exemplified by the case of Amazon's algorithm in 2018. Concerns about biased expert knowledge influencing AI selection tools.
Complexities regarding employee's acceptance and trustworthiness (Kochling et al., 2022)	Human decisions perceived as more trustworthy and fairer compared to AI based decisions. The mediation of capabilities and emotional difficulties between AI based recruitment and organizational attractiveness.
Techno stress and unethical features (Prikshtat et al., 2021, Qamar et al., 2021)	Increased reliance on AI based systems may lead to techno stress and mistreatment of employees. Ethical concerns arising from the enhanced performance and productivity achieved through AI-based HRM.
Cognitive overload and emotional complexities (Malik et al., 2022a)	Poorly equipped AI-based technology could lead to cognitive overload and emotional complexities for employees. Risks of misunderstandings and anxiety due to AI-based knowledge sharing.
Stakeholder responsibility (Prikshtat et al., 2021)	The need to comply with the ethical principles, including data protection, informed consent, reliability, explainability, and others.

Source: Developed by the authors based on the years 2021-2022.

These categories of risk underscore the potential challenges associated with the deployment of AI-enabled selection tools, ranging from biases and ethical concerns to challenges related to employee acceptance, cognitive overload, and stakeholder responsibility. The experiment conducted in Europe underscores the ethical implications of AI adoption in HRM. The potential for biased algorithmic decisions can significantly impact employee treatment, and human agreement or reliance on these systems may be much greater than anticipated. It is emphasized that organizations need to carefully consider and address these risks to align AI-based decisions with their goals and values (Hunkenschroer & Luetge, 2022).

3.5. Usage of AI in recruitment in different country contexts

The current chapter provides a comprehensive overview of AI-enabled tools in HRM across various geographical contexts, focusing on the recruitment process. This category contains 11 articles from a systematic literature review (SLR). Along the digitalization process, it is becoming quite challenging for HRM to cope with AI-enabled recruiting tools (Malik et al., 2022b). The majority of the studies were conducted in Asian and African countries. These countries seem to embrace AI technologies, recognizing their potential benefits, such as productivity, strategic management, and cost-effectiveness. Moreover, Scandinavian countries and multinational entities highlight mixed perspectives, emphasizing both the benefits and challenges tied to AI integration. Since the pandemic began, various organizations have faced employee experience and employee engagement issues. The process for examining the adoption of AI-enabled HRM is crucial. Study findings by Malik et al. (2022a) in India indicated that AI-assisted applications for HRM improve employee experience and therefore employee engagement. Additionally, there was obvious enhancement in employee productivity and HR function effectiveness. Another study was performed in India to investigate employees' attitudes and experiences with AI-assisted HRM practices. Ten interviews were also conducted with technology leaders, senior HR leaders and employees who participated in the process of implementing HR-oriented AI applications. The results showed that utilizing AI enabled assistants to carry out a range of HRM-focused routine tasks, improved overall employee experience, and increased HR cost effectiveness. Moreover, coworkers have resulted in enhanced levels of commitment and performance (Malik et al., 2023). Multiple studies have indicated the perceived benefits of AI-enabled tools in HRM practices, such as strategic advantages, the ability to minimize recruitment biases, the promise of a more equitable hiring process, and the cost-effectiveness of the HRM process. Studies across India, South Africa and Malaysia emphasize how AI allows HR personnel to move from daily tasks to more strategic roles, emphasizing a shift from operational to strategic HRM. For instance, a qualitative study conducted in South Africa by Chilunjika et al. (2022) demonstrated that AI-enabled recruiting tools are very beneficial since HRM personnel can focus

on more strategic management rather than routine tasks, which aids in minimizing bias in the recruitment and selection process in public service. Another qualitative study was conducted in Malaysia by Sithambaram & Tajudeen (2022), who investigated the usage and influence of AI in HRM among 12 companies in Malaysia. The results of the study revealed that AI utilization could generate strategic, operational, organizational, and informational advantages for organizations.

In his study, Nir Kshetri (2021), in the Global South (Africa, Latin America, and developing Asia), investigated the role of AI in recruitment pools. The author mainly concentrates on the light side of AI-based elements in the recruitment process, such as reducing biases in selecting candidates and delving through various mechanisms through which AI aids in the development and retainment process of employees. The findings of these case studies can be generalized to developed economies since AI-based HRM tools are highly important in Global South economies. AI implementation in HRM is also beneficial for fighting against corruption, and organizations may have access to a larger recruitment pool during the selection process.

Several studies have addressed employee readiness, acceptance and perception toward AI-enabled tools. A comprehensive study (Islam et al., 2022) in Bangladesh was conducted to identify the primary antecedents of the adoption of AI-based technologies in the recruitment process. The author utilized the lens of the unified theory of acceptance and use of technology model (UTAUT) in quantitative research, with perceived credibility and flexible variables. The data were collected from 283 HR professionals working in different manufacturing firms and service organizations in Bangladesh. The results of the quantitative study showed that not only is the impact of perceived credibility on behavioural intention not supported but also that there is no moderating influence of gender or firm size. The current study using the UTAUT model suggests that, despite the perceived benefits, the adoption rate of AI tools may not always be driven by perceived credibility or influenced by factors such as gender or company size. While AI-enabled recruiting tools offer advantages, there are growing concerns regarding their use. For example, there are valid concerns about AI capturing human biases and preconceptions, especially when these biases influence the algorithm's training data. Another important issue is job security, AI tool accuracy and reliability, and people's fear associated with AI adoption in HRM, which revolves around potential job losses, especially as automation becomes prevalent.

Ore & Sposato (2021) performed an interesting qualitative study from a multicultural multinational organization that aimed to identify opportunities and risks of AI utilization in the recruitment process from the perspectives of HR professionals. The results showed that AI may alleviate recruitment biases; however, there is danger of incorporating human bias into machine learning algorithms. AI-enabled recruiting tools are effective through the automation of some mundane work of HR professionals. However, there is still some fear among workers of the use of AI in recruitment because of limitations in the accuracy and reliability of the technology. There is fear of job losses to automation, even though participants believed their work task would carry on existing, because recruiters may always be humans. Einola & Khoreva (2023) investigated the relationship between humans and AI in the workplace. The authors conducted qualitative studies in different organizations in Finland. The results indicated that the implementation of AI solutions in various organizations requires significant effort and time to peacefully coexist in the job market. The current research provides interesting insight into the dynamics between humans and AI, suggesting that establishing a harmonious coexistence between humans and AI is not always straightforward and requires significant effort and adaptation. A quantitative study by Trocin et al. (2021) developed a framework to describe how AI affordances enable digital innovations. The author conducted a survey in Scandinavian organizations offering HR services. The study investigated how AI affordances are actualized and how to reshape decision-making and provide data-driven legitimization. Bartosika & Modlinski (2022) conducted an experiment in Europe in which 76 subjects were tested under 5 different scenarios in which a biased algorithm provided advice regarding disciplinary functions for employees who disrupted the disciplinary work code. The results of the experiment showed that the biased algorithm may significantly alter how employees are treated and that human agreement toward an intelligent decision support system is broader than predicted.

In summary, this section highlights the fact that, in most cases, where AI was utilized in the recruiting process or in HRM, it has positive consequences. However, there is still a gap in the literature on how employees are ready for AI advanced technologies, how their perceptions are constructed, and how they can be shaped and investigated.

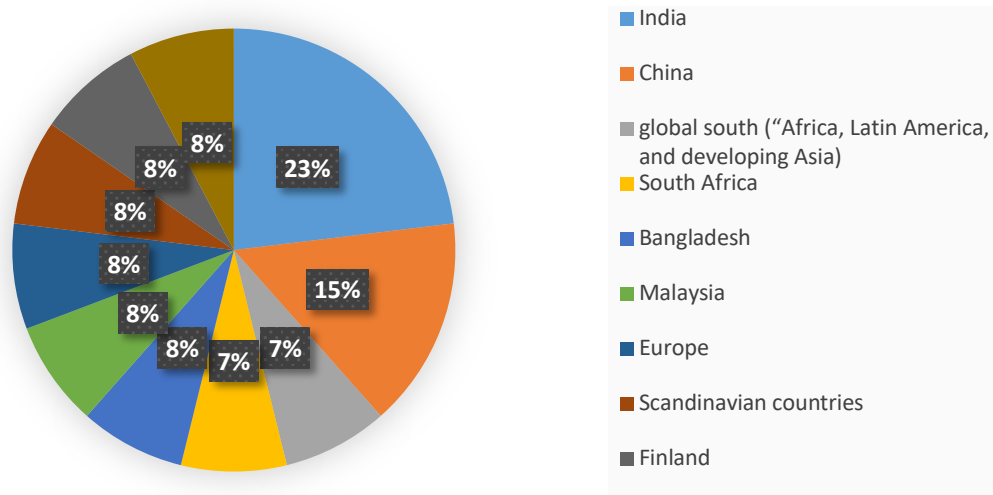


Figure 3. Frequencies of empirical studies per country

Source: Developed by the authors based on the years 2020-2022.

In Table 4, the antecedents and obstacles to recruitment are briefly summarized (with positive and negative marks) from the perspective of employees and organizations located in various parts of the world. Most studies, especially from India, South Africa, and other developing Asian, African, and Latin American countries, show no perceived obstacles when implementing AI in HRM. At the same time, research from developed or multinational regions (Scandinavian countries, Finland, Europe, and multinational organizations) has indicated some obstacles to AI implementation in recruitment. This finding suggests that, compared with developing regions, developed regions or large international organizations might face more challenges or more doubts regarding AI integration. Despite their sizes and resources, international organizations showed similar concerns to those of developed regions. Given the diverse nature of their operations and employees, they might face unique challenges in standardizing AI tools in HRM or ensuring that they meet the varied needs of their workforce.

Table 4. Short description of recruitment obstacles and employee perceptions of different organizations

Organizations per locations references	Recruitment obstacles	Employee's perceptions
India (Malik et al., 2022a)	No	Positive (Enhancement in employee's productivity)
India (Malik et al., 2022b)	No	Positive (HR cost effective)
South Africa (Chilunjika et al., 2022)	No	Positive (Minimizing biases in recruitment)
Malaysia (Sithambaram & Tajudeen, 2022)	No	Positive (Generating various advantages for organizations)
Africa, Latin America, and developing Asia (Kshetri, 2021)	No	Positive (Beneficial to fight against corruption)
Multinational (Ore & Sposato, 2021)	Yes	Negative (Fear of job losses)
Finland (Einola & Khoreva, 2023)	Yes	Negative (Significant time and effort required)
Scandinavian (Trocin et al., 2021)	Yes	Negative (Reshaping decision making)
Europe (Bartosia & Modlinski, 2022)	Yes	Negative (Biased algorithmic decision)

Sources: Developed by the authors based on the years 2020-2022.

Developing regions, especially Asian and African regions, demonstrate a consistent trend of embracing AI without significant obstacles and with positive employee perceptions. In developing regions where no obvious obstacles were reported, employee perceptions were quite positive (Table 4). For instance, employees perceive AI to enhance employee productivity by being cost-effective, minimizing biases in HRM operations, and generating organizational advantages (Malik et al., 2022a, b). According to previous research (Kshetri, 2021), analyses of Africa, Latin America, and developing Asia have demonstrated that the use of AI as a tool can be beneficial for fighting against corruption.

On the other hand, research from developed regions highlighted negative perceptions among employees. These authors expressed concerns about AI's potential to cause job losses, requiring substantial time and effort, reshaping traditional decision-making processes, and possibly introducing biases in AI algorithms (Trocin et al., 2022; Bartosiak & Modlinski, 2022; Ore & Sposato, 2021). This indicates that while these regions may

have advanced technology and infrastructure, they might also have more concerns and skepticism about AI integration and its impact. It is possible to conclude that while AI in HRM is viewed positively in many developing regions, it is evident that much work still needs to be done to address concerns and change perceptions and views in more developed areas and complex international organizational structures. This means that there is a need to develop AI integration strategies based on the specific context that fits the unique needs of each region and organization.

4. Research methods utilized in various studies. Research methods and techniques were analysed for each category (Table 5). Generally, qualitative research methods dominate in various articles. Regarding the specified article groups, "AI in HRM" section, mostly qualitative studies have been used. A systematic literature review, narrative review and bibliometric analyses were then performed to explore possible facilitating and adverse effects of tools on AI adoption in HRM. An ethnographic study was conducted to observe the development process of AI in hiring. In the cluster Ethics of AI in HRM, qualitative methods were applied, and the articles were systematic literature reviews and research papers.

In the categories of benefits and risks of AI-enabled selection tools, qualitative and quantitative research methods are approximately equally utilized. A qualitative research methods-systematic literature review was performed to develop a theoretical framework and understand the consequences of AI-based recruitment tools. Quantitative research methods and cross-sectional surveys were used to explore the primary antecedents of the adoption of AI-based technologies in the recruitment process. Surveys were also conducted to determine whether AI-enabled tools in the recruitment process diminish the opportunity to perform and increase emotional complexities.

In the final category titled "Usage of AI in recruitment, in different country contexts", researchers played a combination of qualitative and quantitative methods, with a predominant focus on qualitative approaches. In-depth interviews were also conducted to explore opportunities and obstacles associated with the use of AI in recruitment and selection. Case studies were performed to evaluate the use of AI in HRM in emerging economies in the Global South. Content analyses were performed to identify challenges, opportunities, and prospects in the AI adoption process in HRM in South Africa. Concerning quantitative studies, cross-sectional surveys are utilized to investigate how artificial intelligence affords digital innovation in various countries. Experimental methods used to determine features of biased intelligent decision support systems in the workplace.

Table 5. Frequency of utilized research methods

Qualitative		Quantitative	
Narrative review	1	Survey, questionnaire	6
SLR	9	Scenario-based	1
Content analyses	3	between-subject	
Case study	2	design	
Observation	1	Experiment	2
Ethnographic study	1	Cross-sectional survey	2
In-depth interview	3		

Source: Developed by the authors based on the years 2019-2023.

To summarize the utilized research methods, it can be assumed that the majority of the articles applied qualitative designs, used leading systematic literature review techniques, and then used sequence questionnaires and quantitative methods to collect additional data, as they were possible and statistically analysed. The high number of SLRs shows that, first, there is a missing theoretical overview, as this is a new topic. Therefore, people are first trying to see how much work has been done thus far.

5. Future directions. The article argues about possible opportunities and obstacles associated with AI-enabled recruitment. The findings of this study were used to cluster several categories of AI implementation in HR management: (a) AI-based HRM, (b) ethics of AI in HRM, (c) benefits of AI-enabled selection tools, (d) risks of AI-enabled selection tools, and (d) usage of AI in recruitment in different country contexts. From the perspective of article outcomes, the majority of related studies have been performed in African and Asian countries, which suggests that there is a lack of empirical studies in the European region. One of the major causes may be assumed to be legislation issues, precisely the GDPR, enforced in the European Union, which hinders AI deployment in HRM and, specifically, in recruitment (Franca, et al., 2023). For future recommendations, the authors suggest the following directions:

- More empirical studies in European regions should be explored since there is a lack of usage of AI-driven technologies during the recruitment process.
- Investigate ethical concerns and legislation issues regarding AI deployment in HRM (Hunkenschroer & Luetge, 2022).
- We conducted an empirical study to compare the costs of manual sorting and those of the AI recruitment process (Kambur & Akar, 2022).
- Investigate the long-term effects of AI integration on employee engagement, productivity, and organizational outcomes.
- Investigate the potential of hybrid solutions where AI and human expertise synergize to optimize recruitment processes.
- In-depth exploration of employee perceptions of AI's impact on recruitment, including concerns, fears, and expectations, is needed.

6. Conclusion. This paper reviews the literature spanning the years from 2019 to 2023, examining the integration of AI in HRM and its implications for the recruitment process. The findings of the study indicate that HR managers should not have concerns about being replaced by AI in the recruitment process. The implementation of AI solutions in various organizations requires significant effort and time to harmoniously coexist in the job market. This can be achieved with successful training and development programs. To build strong HRM, collaboration with AI is necessary. However, surveillance of AI technologies should not be lost. This article describes five prominent categories and offers suggestions for future research directions. The article also explored the frequency of research method utilization in related studies. It should be emphasized that due to the continuous development of AI-based technologies, this topic has not been fully explored, necessitating additional holistic investigations, such as utilizing mixed research methods, to obtain a more precise picture of AI deployment during recruitment. Within the scope of this chapter, it is essential to acknowledge that the chosen timeframe and databases represent limitations of the study. The focus of the study was certain years, English language, articles, and review articles. In the future, the inclusion of other databases, as well as the inclusion of conference papers and other proceedings, may fully cover the outcome of AI-based tools in the recruitment process.

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Інноваційні інструменти в управлінні людськими ресурсами: перспективи використання штучного інтелекту

Інтеграція цифровізації призвела до поширення штучного інтелекту (ШІ) в управлінні людськими ресурсами (HRM), зокрема використання програм на основі штучного інтелекту під час пошуку та найму нових працівників. Ці технології на основі ШІ набули популярності завдяки їхній здатності сприяти синергетичному співробітництву між людьми та комп'ютерним інтелектом для ефективного досягнення поставлених цілей. У цій статті розглядаються дослідження проведені у сфері управління людськими ресурсами на основі ШІ. Вибірку дослідження було сформовано з наукометричних баз даних Web of Science та Scopus і включає 46 наукових статей, опублікованих в період з 2019 по 2023 рік. Результати дослідження було розділено на п'ять категорій: (а) управління людськими ресурсами на основі ШІ, (б) етика ШІ в управлінні людськими ресурсами, (в) переваги інструментів відбору на основі ШІ, (г) ризики використання інструментів відбору на основі ШІ та (д) використання ШІ в наймі у розрізі різних країн. Стаття надає загальний огляд управління людськими ресурсами на основі ШІ, його двозначності та складності. Одним із найскладніших викликів для управління людськими ресурсами є збереження співпраці, коли люди працюють поруч з місцем роботи. Організаціям потрібно сприймати як потенційний ризик, так і можливості, які можуть виникнути в результаті використання інструментів найму на основі ШІ. Авторами наголошено, що більшість пов'язаних досліджень проведено в країнах Африки та Азії, що свідчить про відсутність емпіричних досліджень в Європі. Однією з основних причин може бути припущено проблеми законодавства, зокрема правил захисту загальних даних (GDPR), які ускладнюють процес прийняття на роботу з використанням інструментів ШІ. Незважаючи на деякі переваги ШІ в наймі, такі як оптимізація завдань управління людськими ресурсами, це породжує багато етичних і правових питань, які повинні бути вирішені щоб не залишати враження несправедливості серед потенційних працівників. Авторами наголошено, що менеджерам з питань персоналу не слід відчувати загрозу заміни їх функцій інструментами на основі ШІ. Ця стаття розглядає ключові тенденції в науковій літературі, основні фактори та перешкоди, пов'язані із впровадженням інструментів найму з використанням ШІ. Авторами зроблено висновок, що серед наукової спільноти зростає інтерес до вивчення проблематики використання ШІ в процесі управління людськими ресурсами.

Ключові слова: працівники; найм; HR; рекрутинг; технології; інструменти.