

The impact of artificial intelligence on human resources management recruitment processes: A systematic review

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Abstract - This systematic review paper examines the implementation of artificial intelligence (AI) in Human Resources Management (HRM) recruitment processes. The study includes an analysis of academic, magazine articles, and highly-rated websites in related fields. By exploring the findings of this research, we aim to enhance the general understanding of AI's influence on HRM recruitment. While it is not possible to cover all topics related to this subject, the chosen research methodology is reasonable and encompasses a substantial number of articles pertaining to the core subject area. The results indicate that AI offers significant advantages in recruitment, as technology can effectively support this domain. By automating time-consuming tasks, AI frees up human resources to concentrate on more critical aspects related to performance and development. Implementing automation, cognitive insights, and cognitive engagement in the recruitment process enables systems to mimic human brain functionality, facilitating unbiased, efficient, and rapid data analysis and processing.

Keywords: artificial intelligence; HRM recruitment; systematic review; cognitive insights; cognitive engagement; unbiased processing

Introduction

The business landscape is undergoing rapid transformation, presenting new challenges for human resources (HR) departments. According to the World Economic Forum's Future Jobs Report 2018, the integration of robotics and artificial intelligence (AI) is expected to result in the disappearance of 75 million jobs by 2022, while creating 133 million new jobs (Leopold et al, 2018). The traditional conflict between humans and machines has evolved into a paradigm of human-technology collaboration, with the aim of enhancing human capabilities. In today's global market, organizations seek talented candidates with diverse skill sets to remain competitive.

This paper aims to provide a comprehensive understanding of the implementation of AI in the recruitment process and its impact on three key aspects: screening, human bias, and identifying the best-fit candidate. AI technologies have revolutionized the screening process by enabling automated analysis of large volumes of data, streamlining the initial candidate selection phase. Additionally, the integration of AI systems in recruitment aims to mitigate human biases that can influence decision-making and lead to discriminatory practices. By leveraging AI algorithms, organizations can strive for unbiased and fair evaluations.

Furthermore, AI offers the potential to identify the best-fit candidate for a given role by employing advanced data analytics and machine learning techniques. This facilitates the identification of patterns and correlations in candidate profiles, enabling HR professionals to make informed decisions based on objective criteria.

By exploring these aspects, this paper seeks to shed light on the transformative impact of AI on HRM recruitment processes. Understanding the advantages and challenges associated with AI implementation in recruitment will provide valuable insights for organizations looking to optimize their talent acquisition strategies and adapt to the changing dynamics of the job market.

Keywords: artificial intelligence, recruitment process, screening, human bias, best-fit candidate.

Method

This paper utilizes a systematic literature review methodology to examine previous studies on the implementation of AI in the recruitment process. The research methodology is based on the principles outlined by Jesson et al (2011), as illustrated in Figure 1 (Fig 5.2).

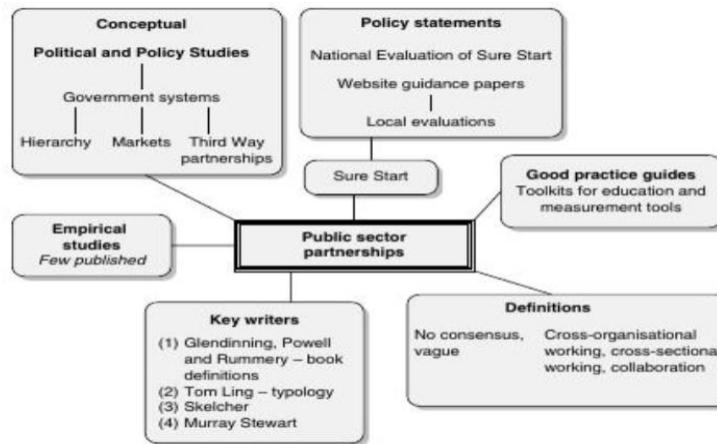


Figure 5.2 Example of a mind map/table sort of materials on Sure Start public partnership evaluation

Figure 1: Six principles methodology (adapted from Jesson et al, 2011; Daghfous, 2023)

The researchers followed the following steps in conducting the study. Firstly, two research questions were formulated to guide the investigation. (1) Which studies have focused on the impact of AI on the recruitment process? (2) What are the results of these studies, considering the inclusion and exclusion criteria? Subsequently, specific keywords were selected to identify relevant studies. The researchers used the search terms "Artificial Intelligence" AND ("Human Resources Management" OR "Recruitment" OR "Talent Acquisition") to conduct searches on databases such as Sage, Scopus, Springer Link, and Emerald. Additionally, grey literature, including non-academic reports, was also considered.

The search yielded a large number of studies, which prompted the researchers to employ techniques to narrow down the results scientifically.

They applied specific year and field limitations to refine the findings. Ultimately, the researchers identified 98 relevant research papers, which underwent manual screening to exclude irrelevant studies. This process led to the selection of 21 papers that directly aligned with the research scope.

The analysis in this research involved a comprehensive examination of the 21 selected studies. The papers covered a ten-year period from 2010 to 2020, focusing primarily on the field of Business and Management. The researchers observed an increasing trend in the number of studies published in the past five years, with recent research predominantly exploring topics such as effective screening, human bias, and best-fit candidate selection.

To supplement the academic literature, the researchers also considered relevant websites and journals that focused on AI adoption in recruitment and HR. Table 1 lists some of the selected websites

Table 1 Selected websites for the study

- www.recruiter.co.uk
- www.marketscreener.com
- www.hrdailyadvisor.blr.com
- www.dzone.com
- www.hays.co.uk

- www.theglobeandmail.com
- www.talentlyft.com
- www.bullhorn.com
- www.forbes.com
- www.hrtechnologist.com
- www.benefitnews.com
- www.bloomberg.com
- www.chiefexecutive.net
- www.digitalhrtech.com
- www.economictimes.indiatimes.com
- www.silo.ai
- www.weforum.org
- www.gattacaplc.com

The researcher found a diverse range of articles employing different research methods. Among the selected papers, seven utilized the secondary data method, five employed questionnaires, and eighteen adopted the conceptual approach.

Keywords: systematic literature review, artificial intelligence, recruitment process, methodology, research questions, inclusion and exclusion criteria, databases, grey literature, websites, journals.

Results and Discussion

Use AI in HRM

The concept of artificial intelligence (AI) was first introduced by John McCarthy in 1956/1981 (<https://www.teneo.ai/blog/homage-to-john-mccarthy-the-father-of-artificial-intelligence-ai>), defining it as the science and engineering of creating intelligent machines and computer programs (McCarthy & Minsky, 1950; McCarthy & Hayes, 1981). AI applications have significantly impacted various functions within human resources management (HRM), including recruitment, by leveraging problem-solving and data-driven approaches (Bersin et al, 2018).

AI aims to replicate and enhance human intelligence by utilizing computational models to simulate human cognitive processes such as reasoning, learning, and decision-making. In the context of recruitment, AI-based solutions are used to assist employers in efficiently scanning a large number of job applications. This has become one of the most widely used forms of AI recruitment solutions today. Examples include Textkernel and SAP's Resume Matcher, which can quickly process and analyze thousands of job applications. Textkernel employs AI algorithms to scan applications, while Resume Matcher compares applicants with job descriptions and ranks them accordingly.

However, the practical application and benefits of AI in recruitment have generated contradictory viewpoints, although there is a consensus on its potential. AI systems rely on data from past decisions, which can perpetuate existing biases in human decision-making processes. It is crucial to consider the biases inherent in the data used to train AI algorithms when using AI-based recruitment tools (Dessler, 2020). While AI is intended to address human errors, its effectiveness is contingent on the quality and diversity of the training data. Technology companies in 2020 became increasingly aware of bias issues related to AI, prompting the need to address bias management through in-house solutions or outsourcing. It is expected that public and government concerns about AI bias will continue to grow, necessitating adjustments to AI strategies for companies to remain competitive and compliant. Learning from past mistakes, such as the case of Amazon's AI biased recruiting, is essential for organizations to avoid biases and enhance diversity.

AI has significantly improved recruiters' ability to identify and attract talented candidates (Nawaz, 2019a). By implementing AI in their recruitment strategies, recruiters can efficiently gather data on candidates' profiles and assess their suitability for specific positions. Monotonous and repetitive tasks can be automated, allowing recruiters to focus on more innovative and strategic aspects of their roles. AI systems are designed to mitigate bias in the selection process by reducing the influence of factors such as name, age, gender, race, and beliefs, thereby enabling a more objective evaluation of candidates.

Furthermore, studies have shown that 38% of organizations have already adopted AI in HRM, with the remaining expected to adopt it in the near future (Erickson, 2018). However, one of the main challenges in implementing AI in HRM is the shortage of skills and the fear of change (Bullhorn, 2018). Addressing these challenges is crucial for organizations to fully leverage the potential benefits of AI in recruitment.

This study examines how the literature has addressed the role of AI in the recruitment process within HRM. AI has the potential to revolutionize recruitment by enhancing efficiency, mitigating bias, and enabling recruiters to focus on strategic tasks. However, challenges such as data bias, skill shortages, and resistance to change must be overcome for successful AI implementation in HRM.

Keywords: artificial intelligence, HRM, recruitment, bias, automation, talent acquisition

Study Motivation and Objectives

Previous research (Nawaz, 2019b) has highlighted the lack of literature reviews on the topic of AI in the recruitment process. Conducting a comprehensive literature review on this subject not only supports and enriches the existing body of knowledge but also aligns with the researchers' interest in integrating technological advancements into traditional human resources practices. With the ongoing exponential growth of technology, there is a heightened interest in exploring the application of technological methods in various domains, including HRM.

Given the prominence of AI among emerging technologies, this study specifically focuses on understanding the current utilization of artificial intelligence in the recruitment process. To achieve this objective, the researchers have gathered and compiled numerous articles and published papers, particularly from reputable websites, to provide readers with a consolidated resource containing diverse studies and resources related to the use of AI in recruitment. Additionally, it is crucial to identify and emphasize the importance and significance of AI in enhancing the recruitment process. By conducting this study, the researchers aim to contribute to the existing knowledge by providing a comprehensive overview of AI's role in recruitment. This research endeavor seeks to shed light on the current practices and applications of AI in HRM and highlight its potential benefits for organizations. Through an in-depth examination of the literature, the study aims to facilitate a better understanding of the implications of AI adoption in the recruitment process and provide insights for practitioners and decision-makers in optimizing their recruitment strategies.

Keywords: artificial intelligence, recruitment, literature review, HRM, technology integration.

Several studies have highlighted the benefits of using AI in the recruitment process. Sundaram (2018; see Niehueser & Boak (2020) and Jones (2018) emphasized how AI can save organizations money and effort. Sayfullina (2018) discussed how AI can enhance the skills of recruiters, both in terms of hard and soft skills. Niehueser and Boak (2020) highlighted the improved speed and efficiency that AI brings to recruitment tasks. Gama Filho (2018; Fraij & Várallyai, 2021.) explored how AI can help build relationships between recruiters and candidates, leading to unbiased talent identification (Greenfield & Griffin, 2018).

One of the major challenges faced by recruiters worldwide is the screening of a large number of CVs and applications (Collins, 2018). AI solutions, such as chatbots, have been proposed to address this challenge. Chatbots allow applicants to engage with an organization's interactive system, providing information such as salary expectations, availability, contact details, skills, and experiences. This automated interaction streamlines the screening process and ensures personalized engagement with each applicant.

Other challenge discussed in the literature is maintaining an up-to-date talent pool of previous temporary workers. Collins (2018) suggested leveraging AI to mobilize and activate a larger number of candidates, facilitating connections between organizations and fresh, updated talent.

Communication with candidates at the right time and place is another aspect of recruitment that can be addressed through AI. Chatbots, with their round-the-clock availability, offer a solution for continuous and timely communication with candidates, ensuring efficient and responsive interactions.

This literature identifies three main categories that can benefit from AI implementation in recruitment: screening, addressing human bias, and identifying the best-fit candidates. By leveraging AI technologies, organizations can streamline their recruitment processes, improve decision-making, and enhance the overall candidate experience.

Keywords: artificial intelligence, recruitment, screening, human bias, best-fit candidates.

Screening

The adoption of AI in the screening process of HRM has been discussed by various sources such as Forbes (June, 2018; no date), Malini Goyal (2017), and Forbes Coaches Council (2018). Natural

Language Processing (NLP) and Natural Language Generation (NLG) are two technologies that hold significant potential in talent acquisition. NLP involves transforming text into structured data, enabling computers to effectively understand and analyze language. On the other hand, NLG allows computers to generate language and transform data into text. These technologies can greatly enhance the screening process in HRM.

To effectively communicate with humans, AI needs to understand human beings' written and verbal communication patterns. Analyzing the linguistics used in text can provide insights into a person's emotional state (Faliagka and Ramantas, 2012). However, the reliability of AI's decisions depends on the use of robust algorithms to support the understanding of human patterns. Without reliable algorithms, AI's decisions may be untrustworthy.

In the digital age, EHRM has generated massive amounts of data that are primarily handled manually. Job ads alone can generate tens of thousands of responses, many of which may be irrelevant. AI implementation in the recruitment process offers the advantage of saving time and money while providing real-time results with almost 100 percent accuracy. This fast screening process benefits both candidates and organizations, as it allows HR to gain a better understanding of candidates. AI can validate and authenticate criteria before the final screening process, streamlining the selection of suitable candidates.

Adoption of AI in the screening process brings efficiency and accuracy to talent acquisition. NLP and NLG technologies play a crucial role in understanding and processing human language, enabling effective communication and decision-making in the screening phase.

Keywords: artificial intelligence, screening, HRM, natural language processing, natural language generation

Human Bias

Human bias, such as biases related to gender, ethnicity, and age, can have a significant impact on various aspects of the recruitment process. However, AI can be programmed to ignore a candidate's background and reduce bias. For instance, Google introduced an internal recruitment tool called Droid in 2015, which provides interviewers with position-specific questions and disregards the candidate's background. Data and predictive analytics are also used to assess the likelihood of an applicant's success in a particular role, considering job-specific criteria and an organization's cultural requirements (Neelie, 2017).

AI technologies enable the automation of the screening process, effectively addressing biases associated with human behaviour (Heilmann, 2018; Levit, 2017). By programming AI to ignore candidate backgrounds, recruiters can overcome unconscious stereotypes that may hinder the recognition of existing skills (Levit, 2017). Many large companies have embraced AI to combat bias during the talent acquisition process. They utilize AI to facilitate digital "blind auditions," allowing recruiters to evaluate talent based on keywords and qualifications without being influenced by personal information (Savar, 2017).

However, it is important to note that AI systems are tools and their effectiveness depends on proper calibration. If an AI system is not calibrated correctly, it can produce biased results. This phenomenon is known as AI bias. If biased data is fed into an AI system, it will generate biased outcomes (Gold, 2019).

In summary, AI can help mitigate human bias in the recruitment process by ignoring candidate backgrounds and facilitating objective evaluations. However, ensuring the proper

calibration of AI systems and addressing AI bias are crucial steps in leveraging AI to effectively reduce bias in talent acquisition.

Keywords: artificial intelligence, human bias, recruitment process, AI bias, unbiased evaluations

Best Fit Candidate Selection Using AI

Once organizations have a list of potential candidates, they can leverage automation tools to streamline the resume screening process, enabling human recruiters to narrow down their selection. Some tools utilize keyword analysis to identify the best applicants based on the content of their resumes. Others employ various tests and questions to assess candidates' actual performance and identify the most promising individuals, particularly in skill-based testing. These techniques have demonstrated higher success rates in identifying the right person-job fit.

In this process, readability scores and other relevant characteristics of source documents are analyzed to determine the best fit for the organization. A common challenge in employee success is the lack of cultural fit within the company. AI has the potential to address this issue. Major companies already use algorithms to match job openings with suitable candidates on their job boards. Platforms like LinkedIn assess applicants' suitability by analyzing their profiles and job history. By understanding the similarities between job descriptions and candidate profiles, AI can more accurately predict whether individuals align with the requirements of a particular role. However, it is important to note that the human element remains crucial in the overall process (Alistair Cox, 2018). In recent years after Covid-19, remote working culture has gained significant attention, leading organizations to actively seek reliable candidates for such positions. Artificial intelligence tools can play a valuable role, particularly in the hiring of remote employees. Surprisingly, AI can help evaluate candidates' honesty and integrity to determine their suitability for the job. By utilizing AI, companies can vet trustworthy applicants and allocate the workforce accordingly. This functionality has already proven to be highly beneficial in on-demand applications like Uber, Zomato, and similar platforms (Christopher McFadden, 2019).

AI aids in the selection of the best fit candidates by automating resume screening, utilizing keyword analysis and performance-based assessments. It helps identify individuals who align with the organization's culture and accurately match job requirements. Additionally, AI can play a role in evaluating candidates' honesty and integrity, which is especially valuable for remote working positions.

Keywords: artificial intelligence, best fit candidate, resume screening, cultural fit, remote working, skill-based testing

AI applications have revolutionized various HR processes, including recruitment, in the digital era of Industry 4.0. With the integration of technologies like the Internet of Things (IoT), big data analysis, cloud computing, and AI, organizations have witnessed significant transformations. AI applications are software and/or hardware systems capable of intelligent decision-making based on data, mimicking human thinking (Liu et al, 2018).

While AI has already found its place in areas like speech and face recognition and problem-solving, its implementation in HRM is still in its early stages. AI has fundamentally reshaped the relationship between employers and applicants. Chatbot tools, for example, provide applicants with an enhanced and personalized employer experience. Additionally, various AI-enabled applications automate candidate assessment, interview scheduling, reference checking, and job offer delivery. Currently, only around 10% of companies utilize AI extensively, but it is projected that 36% of organizations will fully embrace AI in the future (Harver, 2020). Let's explore some prominent AI applications adopted by major companies.

- (1) Chatbots: These AI-powered conversational agents engage with applicants, providing information, answering queries, and guiding them through the recruitment process.
- (2) Candidate Assessment: AI algorithms analyze candidate profiles, resumes, and application data to assess suitability for specific roles, using criteria defined by the organization.
- (3) Interview Scheduling: AI applications can automatically schedule interviews by analyzing availability and preferences of both candidates and interviewers, streamlining the process.

- (4) Reference Checking: AI tools assist in conducting reference checks by analyzing references' feedback and providing insights to recruiters.
- (5) Job Offer Generation: AI-powered applications can generate personalized job offers for selected candidates based on predefined criteria and negotiation parameters.

These are just a few examples of how AI is transforming HR processes. While currently in the early stages of adoption, the potential for AI in HRM is vast, with the aim of improving efficiency, enhancing candidate experience, and optimizing decision-making.

Keywords: AI applications, HR processes, recruitment, Industry 4.0, Chatbots, candidate assessment, interview scheduling, reference checking, job offer generation.

There are several AI applications that are being utilized by major companies to enhance their recruitment processes. Here are some examples:

- (1) Fetcher (www.fetcher.ai): Sony Music and over 500 recruiting teams globally use Fetcher. It leverages applicant data to analyze and identify qualified candidates, taking into account diversity factors. Fetcher provides suggestions for qualified applicants in a matter of seconds.
- (2) XOR (www.xor.ai): McDonald's and IKEA employ XOR's AI application. XOR offers modern communication trends through chatbots and provides full application and screening tools like video interviewing and live chats.
- (3) Textio (www.textio.com): As mentioned earlier in this paper, Textio is an AI application used by McDonald's to promote bias-free processes. It helps organizations optimize their job descriptions and written communications for inclusivity and effectiveness.
- (4) AllyO (www.allyo.com): AllyO provides an engaging user experience and offers integration with an organization's HR system. It enhances security and supports analytical intelligence for talent acquisition. Companies like G4S and the Andersons have adopted AllyO.
- (5) Talkpush (www.talkpush.com): Amazon and Walmart have implemented Talkpush to improve communication with applicants. It serves as a CRM-supported communication tool, enabling instant, personalized, and real-time conversations using chatbots and video screening techniques.

These AI applications are used by big companies to address human bias, save time, and streamline the talent acquisition process. It's important to note that these applications complement human efforts rather than replacing them. They transform HRM tasks to be more strategic while still involving human decision-making.

It's worth mentioning that these are just a few examples of the AI applications used in recruitment. The rapid advancement of AI technology has led to a diverse range of solutions available to organizations, each with its unique features and benefits.

Keywords: AI applications, recruitment process, Fetcher, XOR, Textio, AllyO, Talkpush, human bias, talent acquisition.

The studies mentioned previously highlight the consensus among researchers regarding the benefits of AI in recruitment processes. AI can significantly streamline the screening of resumes and handle a large number of applicants efficiently (Collins, 2018, in Fraij & László (2021); Alistair Cox, 2017; Cara Heilmann, 2018; Attfield, 2018; Ethan Lee, 2018; Chiradeep BasuMallick, 2018; Niehueser & Boak, 2020).

Furthermore, researchers agree that AI has the potential to reduce the influence of personal connections or favoritism within organizations. This means that even if an applicant does not have any personal connections, the hiring process will not be compromised by biased decisions (Berta Melder, 2018; Rebecca Greenfield and Riley Griffin, 2018; ANZ, 2018; Savar, 2017; Alexandra Levit, 2017; Alistair Cox, 2017).

AI is seen as a valuable tool for identifying and hiring talented candidates. Attracting and hiring talented individuals is a crucial goal for organizations, and AI can play a significant role in achieving this. AI technologies enable automation, cognitive insights, and engagement in the recruitment process, resembling the data analysis and decision-making capabilities of the human brain. By adopting these technologies, organizations can compete effectively in selecting top talents from the market pool.

It is important for organizations to stay updated with the latest developments in recruitment technologies to remain competitive in talent acquisition.

Keywords: AI in recruitment, screening resumes, reducing bias, identifying talents, automation, cognitive insights.

Conclusion

Research aimed to provide a comprehensive understanding of the impact of AI on the HR recruitment process. The study summarized the existing literature and focused on the various applications and benefits of AI in screening, reducing human bias, selecting the best fit candidates, and improving the quality and efficiency of recruitment processes.

AI has revolutionized the recruitment field by enabling computers to think logically and mimic human behavior. It has proven to be efficient and effective in assisting HRM with the recruitment and hiring processes. While traditional methods of recruitment are still prevalent, AI tools and applications have become indispensable in automating various tasks and enhancing decision-making. The use of AI in recruitment has resulted in time and effort savings, improved hiring quality, and unbiased candidate selections. HR managers now have the opportunity to focus on strategic HR initiatives and the bigger picture of organizational success. However, organizations need to be prepared for the adoption of these new technologies and address the potential job displacement of certain administrative roles.

The findings of this study suggest that the impact of AI on the recruitment process is beneficial, enhancing the practices of HR departments and improving overall organizational performance and productivity. Although the study has limitations due to the accessibility of some published papers, it has covered a substantial portion of the available literature in this field.

Future research is recommended to further explore and compare different AI recruitment applications, investigate the specific impact of AI in various sectors and geographical locations, and assess the long-term effects of AI implementation on HR practices and organizational outcomes. Keeping up with the latest advancements in AI technology will be crucial for organizations to stay competitive in talent acquisition and management.

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