



UMEÅ UNIVERSITY

THE VIABILITY OF AI-BASED RECRUITMENT PROCESS

A systematic literature review

Ayesha Javed, Juthika Kabir Brishti

Department of Informatics

IT Management

Magister's Thesis 1-year level, 15 credits

SPM 2020.03

Abstract

AI is one of the most promising technologies which is changing our world by showing its potential in various sectors like healthcare, transportation, and entertainment. It has emerged in the recruitment sector in recent years for searching candidates from large volumes of data, screening candidates' profiles, interviewing and selecting the most suitable ones, etc. Hence, it can change or modify HR's role, candidate perspective, or even change a company's whole environment and policy. The challenges, in this case, are closely related to real-life as either the availability of this technology is not very well known to the recruiters or the companies using this technology are in the initial phase of implementation. This motivates us to research in this area to let the readers know the viability of this technology. This thesis, therefore, aims to synthesize a systematic literature review of the past five years of available literature on AI in recruitment and thus, provides insight into the usage of AI in recruitment. Moreover, we study the opportunities for the recruiters and candidates and find the core challenges and how they can be addressed. The finding shows the opportunities and challenges of using AI in the recruitment process and how it is impacting the hiring. It also allows readers to judge the usability and viability of AI in the recruitment process.

Keywords: Artificial intelligence (AI), recruitment, literature review, recruiters, applicants, candidates, job seekers.

1. Introduction

For a rapidly changing business environment with less defined and unstable jobs, the conventional recruitment methods based on psychometric principles might no longer be effective (Lievens et al., 2002). Additionally, traditional sourcing methods such as job applications and printed mediums are shrinking in favor of internet sources and e-recruitment where the variation in the candidate accessibility skill is significantly declining (Bartam, 2001, Lee 2005). Human resources (HR) is one of the most important assets of an organization as highly skilled, experienced, and qualified employees play a vital role in the growth, competitive advantage, and innovative transformation of an organization. That is why organizations compete to acquire the right skills and qualifications, investing a lot of time, money, and effort to get and retain the best candidates. Recruitment is the process of searching and selecting the right candidate for a job which starts with analyzing the job requirements by the organization, then attracting the potential candidates by announcing the job positions followed by screening and selecting the candidates and finally hiring and welcoming the hired ones into the organization. Continuous innovation in HR and recruitment is shaping the future of HR and as a result, AI-based solutions are being adopted to overcome any challenges. The increased complexity of the new technological content and its association with the rapidly changing business environment has changed the conventional method of employee selection by making it more technologically dependent (Even et al 2005). In the area of recruitment, AI has been strengthening its position by increasing the productivity of employees, reducing cost and time, and eliminating human errors and biases. It helps to automate the candidate sourcing and search, matching the candidate with the employer, real-time

communication with the applicants, providing feedback to the recruiters of the applicant's experience, interviewing, facial expression analysis, candidate selection, and diverse hiring.

Adoption of AI in recruitment emerged in 2018 where hiring professionals started sourcing millions of social profiles of individuals which were not possible by human recruiters. The social media data helps recruiters to assess the values, beliefs, and attitudes of the candidates, hence, providing them information about personality traits that is absent in traditional resumes. AI technology also helps companies to rediscover talent by screening the existing pool of candidates so that companies can utilize already tested and experienced candidates.

AI is unbiased and gives equal weights to candidates based on selection criteria, hence releasing recruiters from boring, repetitive, and tedious tasks. Recruiters can replace their traditional role with that of a talent advisor by planning and building relationships with newly hired employees through rapport building and assessing cultural fit. AI is helping humans to be more productive by speeding up the hiring process. AI-powered chatbots are used to communicate with applicants quickly by providing real-time feedback, responding to queries, and engaging the candidate during the hiring process. AI recruiting software ranks the resume for qualification, experience, and skills, and responds to candidates with positive or negative feedback. With AI's quick feedback, the candidates not only get rid of the frustrating waiting period but the rejected candidates are informed about any deficiencies in skills, experience, or qualification also hence providing them with a positive experience of undergoing AI-based recruitment. Moreover, AI offers the candidates the positions that might be of interest to them for current or future roles. AI assists the candidates throughout the hiring process through web and mobile platforms. Chatbots make real-time communication through text messages and emails. On the other hand, it provides feedback to the recruiters on the applicant's experience.

AI-powered systems are programmed to avoid unconscious biases like age, gender, race, or names. Unconscious human bias in recruitment occurs when an individual or a group of individuals gets a favor based on age, race, color, education, or ethnicity. Many studies (Davison & Bruke 2000, Correll et al. 2007, Gordon & Arvery, 2004, Bertrand & Mullainathan, 2004) have been conducted on human biases that may affect hiring decisions, Davison and Bruke (2000) reviewed 49 studies on gender biases and concluded that during the hiring process, recruiters tend to bias against female candidates. Correll, et al., (2007) in their study about bias against ethnic groups held that white names candidates receive 50 percent more calls for interviews than for African-American names. AI eliminates errors and biases associated with humans during the screening and selection of candidates. The algorithm used in AI captures the applicant's characteristics to construct a profile that predicts if the person has the required competency and expertise that the company is looking for irrespective of age, gender, ethnicity, and race, hence revolutionizing recruitment and creating diversified, rapport and vigorous workplaces.

After the advancement of big data, internet connectivity and computer hardware such as memory capacity and high-speed processors, intelligent software and robots can perform complex tasks beyond human capability (Lucci & Kopec, 2016), the question arises will these smart systems replace humans? Currently, AI-based software is automating the process of recruitment by

screening millions of applicants profiles, conducting programmed video job interviews, providing assistance to applicants through the process and updating them on the status of their applications, matching the profiles of candidates to employers requirements, thus reducing the hiring cycle and improving the quality of hire. It's evident that AI will help workers do their jobs better as recruiters and will not replace them as it will assist them to maximize the diversity of the talent pool by identifying the best performing candidates faster.

To answer the question '***What are the advantages and challenges of using AI in the process of recruitment, and how AI impacts the hiring by transforming the traditional hiring process?***' a literature review is conducted in this thesis. Through the literature review, this study aims to outline the challenges and advantages of using AI in the recruitment process and how the challenges can be addressed. This review also aims to contribute to filling the knowledge gap with many recruiters not understanding the technologies available to them and how to get value from the advantages of this technology.

In exploring the research question, this literature review identified four themes namely, AI role, Actor role, AI adoption, and Potential risks, for companies that seek implementation of AI in recruitment or parts of recruitment. The following five chapters cover related research, methods, analysis, discussion, and conclusions.

2. Related research

In this section, related research will cover a brief understanding of the recruitment process, AI and its different areas, and the trend of using AI in the recruitment process.

2.1 Recruitment Process

The recruitment process can be defined as gathering or accumulating a group of diverse and qualified candidates for the associated vacancy of a company. (Stoilkovska, Iieva & Gjakovski, 2015). A recruitment process seeks the right person to fit for the vacancy or role of a company selected from several candidates who desired to have this role as their job. The goal is to find a potential person who is most suitable for the role as well as fit to the culture of the organization. The recruitment process involves targeting several prospective people with appropriate job skills and persuade and motivate them to work for the organization (Kamran, Dawood & Hilal, 2015). The recruitment process needs to concern about choosing the right and the most appropriate candidate who will not only be well suited to the company culture but also a perfect fit for the vacancy of the company (Newell, 2005). The recruitment process includes some administrative works such as posting job vacancies, managing data of the applicants as well as the potential applicants, etc. and some strategic recruitment decisions which are not negligible. Recruitment is considered as the strategy of HR because it creates the first opportunity to predict future employees' behavior and plan accordingly. Also, another strategic purpose would be to minimize recruitment costs and to shorten the time of recruitment to reduce the loss from an empty position (Stoilkovska, Iieva & Gjakovski, 2015).

There are several common sequential steps in the recruitment and selection process which helps to manage the recruitment as well as analyze different recruitment models. (Thebe and Waldt 2014) Selection is also considered as a part of the recruitment process. As recruitment is to attract potential candidates to meet the requirement whereas selection is to evaluate differences between those candidates and discover the best candidate according to the job description. (Newell, 2005). The selection process usually starts at the screening of the applicants and in the case of recruitment, the steps in the selection process are sequential in nature (Thebe and Waldt 2014).

To understand the whole process it is important to see the combined steps of the recruitment and selection process (Fig 1) in the appendix.

2.2 Models of the Recruitment process

Several models for the recruitment process have been mentioned by different authors. In one of the recruitment process models proposed by Breugh (2008), the author focused on both the organization and the applicant, perspectives. The first three-steps of the model describe the organization's perspective, fourth steps involve in the applicants' view and the final step is to capture the whole recruitment process (See Fig 2 in Appendix). The first step for this model is to set some recruitment objectives like attracting suitable candidates according to the job description to fill the empty position. The second step is to develop a strategy of recruitment by generating some questions in mind such as whom to recruit, what is nature of the job offer, what is the budget constraints, and so on. The third step is recruitment activities which require different types of activities posting jobs in specific sites, extend the recruitment time if needed, selecting the recruiter's types, and basically, it involves the types of recruitment methods that will use in this step. The fourth step of the model is to observe the interest of job applicants such as the interest of accepting the job, expectation from the job, applicant self insights, and also the decision-making process of the applicant. And the fifth and final step is to evaluate the whole recruitment results by going back to the recruitment objective and measuring the outcome of the results which help to learn from experiences and improve the effectiveness of future recruitment processes (Breugh, 2008).

2.3 Artificial Intelligence (AI)

Artificial Intelligence (AI) is an umbrella term that defines and indicates the implicit intelligence of the machines. After so many years of its discovery, this is still a blurry concept to most people and often people still wonder what AI actually is (Kaplan & Haenlein, 2019). AI does not have a specific definition and can have various meanings based on its circumstances, uses, and intelligence (Jarrahi, 2018). In general, AI can be thought of as a system that mimics general humane abilities such as learning, speech, problem-solving which make it behave like an intelligent human (Jarrahi, 2018; Russell & Norvig, 2010). In further elaboration, AI can be defined as a system that can interpret and learn from external data to accomplish specific goals by adapting the situation (Kaplan & Haenlein, 2019). From the definition, it is evident that AI not

only should have a fast and accurate ability to analyze and solve a problem but also should have the ability to imitate and develop human-like intelligence such as cognitive, emotional, and social competences. According to Kaplan & Haenlein, 2019, AI systems can be classified into three groups such as analytical, human-inspired, humanized AI, depending on that intelligence. Analytical AI with cognitive intelligence has the ability to make future decisions based on learning and analyzing past data which can be used in Virtual teaching assistance, fraud detection, image recognition, and so on. Human-Inspired AI that has both cognitive and emotional intelligence, can recognize and analyze human emotions such as anger, happiness, etc. which affects their decision, for example, virtual recruiters identify a candidate's emotions during the selection process. Humanized AI has all three cognitive, social, and emotional competences. A virtual agent with real-time engagement with the customer can be such a system. (Kaplan & Haenlein, 2019).

AI different areas, applications, and algorithms available such as neural network, deep learning, machine learning, machine vision, genetic algorithm, and so on (Jarrahi, 2018). It also expands its field in robotics, natural language processing, expert systems, automated reasoning (Ved et al, 2016). Machine learning is one of the primary areas of AI which uses statistical techniques that makes a machine learn and improve at tasks with experience (Raub M. 2018). It uses a large volume of structured data to find an accurate result of a task while some sector produces unstructured data, without clear and known features, such as the health sector, which causes machine learning application development a time-consuming task (Stefano A. Bini & MD, 2018). Deep learning is an advancement of machine learning that allows a program to learn on its own to perform tasks like speech and image recognition which is achieved by revealing the large volume of data to the multilayered neural network (Raub M. 2018). Deep learning can work with unstructured data without having any human intervention to detect features just like how a child learns. (Stefano A. Bini & MD, 2018). It also expands its field in robotics, natural language processing (the process through which machines can understand and analyze language as used by humans), machine vision (algorithmic inspection and analysis of images), expert systems, automated reasoning (Ved et al, 2016; Jarrahi, 2018).

Besides the advantage of AI, it has many challenges that need much attention. Some of them are data challenges, political, legal and policy challenges, and ethical challenges. As AI needs to feed a large amount of data, due to poor quality, lack of data availability, transparency, unavailability of data collection format, discontinuity of data, etc creates significant challenges. (Dwivedi et al, 2019). To maintain the privacy and safety of people the government needs to create a legal framework to maintain a balance between AI data and public privacy (Dwivedi et al, 2019). As AI needs an enormous amount of data strict rules and regulations may slow down its implementation. According to European GDPR (General data protection rules) imposed in 2018 companies need to take strict precautions to handle and transaction personal data which may affect the freedom of using the data in AI. (Kaplan & Haenlein, 2019).while accessing public data from social media or other private sources it is important to maintain ethical intent. The Moral dilemma, discrimination, and the biased decision made by AI, suitability, and compatibility between a human and a machine causes AI ethical challenges. (Dwivedi et al, 2019)

2.4 The trend of AI in Recruitment

AI has been used and implemented significantly in recruiting professionals in various companies from 2018 and becomes one of the latest trends in the recruitment industry since then (Upadhyay and Khandelwal, 2018). Recruiting the most suitable professional has always been a challenging task. In today's world, people spend and share most of their time and views on social media which becomes an integral part of their life (Van Esch & Black, 2019). For this recruiter started posting their job advertisement on social media to attract candidates. But this creates a significantly huge number of applicants and hiring the most appropriate talent on time has become a challenge to HR (Michailidis, 2018). Not only that to screen and evaluate a large number of applications for single job post companies had to appoint a lot of recruiters which is very expensive, and also the effectiveness and efficiency of digital tools are very high in comparison with a human (Van Esch & Black, 2019). Also, there always exists a chance of human cognitive biases (Black & Van Esch, 2019). So to overcome such challenges and make recruitment more efficient and timely, recruitment companies need to use AI-powered digital and tools. IKEA, L'Oreal, Unilever, and Amazon, which have used AI-powered recruitment systems like Robot Vera, chatbot called Mya, HireVue Assessments, have helped in their particular and specialized ways to improve their talent-hiring capabilities.

The use of AI tools has emerged in almost every step of recruitment which transforming the recruitment market more innovatively and these AI tools has become a huge help of selecting the right candidates from a vast pool of different applicants and profiles (Sekhri & Cheema, 2019). These tools are a great help in different ways such as creating job descriptions using proper wording and language which is bias-free, gender-neutral and target a particular set of candidates for the job (Rab-Kettler & Lehnervp, 2019). For example, AI firms such as Textio implement AI to help their clients to customize the wording and language of job ads and descriptions and make them personalized (Van Esch & Black, 2019). Also, L'Oreal used AI to change the gender bias wording in their ads which helps them to achieve an even number of male and female candidates (Sharma, 2018). The AI-powered CV screening tool ATS (Applicant Tracking System) can pre-screen an applicant and detect and evaluate the keywords to place the right candidate to the appropriate openings. An AI-powered chatbot is also getting popular in recruitment. These chatbots can interact with the candidates, answer their queries 24/7, enable real-time and personal engagement through text message, email, social media, etc. (Upadhyay and Khandelwal, 2018). By using natural language processing these bots are able to process and interact with people almost like a human by using contextual words, shorthand, emotions, etc (Nawaz & Anjali, 2019). For example, an AI-powered assistant named Olivia from AI startup Paradox to interact with candidates via text messages and social media channels to learn their qualifications, competences, and relevant job experience (Van Esch & Black, 2019). Video chat analysis is also being used as an AI-powered tool where the system can be programmed to analyze the interviewee's features like age, lighting, tone of voice, cadence, the keyword used, mood, behavior, eye contact, emotion, etc (Fernandez & Fernandez, 2019). For example, Affectiva, HireIQ, HireVue that tries to evaluate a candidate's performance during a video interview by analyzing

candidates' facial expressions, use and frequency of words, tone, and speaking patterns to evaluate their emotional intelligence, honesty, and personality. AI-recruiters can process volumes of social media data by scanning social media space to find the right talents and assess the candidate's social values, beliefs, attitude to get an idea about that candidate's personal and professional traits without putting any bias or favor (Upadhyay and Khandelwal, 2018). For example using AI-powered recruiting tools across social media like Facebook, WayUp, and Muse, Unilever was able to increase its fresh graduate candidates pool at a considerably lower cost than before. (Van Esch & Black, 2019).

The applications in the recruitment process are prospective and the increasing demand for these tools with new features makes it more promising. But still, practically AI tools are not used to a great extent in the recruitment field (Upadhyay and Khandelwal, 2018). So there are many things to learn to integrate and adapt to these new technologies without any friction. Therefore the study aimed to know the challenges and opportunities of AI in recruitment to get the maximum advantage of it.

3. Method

In this section, we argue for conducting a literature review and we also explain the procedure of selecting the literature and analyzing it.

3.1 Literature Review

A review of prior, relevant literature is an essential feature of any academic project. An effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed. (Webster and Watson 2002). AI in recruitment is relatively a new topic and research is being done to assess the advantages and challenges of using AI in recruitment and selection. ***However, there is a knowledge gap that exists when recruiters need to understand how the AI algorithm works for them and assists them to get maximum benefits of using AI.*** A literature review is thus a valuable way forward to fill this gap. To compose a successful relevant literature section, a systematic search can ensure that the author compiles a relatively complete list of relevant literature (Webster and Watson 2002). The literature review covers relevant literature on the topic and is not limited to one search methodology, one set of journals, or geographic region (Webster & Watson, 2010). In this case, all the articles were searched from various sources like Google Scholar, Research Gate, and Umeå university library.

A literature review is commonly structured as concept-centric, meaning concepts determine the organizing framework of the review; however, some authors take an author-centric approach and present a summary of relevant articles (Webster & Watson, 2010). This review is concept centric as the concept of AI and recruitment determines the organizing framework of this review.

The tone of a successful review informs the reader about what has been learned rather than being overly critical (Webster and Watson 2002). The selected literature informs the reader about

the knowledge and understanding of AI being used in recruitment and how it is impacting the recruitment industry. What are the advantages and challenges and what needs to be understood by the recruiters to fully utilize the potentials of AI in recruitment?

3.2 Data Collection

Our data collection process starts with searching from the different kinds of databases such as “Google Scholar”, “Umeå University Library”, “Research Gate”, “Science Direct”. Both forward and backward search has been done for conducting this literature review. The forward search means to find an article that has cited some impactful papers. Different search engines like Google Scholar, Research Gate perform such a forward search (Schryen, 2015; Webster & Watson, 2002). The backward search is meaning the process of finding the articles by searching through the reference list of important and significant papers (Webster & Watson, 2002; Vom Brocke et al., 2015). We have conducted our search by keeping our research question in mind. According to Templier & Paré (2015) and Okoli (2015), the investigation must be done keeping the research question in focus and the search strategy has to closely related to the research question. Our search started by searching with the keyword “AI in Recruitment”, which closely related to our research question. This results in many hits including some unrelated search results which are not related to “AI in recruitment”. As the research conducted in this area is not very old, as this field is still evolving. Therefore, we decided to set our search filter from 2015 to 2020, which had shown the most relevant hits.

After this phase, the related papers need to be screened to define the exclusion or inclusion criteria, reviewing those papers and then selecting papers based on the relevance, credibility, and rigor (Vom Brocke et al., 2015; Mikalef et al., 2018). So, our inclusion criteria for selecting the papers were based on our research question and scope of the study, and exclusion criteria were to not use duplicate studies in different sources. Then the selection process is done by following some steps, firstly screening through the abstract, keyword, and the exclusion and inclusion criteria. After the initial screening the selected papers were again reviewed by reading the introduction and the conclusion and 26 articles have been selected. Finally, these selected papers were reviewed as a whole for relevance, credibility, and rigor. However, after reviewing the 26 articles, 22 articles were found to the most relevant.

We have extended our search to do some related research such as AI and its different areas, the recruitment process, and how it works in general, which is necessary to realize the advantages, disadvantages of AI, and its impact on the recruitment process. We have selected 8 papers for AI and 5 papers for the recruitment process by conducting forward and backward searching. This had strengthened our research context and gave significance result in our findings. The Appendix provides the list which contains the selected literature for the review analysis.

3.3 Data Analysis

This section provides detail on how the selected articles were analyzed. We used the inductive approach and thematic analysis to analyze our 22 selected articles. We familiarize ourselves with the data by going through the articles which helped us to understand not only the data but also eliminated the preconceived notion and bias towards the results. We then started the coding process by loading the documents in ATLAS.ti cloud platform and created codes for all 22 articles individually. ATLAS.ti cloud platform enabled us to collaborate remotely online at the same time. Once done with the coding, we started collating codes into potential themes and defined clear names for each of the four themes created. These four themes namely, AI role, actor role, AI adoption, and potential risks, encapsulated the generous view of what the previous research had identified.

The theme of the Actor role emphasizes on advantages and opportunities that the actors, both recruiters, and applicants, will be able to achieve from the implementation of AI in recruitment and selection. It propels them to perceive AI as an opportunity for selection and recruitment. However, actors need to understand how AI is facilitating them to improve searching and selecting the right talent and is equally favorable for both actors.

The theme of AI role explores the impact of AI in recruitment and selection as a powerful technology tool by discussing in detail all dominant advantages of AI in the recruitment process.

The theme of potential risk identified some challenges of using AI in the recruitment process. It uncovered some risks associated with the system. Though there may exist a lot of opportunities utilizing AI in recruitment, making decisions by AI impacts directly human life that may end up creating some challenges towards successful implementation. Also, the system is not error-free as it is a human build system. And in the end, the system learns from the inputs which are provided by the human. Based on these inputs, there is a possibility of generating right or wrong results. So, before we start to implement the system, it is necessary to identify what kind of impacts it may create due to the system's wrong result. This theme is discussed by exploring different potential risks that need to be faced while using AI in the recruitment process.

Finally, the theme of AI adoption identified how well people are agreeing to use AI and collaborating with other actors for sharing the knowledge and information, which may help to get the benefits and opportunities created by AI. Also, this theme explores the challenges of adopting new technological knowledge of AI-enabled tools by the actors. The challenges of this theme depend mostly on the willingness of people to adopt the technology and how much they are ready to collaborate to achieve the proper benefits and opportunities of AI.

Then, we performed an analysis of the selected extracts and related them to our research question. The themes and codes are shown in Table 1 (see appendix).

3.4 Limitation

Though we have found many pieces of literature, many of them had some restrictions to access it such as we had to pay to gain access to certain literature or request the author whether he could provide us a free copy of his literature. There was also some confusion about using the keyword

for searching the literature. Searching using different keywords with the same meaning can show different results that end up either misleading or not relevant to our research context due to the author's preference. For example, when we used "AI" or "Artificial Intelligence" has an identical meaning, but "AI in recruitment" and "Artificial Intelligence in recruitment" can show different results during the searching process. Furthermore, some search may result in showing articles which has the same keywords but the title or the context was found to be confusing and sometimes misleading. Also, many articles were found in journals that were not familiar in IS fields but renowned in other fields of research. This may confuse the readers, as this study mainly focused on information systems or information technology fields.

3.5 Trustworthiness

Considering the ethical issues and to keep the transparency, we searched articles by keywords like "AI", "Recruitment process" and "AI in Recruitment Process" which are relevant to our research. We found our literature from "Google Scholar", "Umeå University Library", "Research Gate", and, "Science Direct". We initially collected literature from renowned journals in the IS field and then moved forward to collect literature from other related fields to extend our scope. Then we reviewed and selected the articles based on relevance to the research subject.

4. Analysis

This section provides a selective overview of information from the articles finalized for review. Through the coding process, four themes have been identified. Section 4.1 provides an overview of the impacts of AI in recruitment on actor roles. Section 4.2 explains the advantages of AI in recruitment by discussing the AI role in detail. Section 4.3 outlines the importance of AI adoption. Section 4.4 provides detail of possible risks associated with AI in recruitment.

4.1 Actor role

The actors are both recruiters and candidates who are using AI in the recruitment process. J. Dijkkamp (2009, p. 33) argued that candidate encouragement plays a vital role in maximizing the number of applicants who prefer to use AI-based recruitment over human recruitment. James Wright (2019, p. 31) writes,

It is important to make people aware of the usefulness of the AI systems so that they embrace it. Candidates need to know how a computer program makes the process fairer and transparent. Candidates need to understand how a computer programme makes the process fairer and transparent which was highlighted by Hulme, Lee and Newry. AI, through chat bots can enable feedback to both successful and unsuccessful candidates, which in roles that receive high volume applications was not possible (Bullhorn, 2018).

(Srirang-Shweta-Manoj 2019, p. 8) highlighted that staffing companies also need to consider the concern of job seekers about exclusion, discrimination, and privacy while encouraging AI-

powered tools in the hiring process and find ways to reassure them about the neutrality of the machines and make the interface more user friendly and comfortable. Furthermore, Geeta Reddy (2008, p. 68) emphasized that AI tools help the candidate to engage themselves before or even after they apply for vacancies specified by the organization. Running in the digitalized economy companies can interact with candidates using a chat box as it is an AI tool. Nawaz and Gomez (2020, p. 4) write “A Chatbox helps the candidate by responding to the queries and also an AI tool asks for feedback and required information about the candidate. Recruitment chatbots can connect with applicants in a conversational trade as well as answering FAQs, a boundary that prevents numerous applicants from applying. Stewart Black and Patrick Van Esch (2019, p. 10) write in their paper “AI-enabled recruiting: what is it and how a manager should use it” write that more and more candidates are motivated to engage with AI-based systems because they perceive it as a novel, convenient and empowering. Black Van Esch (2019, p. 7) also reasons that AI-enabled systems can make job applicants experience a smooth and positive one for the vast majority of rejected candidates as once rejected by a company are more likely to be open to a subsequent opportunity if they had a positive experience when they were rejected. Nawaz and Gomez (2020, p. 4) state that this brings down their nervousness and encourages them to proceed onwards to discovering openings that are more appropriate for them.

Savola and Torque (2019, p. 67) claim that delegating the repetitive tasks of screening to AI, recruiters can focus on more creative and strategic matters in their daily routines as HR managers will shift their focus from operational tasks to a leadership role, motivating and cultivating their teams’ potential and skillsets. Hmoud and Laszlo (2019, p. 26) also proclaim that administrative routine jobs will be replaced by smart AI technologies and will gradually disappear enabling recruiters and HR managers to focus more on strategic functions. Ashwani Kumar and Komal Khandelwal (2018, p. 225) write that AI is good at identifying talent but still, activities like rapport building, assessment of cultural fit, and negotiation need to be done by humans who now act as talent advisors. They argued that the recruiter spends more time building relationships with the new employees, as well as focuses more on talent identification and talent development. Savola and Torque (2019, p. 66) mentioned that

Adaptability requires companies to focus on business development, and managers to focus on using their leadership skills to guide employees in skills readjustment (Vinnova, 2018). Kaplan and Haenlein (2019) state that in a time when AI is transforming the business and work environment in striking ways, managers need to incrementally adopt a leadership style that exudes confidence to the employees.

To improve data quality, Savola and Torque (2019, p. 60) state that the organization needs to standardize the interpretation and the outlook of the data to be processed by the AI system and computers (Vinnova, 2018). Bhalagat (2019, p. 26) mentions that the knowledge-based search engine employs a predefined algorithm that is based on ontology-driven information extraction within the system to improve the search results for matching candidates (Çelik, 2016). The quality of hiring increases HR’s need to select the right people from a big pool of applicants. Joris Dijkkamp (2019, p. 34) highlighted the importance of data quality by stating that garbage in is

garbage out. So, what you put into it will come out. So, if you put the wrong data in the algorithm, the algorithm will not learn what you expected or make the wrong decision.

To maintain transparency, J.Dijkkamp (2019, p. 34) emphasized that it will be increasingly important to develop AI algorithms that are not just powerful and supportive tools but also be transparent to inspection. Joris Dijkkamp (2019, p. 25) further states that if organizations introduce tools that support them, for example assessing resumes, it is crucial to show openness and transparency in how the algorithms act and learn indicates one respondent: "It is about the ethical discussion of what the algorithm does and how do you know that we play fair as an organization. Openness is then very important.

More innovative human-machine integration at the intuitive and empathetic intelligence level will evolve; however, the human touch will always be needed (Bhalagat 2019, p. 29). It is crucial to have a certain feeling with the candidate (Joris Dijkkamp 2019, p. 27). Humans as recruiters are still needed to understand, interpret, and quiz the candidates for the right mix of empathy and emotions (Ashwani Kumar and Komal Khandelwal 2018, p. 256).

4.2 AI role:

Minimizing the human biases is the most prominent aspect of AI-based recruitment, Bhalagat (2019, p. 57) stated in their study that with the rapidly emerging trend of utilizing AI technologies in the business environment in the last two decades, the recruitment and selection practices of the HR management will gradually incorporate more AI-based software into its process. The growth of AI provides promising solutions for recruiters to optimize talent acquisition by taking over time-consuming repetitive tasks such as sourcing and screening applicants, to improve the quality of the hiring process, and eliminate biased - human decisions. Maria Michaelides (2018, p. 21) mentions that AI is helping to improve the selection of a diversified pool of candidates through an algorithmic assessment platform, which can be set up to reduce biases and maximize objectivity. Van Esch, Black (2019, p. 2) also states that these advantages come from AI's ability to process information and make decisions at volumes and speeds that far exceed human capacity and the availability of AI-enabled recruiting tools and systems that overcome common cognitive biases that hurt the reliability and validity of human judgment in recruiting activities. Furthermore, they also stated (p. 10) that AI-enabled recruiting systems are less biased and more objective than humans. J.Dijkkamp (2019, p. 25) also states that where biases often emerge in screening stages, since that is a human thing, these tools can exclude these biases. Bhalagat (2019, p. 28) supports that AI will add a deeper level of transparency in the hiring process by eliminating human biases and improving job seeker perceptions about employers who will enhance employers' image and brand.

Justifying how AI will change the HR role, Kumar and Khandelwal (2018, p. 257) state that with AI, speedy hiring can be done without compromising on the quality. Sekhri and Cheema (2019, p. 3075) mentioned that the new employees can access all hire information in the AI-based applications along with the reporting details, team members, tasks assigned at work. In addition

to the above, mechanized systems will answer all the queries of new employees. Nawaz and Gomez (2020, p. 4) argue

Intellectual chatbots are capable of accessing the calendar of the recruiters to check if they are available and then schedule the date and time for the relevant candidate. They can interpret resumes and request elucidations. Interacting with applicants one to one, instant messaging conversations on platforms like Facebook Messenger and text messages, chatbots can get some information about the applicant's experience, answer usual inquiries, and gather a wide range of data and request for a human selection representative to analyze.

Black & Van Esch (2019, p. 3) write that Unilever used HireVue and reported that it dramatically increased the speed and quality of the finalists who were subsequently interviewed in person and made offers. J.Dijkkamp (2019, p. 25) writes that a large part of the screening process will disappear as the task and responsibility of the HR professional, where it is no longer necessary to assess resumes in the future, and AI tools will do this. Savola & Torqe (2019, p. 32) proclaims that chatbots help recruiters by dealing with the first stages of recruitment, like asking and replying to frequently asked questions like on employee benefits or company culture, and thus allowing human recruiters to concentrate on the later stages of recruitment. Hence, AI plays a prominent role in replacing the repetitive and tedious work of HR as Savola & Torqe (2019, p. 19) claims that In this way, recruiters can deal with other parts of the recruitment process, like interviewing, while AI increasingly takes care of the candidate sourcing/attraction, selection, screening, and testing.

To support that AI is cost-effective Black and Van Esch (2019, p. 2) wrote that screening and evaluating the staggering increase in applications, a company would have to hire an army of recruiters, which would be prohibitively expensive. As a consequence, companies have no choice but to use AI-enabled tools to screen the ever-growing number of job applicants. Bhalagat (2019, p. 28) supports the idea of time reduction by stating that AI tools decrease the burden of heavy and time-consuming repetitive tasks such as sourcing, screening applicants, and other administrative tasks. Such benefits will contribute significantly to reducing the hiring cost and improving the quality of recruitment as well.

To prove that AI will help recruiters save time Bhalagat (2019, p. 24) emphasized that time is valuable for every organization, and the recruiting industry is no exception. AI-based software only needs a fraction of seconds to analyze big amounts of data of candidates and provide understandable results that can be considered by HRs. Geeta and Reddy (2018, p. 69) state that AI saves time by keeping the records as such which leads not to do the repeated event. The usual mode of recruitment takes place to spend enough time to screen the resume of candidates. And as such screening of resumes is a repetitive task. Srirang-Shweta-Manoj (2019, p. 3) proclaims that AI-based hiring processes have been characterized by speed, accuracy, effectiveness, objectivity, and cost-effectiveness. Nawaz & Gomes (2020, p. 4) also write that with a new job opening, numerous numbers of applicants will be pulled in a high volume, it very well may be a

major errand for a human to deal with. Proficiently that is, a chatbot can intercede with faster reply and speed up the procedure.

Nawaz and Gomes (2020, p. 3) state while arguing for value creation that

Companies can check their database information which is a key influence. With individual and automated discussions companies can refresh applicants' accessibility, their present position, their mobility, or even a new certification. Companies can add value to their database by deploying a chatbot within the preferred audience which can add value to the database. Moreover, a chatbot can help by engaging candidates through a messenger, replying to any questions regarding any misgivings they have which might daunt them from submitting any application, it can also give a reminder to candidates to complete all the information in case it is insufficient. This type of platform will enable the company to tag how many times a particular question has been asked and what candidates want and are looking for. Chatbots are great assistance to recruiters with their prompt replies and instant availability.

Consequently, Black & Van Esch (2019, p. 6) states that reducing time-to-hire represents not just an efficiency gain but also potentially a strategic advantage in the battle for human capital, especially in industries in which there is high turnover. In addition to the recruiting speed and efficiency gains that are possible with AI, there are also potentially impressive effectiveness gains as well.

AI-based automation facilitates matchmaking, as Kumar and Khandelwal (2018, p. 3) bring up that the recruitment agencies can now pursue both high volume and high touch strategy simultaneously, leading to a long-lasting relationship with candidates. Kumar and Khandelwal (2018, p. 2) also write that AI assistants intelligently provide the next steps and can route suitable candidates directly to recruiters. Srirang-Shweta-Manoj (2019, p. 2) argue that AI can make precise predictions about candidates who would be most suitable for the jobs vice – versa. James Wright (2019, p. 7) claims that Okolie et al (2017) stated employers had benefits including lower costs, more applicants, and better candidate matching with candidates having an easier application process, with a wide variety of job opportunities and finally a greater response rate from the employer to receive feedback. Savola & Troqe (2019, p. 33) mentions that when Google launched the Cloud Jobs program, many of its customers like FedEx, and Johnson and Johnson started using it to enhance the communication with potential applicants in their hiring platforms as well as to increase visibility and matching probability to job seekers.

Geeta and Reddy (2018, p. 68) support real-time engagement and claim that AI tools help the candidate to engage themselves before or even after they apply for vacancies specified by the organization. Running in the digitalized economy companies can interact with candidates using a chat box as it is an AI tool. A chatbox helps the candidate by responding to the queries and also an AI tool asks for feedback and required information about the candidate. Hmoud & Laszlo (2019, p. 25) The chatbot has significant potential to improve the candidate's experience (Burgess, 2018) by providing consistent instantaneous updates throughout the application process which

eliminates the communication gap between recruiters and applicants when dealing with a large pool of candidates.

Another role of AI is quick decision making. James Wright (2019, p. 7) writes that Bafaro et al (2017) explain that data analytics tools are the key to enable better decision making and predictions about candidates. Geeta & Reddy (2018, p. 69) explains that AI packages help to screen and select quality aspirants. It helps to identify candidates' skills, competency, and traits that match the job applied for. So, it results in hiring a talented candidate. James Wright (2019, p. 17) states that Hutchinson supports this suggesting AI can enable "cost-saving" and cut out mistakes made by a human recruiter. Bolier sees AI as a way to support the human recruiter by "obtaining insights" to "help recruiters make better decisions". Savola & Troqe (2019, p.34) claims that another strength of AI systems is the capability to integrate massive amounts of data and apply predictive analytics, which then can be used to evaluate different decisions.

To highlight the importance of timely feedback, Nawaz & Gomes (2020, p. 1) supports the claim by mentioning that AI chatbots developed to make messages to provide assistants to the consumers for 24/7, to answer all queries and acting like FB messenger, webchat, but the competitive environment enthusiastically looking for newly added features in AI chatbots to handle all the raised complex problems, therefore AI chatbots are much demanded in chatbot market. Geeta & Reddy (2018, p. 69) point out that employees get updated information and get immediate responses to their queries. Ultimately, it leads to satisfying employees and ends up with employee engagement. And, it helps in decreasing employee turnover ratio and entitles with good service to the organization. Kumar & Khandelwal (2018, p. 256) highlights that AI is used to let the rejected candidates know so they can move on with their job search. Johansson & Herranen (2019, p. 17) states that when it comes to candidates who were rejected from the job vacancy, AI systems allow feedback about their qualifications and skills that these candidates can develop further in the future.

James Wright (2019, p. 7) mentions that several respondents describe artificial intelligence as a tool that uses data from the past to make predictions and as a tool to get candidates faster and with less effort out of the labor market. Bafaro et al (2017) explain that data analytics tools are the key to enable better decision making and predictions about candidates. Denise Han (2020, p. 2) writes that Implementing these algorithms, companies have reported a decrease in employee termination, employee resignation, and employers' time spent combing through vast amounts of employee data. Savola & Troqe, (2019, p. 33) When it comes to hiring, one well-known attribute of AI over humans is the ability to make better predictions for things like job performance, productivity, and employee turnover.

AI is helpful in the behavioral analysis as Bhalagat (2019, p. 28) explains

Intuitive solutions and Chabot's are used to interview and screen applicant's skills, hence, social, emotional, communicative, and highly interactive robots with a picture and sound recognition technology will be used to conduct a face-to-face interview with candidates in the near future. Khosla et al. (2016) conducted a study to check the use of social robots to interview applicants by assessing subtle

variations in their facial expressions and sounds. The robot evaluated applicants' emotional and cognitive behavior based on verbal and non - verbal variables and the results were benchmarked according to the organization's expectations.

Bhalagat (2019, p. 57) further explained

Video interviews with (out) an artificial intelligence decision agent can be put into practice for successful candidate screening (Suen et al., 2019). For job application and selection, artificial intelligence can adopt behavioral and physiological features (e.g., biometrics) as a component of the entire decision - making process.

Denise Han (2020, p. 2) supports the claim by stating that Fortune attributes these algorithms' success to their use of "natural-language processing and machine learning to construct a psychological profile that predicts whether a person will fit a company's culture." James Wright (2019, p. 17) also writes that AI will significantly help identify "who works well within our organization and try and quantify those characteristics and identify gaps within areas of your business and then by doing so you can go even deeper and say what kind of person aligns well and fits within our culture and beliefs.

AI provides a competitive advantage, especially to the first mover. James Wright (2019, p. 7) concludes in his study that "*This is leading to recruitment firms and leadership radically changing their processes to accommodate for the acceleration in the capabilities of AI (Chitkara et al, 2017 & CognitionX, 2017) to ultimately benefit from the competitive advantage seen from the first movers (Rao et al, 2017).*" Hmoud & Laszlo (2019, p. 26) indicate that AI solutions will facilitate talents' access, which will increase competitiveness and place more pressure on organizations and HR managers to adapt and incorporate AI into their recruitment strategies. Savola and Troqe (2019, p. 72) mention the use of AI does not only change an organization internally, but it can also impact the recruitment industry and therefore competition rules, by affecting revenue, profitability, and talent acquisition. Furthermore, Savola and Troqe (2019, p. 73) write that for recruiters in the future, it is essential to understand the role and the transformational power of automation and AI, as being able to master this power will determine talent flow absorption, and ultimately gain a competitive advantage over competitors.

AI enables recruiters to hire an appropriate candidate as Sekhri & Cheema (2019, p. 3075) highlighted that augmented intelligence is of immense help in assisting the HR managers in finding strong candidates amongst the giant pool of applicants. Geetha and Reddy (2018, p. 69) emphasize that AI tool works in a way that it uses huge data for recruitment and does an unbiased screening and selection takes place, this leads to hiring quality candidates. AI helps to identify candidates' skills, competency, and traits that match the job applied for. Hence, it results in hiring talented candidates. Black and Van Esch (2019, p. 5) support the claim of selecting the right candidate by mentioning that AI can not only help firms increase the total number of applicants, but it can also target more appropriate candidates. Savola and Troqe (2019, p. 50) state that nevertheless, the recruiter is the one who makes the final hiring decision in the end, while AI can only provide the best alternatives.

4.3 Adoption

This theme explains the factors that have been showing in previous research as important when it comes to the adoption of AI in the recruitment process. For the successful integration of technology collaboration between actors play a significant role. An actor could be the employers, candidates, organization itself, or the outside organization, those who could contribute directly or indirectly in the whole process. The HR department of different organizations along with their IT teams are collaborating with other stakeholders or partners such as software firms, universities, other organizations, etc. which are essential for exchanging knowledge, creativity, best practices and resources which is used to create to new values and opportunities (Savola & Troque, 2019). Collaboration with both internal and external expertise is necessary for the successful implementation of AI tools but also beneficial for the employers and the candidates as well. Also, it is significant for the actors to cooperate with the machine. Though this technology may be unique and novel, based on the candidate's experiences, it can lead a company to either accept or reject such technology. As a consequence of accepting this technology, it can effectively replace the human from the decision-making position, that can rise to another debate which is human vs. machine, who is better in making decisions. This debate is old-fashioned according to Savola and Troque (2019, p57)

When it comes to the discussion about who's the better decision-maker, the idea of humans versus machines is becoming outdated, and more authors like Boudreau(2014), Jarrahi(2018) and Kaplan and Haenlein(2019) believe that the answer to this equation relies in the fruits of collaboration of both players.

All of these collaborative adoptions could help to get the opportunities of AI and may accelerate the integration of AI in recruitment. Another factor to consider is the acquiring of knowledge on using AI-enabled tools. Though many companies are showing interest in using AI for their recruitment purpose, they are still very new in this field in terms of knowledge and development experience (Black & Van Esch, 2019). Most of the companies are in the initial stage of the implementation of AI tools for that many tools are still unfamiliar to the HR professionals. Moreover, it is observed in some studies that there exists a trust issue towards machines which leads to the unwillingness to adopt this technology. Wright & Dr. Atkinson, (2019) found that the candidates always feel that human touch is essential in any one of the steps of recruitment and they feel comfortable interacting with a human while in the interview. Not only the candidates, there is a possibility of distrust towards the machine but also the employer can see them as a threat. Black & Van Esch (2019, p9) mentioned: *"The possibility that HR employees will see AI-enabled recruiting tools as a threat to their jobs is another challenge and, as a consequence, will stymy or even sabotage the implementation of such tools"*. Also, to use this new tool, employers such as HR has to learn new skills like commercial skill, beta skills, analytical skills, knowledge of data and tools, etc. to cope up with the difficulty of implementing a new system as well as integrating with the existing system (Michaelides, 2018; J.Dijkkamp, 2019). All these factors can have motivated them to be unwilling towards adopting this technology as it is a drastic move from the traditional process. It is suggested for the HR professionals to obtain the knowledge of

algorithms of these AI tools, which will help them to trust these tools and unfold transparency towards their decisions (J.Dijkkamp, 2019). This acquisition of knowledge is important because if the employer does not have any solid knowledge of the working method of the algorithm, then they might doubt the decision made by the AI tools, which can lead to rejection of using AI at all. And, if the employers could not explain to them the fairness and transparency of decisions made by the AI tool, they may lose trust in the candidates as well (J.Dijkkamp, 2019). Also to prevent AI from unconscious bias, it is essential to program the AI tool with the right parameter, for that the recruiters need to have deeper knowledge about its workings (Upadhyay and Khandelwal, 2018). As the system is not fully error-free, it is not appreciated to completely depend on the system and have the ability to understand if the system gives any wrong decisions. Since the usage of AI has become a trend in today's industry, HR professionals, as well as the recruiters, must work and learn to mitigate the challenges which may arise for these tools (Han, 2020).

Though AI may have some bias, it can be minimized or fixed with proper knowledge, but the human's own perceived bias is very hard to fix (Wright & Dr. Atkinson, 2019). Even though the AI is not completely free of cost, it is quite cost-effective and efficient on a per-candidate basis than a human, and the outcome candidate pools will result in 200 or 5000 hires (Black & Van Esch, 2019). So, the AI tools are creating a positive attitude towards the recruiters. Wright & Dr. Atkinson (2019, p4) mentioned: "*A survey conducted by the HRP (2016) found that 84% of HR firms thought AI was a useful tool within recruitment, the same report also concluded that HR firms are either 'not very prepared' (33%) or 'not prepared at all' (35%) for AI within their operations*". So, there is a possibility of positive outcomes for a company adopting AI in recruitment. Also, more knowledge and information, as well as collaboration between different innovators, are needed to get its opportunities and adopt the current trend.

4.4 Potential Risk

This theme describes the potential risks which would be considered as challenges or barriers of using AI in the recruitment process. One of the most cited and critical challenges of using AI in the recruitment process is maintaining data privacy and taking appropriate measurements against ethical issues. Using different tools used for the recruitment process, the recruiters can collect different personal information which may not directly be related to recruitment. For example, age, health, body image, gender, sexual orientation, etc. which can later be used to sort the candidates and even discriminate where possible (Van Esch, Black & Ferolie, 2019). Collecting this additional information may lead to ethical and privacy issues (Van Esch et al., 2019). Those companies who use AI for recruitment have the potential of collecting this information. And if this is done without the knowledge of the candidates, they might feel insecure and uncomfortable. This also put the whole company values into question. Though AI tools were designed to minimize the human bias, this tool may introduce new biases by the inputs or the data they have fed to build the learning algorithm. Srirang, Shweta & Manoj (2019, p6) argues that "*there might be prejudice inbuilt in the algorithm itself due to subconscious biases in the minds of the programmer who writes codes for the same.*" This implies that a machine fed with the bias data, it will produce bias

results, which has nothing to do with the performance of the machine or the algorithm that runs the machine. The machine will generate the exact output according to the input it was given whether it is biased or not. *“If there has been gender, age, race, education or other biases in the past and if those emerge in the current high performers in the company who serve as benchmarks, the algorithms will simply learn those patterns and perpetuate the biases”* (Black & Van Esch, 2020, p9). For example, Amazon also uses AI for recruiting purposes, but due to bias input data fed to the system, the machine taught himself to be biased causing it to penalize female candidates despite having proper qualifications (Han, 2020). Even after modifying the programs, Amazon is still not sure about the transparency and unbiasedness or gender neutrality of their system that points out the most alarming things which are even the developers who built the program, do not have complete control over the outcome of the program produced (Han, 2020). Maintaining transparency towards candidates is important, as the decision is taken by the machine will influence and impact their life.

Poor data quality and restriction over data could be another challenge of using AI in recruitment. As mentioned earlier the algorithm depends mostly on the data which would be used as input for producing the result. So, the data that will be used as an input must be clean, bias less, quality full, relatable to achieve expected and accurate results. So, if the wrong data is fed in the algorithm, the algorithm will not learn what is expected or make the wrong decisions (J.Dijkkamp, 2019). To obtain such high-quality data is challenging as quality datasets are becoming restricted and there is a lot of open and cheap dataset available which has poor quality and less validity. If companies use poor datasets because of minimizing cost that will add no value and might bring risk in unwanted results in recruitment. (Wright & Dr. Atkinson, 2019). Also because of data restriction due to legal privacy law or people in general concern start to restrict their social media profiles, which could limit access to data, which needs to train the AI tools. Wright & Dr. Atkinson (2019, p6) mentioned *“GDPR is another data challenge that needs to be considered and with an estimated 80% of recruitment companies not being complicit with the rules, it will heavily impact the industry”*. These legal restrictions may cause high-quality datasets protected which eventually may lead companies to use the cheap and unreliable datasets for training their algorithm.

Furthermore developing, implementing, integrating, and teaching an AI tool is expensive and also is not error-free which may create investment insecurities towards companies. Though AI applications have created many opportunities in recruitment, implementing, and testing this application is time-consuming as well as costly (Savola & Troqe, 2019). So, the cost of creating AI tools and systems is one of the challenges of an AI-powered recruitment system (Black & Van Esch, 2019). And the goal of investment in AI-powered recruitment is to get the right job to the right candidate more efficiently and effectively, which only can be achieved if the candidate accepts the job offer (Van Esch & Black, 2019). There is a significant amount of uncertainty in investing money as it is not only depending on the organization who implements and uses an AI-powered recruitment system but also depends on the candidates who might accept or reject the job offer. Also, the investment depends on the company size and preference, as it is very difficult

to make a huge investment for a small to medium-size company (Bhalgat, 2019). There are several factors which can cause investment insecurities should be taken into consideration while making the business goal. So before implementing AI tools, the development and utility costs of these algorithmic and internet-based tests should be well evaluated (Savola & Troqe, 2019).

5. Discussion

The first theme describes the advantages and opportunities of AI for both actors i-e, recruiters, and applicants. However, the prominent advantages of AI in recruitment that impact the actors using it cannot be achieved until an awareness of what AI is and how it works is yielded for them. Also, the actors need to understand that the AI recruitment process is transparent, fair, easy to use, and responds in real-time. It helps the candidates with the efficient completion of the application process and provides them with feedback, both positive and negative, personalized communication. The timely negative feedback with suggestions encourages applicants to improve their application and skills which is a source of motivation for using AI in recruitment for both actors. Meanwhile, the mundane, time consuming, and monotonous tasks of CV screening are managed by AI, the role of HR managers can be transformed as leaders and advisors. They can focus on relationship building, talent development, redevelopment of skills, and manage a diverse culture at the workplace. The most important aspect of the success of the AI-based recruitment that the actors must understand is the quality of data that is used to train the algorithm. To search and select for the right talent, the data feed to the algorithm should be of high quality. Another aspect of being open about the algorithm to be used is that the applicants will trust the transparency and fairness of the process. At the same time, with AI, recruiters can scan volumes of social media data to discover the candidate's values, beliefs, and attitudes. Even though AI can be used to assess the candidates' facial expression and behavior, human recruiters are still needed to assess the candidates for the right mix of emotions and sensibility.

The second theme is the AI role which explores the impact of AI in recruitment and selection by discussing in detail all dominant advantages of AI in the recruitment process. Human biases are possible in recruitment during the screening stage, but AI removes these biases and provides promising solutions to acquire appropriate talent. AI can eradicate human biases through algorithms that ignore biases like race, gender, name, school, or college attended, etc. On the other hand, it screens candidates based on the data fed to it like qualification, skills, and experience, etc. Thus, AI works according to facts and no emotions or sympathies can affect its assessment. This unbiased judgment is done on volumes of data that promotes diversity and inclusion. AI algorithms can also build a psychological profile that can assess the applicant's emotions and behavior by evaluating variation in facial expression and sound. It can also estimate the cognitive behavior of an applicant, so in the future, it will help organizations to recruit not only the right skill but also the right-aligned with the company's culture and beliefs. AI is propitious towards changing the role of HR by taking over the repetitive, time consuming and tedious work of sourcing, screening, interviewing, selecting candidates, and delivering the right information to

these newly selected employees. AI can interpret resumes, communicate with the applicants individually, schedule meetings between recruiters and candidates by checking the recruiters' calendar, hence speeding up sourcing. AI can filter massive data and can apply predictive analytics by identifying different related variables and recognizing patterns, hence accelerating the decision of hiring the relevant candidates. Improved decisions to hire the right candidate are leading to a decrease in employee turnover for some companies. This way, efficient and improved hiring is done while maintaining the quality of the hiring process.

AI continuously assists recruiters to process volumes of data efficiently, effectively, and accurately. AI-based hiring saves money, cost, and human effort throughout the hiring process from sourcing the prospective candidates to onboarding by automating the entire hiring process. AI's ability to process information, make reliable decisions based on predictive analysis and timely feedback helps to improve candidate experience, and enable recruiters not only to acquire the best but also to revamp the recruitment process.

The third theme potential risk describes some challenges which address the possible vulnerabilities created by using AI in recruitment. This theme mostly focuses on the ethical, privacy, legal, investment insecurity challenges associated with AI. During the recruitment process, human recruiters can be biased towards any candidates, because of the nature of human. AI has come forward to eliminate such bias for making the recruitment process as fair and transparent as possible but still, AI has its own unconscious bias associated with its system. Since the AI depends on the large volumes of data and learns from those data as well as teach itself, but if the data that fed to the AI is previously biased and contains discrimination towards a certain group of people, then the AI will consume that data and introduce bias in its programs which will show a discriminating result. Srirang, Shweta & Manoj (2019) and Black & Van Esch (2019), both highlighted that due to the past activities of a company or the subconscious bias of the programmer, the AI which falls under such circumstances may turn out to be a biased one. Such as if a company previously hired only male candidates over the female candidates for their vacancy, then the AI which will use that company's data may show discrimination towards woman even if all the criteria of that job vacancy has been fulfilled. A human may not discriminate against a candidate for their gender, race, or age but since AI does not possess such sense, it only depends on the data which is given to it. It tries to find a pattern according to the given data and penalize a candidate based on that bias. This biased pattern may be based on the candidates' age, gender, or race. Moreover, sometimes it is hard to tell in which way this pattern will take a turn and becomes a biased one and how that bias even works. For this reason, Amazon's machine learning algorithm is a failure, since it was biased against female candidates due to the decade's past data fed to it. So, the data needs to be refined and analyzed thoroughly beforehand. And it is important to improve the quality of the data which will bias less and error-free. Dijkkamp (2019) argued that the algorithm will produce the wrong result if it was fed the wrong data. That's why the company who build such AI needs to aware of what kind of data they should use to train their AI, as today a lot of cheap and poor datasets are available most of those are free and, good and quality full data are either hard to find or costly or restricted. So, the company must be more careful to use a good

dataset for training their AI, otherwise, they end up training a biased or poor-quality AI which maybe even pose a threat to the company.

Another challenge is to prevent AI from using personal data of a candidate without their consent. AI can access social media data to target suitable candidates and get to know their profiles. Using those data AI can build a personal profile of that candidate, which may not necessary for the recruitment. This way AI can discriminate and even misjudge a person's ability. And using the personal data from the public domain, may not always end well. A human may understand the feeling of that personal information such as views on political or social issues but AI may not understand such underlying feelings and could create a misleading profile of that candidate. Using personal data in this way is not ethical as that person has not authorized to use his personal data for statistics purposes, which could lead to a breach of privacy of that person. Such as Van Esch, Black & Ferolie (2019) argued that candidates' additional personal information such as age, race, gender, sexual orientation, etc can be used to discriminate in recruitment which may lead to ethical and privacy issues. And the employer should not collect personal information if it is not directly related to the job. For this reason, different kinds of legal privacy laws have been imposed to restrict the unauthorized use of social medial data and AI should not be used to violate people's privacy or data rights. According to Wright & Dr. Atkinson (2019) highlighted that, GDPR is one of the most considerable data challenges where most of the recruiting companies do not comply with GDPR which will greatly affect the industry. Such restrictions may reduce data availability. So, there must be a balance between data privacy and data accessibility, where people's personal data can be accessed through clear consent and privacy will not be violated due to the usage of AI.

Moreover, it is challenging to invest for the companies to develop, implement, and train AI-enable tools as is a time and resource-consuming work in terms of money, manpower, digital tools, etc. Savola & Troqe (2019) suggested that, as it is associated with huge cost companies must be conscious before investing money for implementing AI. Also, a company should consider its capabilities before making a big leap. Bhalgat (2019) mentioned that it is very difficult to make a huge investment for a small or medium-sized company. So, investment needs to be considered according to the company's size and preference. And, the goal of using AI is not only to select the right person for the right job but also the selected person has to accept the job offer. Also, it is not certain whether the AI will produce the correct result or not. This creates investment insecurity, where the investors are not certain whether their investment will return the fruitful results.

The final theme Adoption describes the embracing opportunities and challenges of adoption of AI. To get the proper benefit and opportunities of adopting AI, the different actors such as employers, candidates, the organization itself, or the outside organization, etc. need to agree to collaborate. Actors need to have an open mindset to collaborate and work with outside actors and establish sharing platforms where knowledge and different resources can be interchanged. Savola and Troque (2019) argue that for sharing knowledge and creativity HR departments from different organizations along with their IT departments collaborate with other organizations to create new values and opportunities. For example, the different organizations can have AI-

powered tools from a third-party software company to increase their performance and efficiency, also acquiring knowledge about those tools and to deliver that knowledge to train their internal actors and to cope up with the technology. It is challenging for an actor to share their knowledge with the actors from outside of the organization due to the company's rules and regulations. To properly utilize the benefit of AI technology, the actors must have an open and flexible mindset to exchange knowledge. Also, actors need to embrace this technology and agree to cooperate with the machine as well. Because this machine may replace a human from a decision-making position which may cause discomfort and unwillingness to work with the AI tools. Authors including Boudreau (2014) Jarrahi (2018), Kaplan & Haenlein (2019) highlighted that the best result comes from the collaboration of both humans and machines. There is no need to debate about who is better in deciding between a human and a machine, both can support each other to maximize the benefit.

Another challenge to mention is that to acquire knowledge on using AI-enabled recruitment tools. Though AI is a promising technology, in the recruitment field it is in the development phase and still a lot of knowledge to gather and skills to develop. Employees of an organization need to know and understand about the working methodologies and underlying technologies to properly implement and integrate this new AI recruitment tools with the current system. Michaelides (2019), Dijkkamp (2018), and Han (2020) suggested that HR professionals of an organization need to develop different kinds of new skills and knowledge to adapt to the new technology. However, it is not easy to adopt new knowledge or skills. Some factors may prevent them from acquiring this knowledge. One of these factors mentioned by Black & Van Esch (2019) is that the HR professionals may feel these AI recruitment tools as a threat to their job. Due to the lack of knowledge, the HR professionals may distrust these tools and their unwillingness to acquire new skills are other such factors. Also deviating from the traditional procedure and adopt new technologies are always challenging for people. That's why acquiring new knowledge and skills is necessary which will be helpful to establish trust between the employees and the AI recruitment tools. And if the employees understand the algorithm and underlying procedures of these tools, it will be easier for them to distinguish the right and wrong decisions made by these tools and they will be able to modify and control these tools by setting appropriate parameters to mitigate or completely erase unconscious bias. Dijkkamp (2019) also mentions that the employers need to explain the candidates about the fairness and transparency of using these tools which will help them to establish trust between the candidates. So, it is essential to mitigate these adoption challenges of using AI recruitment tools to fully utilize the proper benefits and opportunities.

6. Suggestion for future research

Based on the above literature review, where the majority of the literature we found has focused more on general opportunities it is suggested that more research should be conducted in AI in recruitment as it is a recent topic that has shown many promises and prospects. And more research should be done giving detailed attention to the challenges of using this technology.

Another suggestion is that more study on the use of AI-based hiring from candidates' point of view is required and should be considered by researchers as mostly we could find case studies are done from the organization's perspective.

7. Conclusion and Implication

Finally, after assessing the opportunities and the challenges of using AI in the recruitment process, this will also help the readers to understand more about the progression of AI technology in recruitment for the past few years and the recruiters may be able to recreate new ideas, assess contemporary challenges, and avail the imminent opportunities. A systematic literature review has been conducted by analyzing and scrutinizing different positive and negative aspects of AI that leads to identifying four themes where AI role describes different advantages and uses of AI tools that may create opportunities both the recruiters as well as the applicants, Actor role describes how AI can assists them by making the process efficient, potential risk explores different kind of challenges regarding the system which is essential to know before investing and finally adoption figure out some challenging factors such as collaboration and knowledge gain which can help to mitigate the risk and get the advantage of this technology.

Another concern is whether the challenges mentioned here, is it feasible for HR professionals to mitigate these challenges? Since the whole recruitment process can be automated by machines, to what extent is it fruitful enough to be carried out without human intervention? According to us, these questions can be resolved by conducting more research on existing systems. Therefore, this research helps to judge the usability and viability of using AI in their recruitment process and can be sure about what to expect from AI and what needs to be taken care of before implementing this technology. Also, this thesis will encourage other scholars to look more deeply into this topic and even find new possible research opportunities.

References

- Breaugh, James A (2008). "Employee Recruitment: Current Knowledge and Important Areas for Future Research." *Human Resource Management Review*, vol. 18, no. 3, pp. 103–118.
- Black, J. Stewart, and Patrick van Esch (2020). "AI-Enabled Recruiting: What Is It and How Should a Manager Use It?" *Business Horizons*, vol. 63, no. 2, pp. 215–226.
- Bhalgat, Karan Hiren (2019). *An Exploration of How Artificial Intelligence Is Impacting Recruitment and Selection Process*.
- Correll, S., Benard, S., and Paik, I., 2007. Getting a Job: Is There a Motherhood Penalty?. *American Journal of Sociology*, 112(5), pp.1297-1339.
- Davison, H., and Burke, M., 2000. Sex Discrimination in Simulated Employment Contexts: A Meta-analytic Investigation. *Journal of Vocational Behavior*, 56(2), pp.225-248.
- Dwivedi, Yogesh K., et al (2019). "Artificial Intelligence (AI): Multidisciplinary Perspectives on Emerging Challenges, Opportunities, and Agenda for Research, Practice, and Policy." *International Journal of Information Management*.
- Fernández, Carmen, and Alberto Fernández (2019). "AI in Recruiting Multi-Agent Systems Architectu Re for Ethical and Legal Auditing." *The Twenty-Eighth International Joint Conference on Artificial Intelligence (IJCAI-19)*.
- Gordon, R., and Arvey, R., 2004. Age Bias in Laboratory and Field Settings: A Meta-Analytic Investigation1. *Journal of Applied Social Psychology*, 34(3), pp.468-492.
- Han, Denise (2010). *The Rose: Artificial Intelligence in the Current Hiring Process the Rose: Artificial Intelligence in the Current Hiring Process*.
- JARRAHI, M. H (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, 61, pp. 577-586.
- J. Dijkkamp (2019). *The Recruiter of the Future, a Qualitative Study in AI Supported Recruitment Process*.
- Kamran, Asif, et al(2015). "Analysis of the Recruitment and Selection Process." *The Ninth International Conference on Management Science and Engineering Management, Advances in Intelligent Systems and Computing* 362.
- Kaplan, Andreas, and Michael Haenlein (2019). "Siri, Siri, in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence." *Business Horizons*, vol. 62, no. 1, pp. 15–25.
- Kaplan, Andreas, and Michael Haenlein (2019). "Rulers of the World, Unite! The Challenges and Opportunities of Artificial Intelligence." *Business Horizons*,
- Michaelides, Maria P (2018). "The Challenges of AI and Blockchain on HR Recruiting Practices." *The Cyprus Review*, vol. Vol. 30, no. No. 2.
- Mikalef, P., Pappas, I. O., Krogstie, J., & Giannakos, M. (2018). Big data analytics capabilities: A systematic literature review and research agenda. *Information Systems and e-Business Management*, 16(3), 547-578.
- Newell, S. (2005). *Recruitment and Selection. Managing Human Resources: Personnel Management in Transition*. 4th edition, Blackwell Publishing LTD

- Okoli, C. (2015). A guide to conducting a standalone systematic literature review. *Communications of the Association for Information Systems*, 37(43), 879-910
- Russell, Stuart, and Peter Norvig(2010). *Artificial Intelligence : A Modern Approach*. New Jersey, Pearson.
- Raub, McKenzie (2018). “Bots, Bias, and Big Data: Artificial Intelligence, Algorithmic Bias, and Disparate Impact Liability in Hiring Practices.” *Arkansas Law Review*, vol. 71, no. 2.
- Rab-Kettler, Karolina, and Bada Lehnervp (2019). “Recruitment in the Times of Machine Learning.” *Management Systems in Production Engineering*, vol. 27, no. 2, pp. 105–109.
- Stoilkovska, A., Ilieva, J. & Gjakovski, S (2015). Equal employment opportunities in the recruitment and selection process of human resources. *UTMS Journal of Economics*, 6(2), pp.281-292.
- Stefano A. Bini & MD (2018). “Artificial Intelligence, Machine Learning, Deep Learning, and Cognitive Computing: What Do These Terms Mean and How Will They Impact Health Care?” *The Journal of Arthroplasty*, vol. 33, no. 8, pp. 2358–2361.
- Sharma, A. (2018 August 16). How AI reinvented hiring practice at L’Oreal. People Matters
- Sekhri, Alka, and Dr. Jagvinder Cheema (2019). “The new era of HRM: AI reinventing HRM functions.” *International Journal of Scientific Research and Review*, vol. 07, no. 3.
- Schryen, Guido (2015). “Writing Qualitative IS Literature Reviews—Guidelines for Synthesis, Interpretation, and Guidance of Research.” *Communications of the Association for Information Systems*, vol. 37.
- Savola, Hannimari, and Bijona Troqe (2019). *Recruiters Just Wanna Have...AI? Implications of Implementing AI in HR Recruitment*.
- Srirang K, et al (2019). *Leveraging Artificial Intelligence for Effective Recruitment and Selection Processes*.
- Thebe, TP. & Van der Walddt, G (2014). A Recruitment and Selection Process Model: The case of the Department of Justice and Constitutional Development. *Administration Publica*, 22(3), pp. 6-29
- Templier, M., & Paré, G. (2015). A framework for guiding and evaluating literature reviews. *Communications of the Association for Information Systems*, 37(1), 112-137
- Upadhyay, Ashwani Kumar, and Komal Khandelwal (2018). “Applying Artificial Intelligence: Implications for Recruitment.” *Strategic HR Review*, vol. 17, no. 5, pp. 255–258.
- van Esch, Patrick, et al (2019). “Marketing AI Recruitment: The Next Phase in Job Application and Selection.” *Computers in Human Behavior*, vol. 90, pp.215–222.
- van Esch, Patrick, and J. Stewart Black (2019). “Factors That Influence New Generation Candidates to Engage with and Complete Digital, AI-Enabled Recruiting.” *Business Horizons*, vol. 62, no. 6, pp. 729–739.
- Vom Brocke, J., Simons, A., Riemer, K., Niehaves, B., Plattfaut, R., & Cleven, A. (2015). Standing on the shoulders of giants: Challenges and recommendations of literature search in information systems research. *Communications of the Association for Information Systems*, 37(1), 205-224.

- Webster, J., and Watson, R1. Ved, S., Kaundanya, N.S. & Panda, O.P. (2016). Applications and Current Achievements in the field of Artificial Intelligence. Imperial Journal of Interdisciplinary Research, 2(11), 932-936
- Webster, J., and Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. Management Information Systems Quarterly. Vol.26, No.2, pp.xiii-xxiii
- Wright, James, and Dr. David Atkinson (2019). *The Impact of Artificial Intelligence within the Recruitment Industry: Defining a New Way of Recruiting.*

Appendices

Literature review articles (22 reviewed articles)

- Black, J. Stewart, and Patrick van Esch (2020). "AI-Enabled Recruiting: What Is It and How Should a Manager Use It?" *Business Horizons*, vol. 63, no. 2, pp. 215–226.
- Dignum, Virginia (2018). "Ethics in Artificial Intelligence: Introduction to the Special Issue." *Ethics and Information Technology*, vol. 20, no. 1, pp. 1–3.
- Fernández, Carmen, and Alberto Fernández (2019). "AI in Recruiting Multi-Agent Systems Architecture for Ethical and Legal Auditing." *The Twenty-Eighth International Joint Conference on Artificial Intelligence (IJCAI-19)*,
- Han, Denise (2010). *The Rose: Artificial Intelligence in the Current Hiring Process the Rose: Artificial Intelligence in the Current Hiring Process*.
- Hmoud, Bilal, and VarallyaiLASZLO (2019). "Will artificial intelligence take over human resources recruitment and selection?" *Network Intelligence Studies*, vol. 7, no. 13.
- J. Dijkkamp (2019). *The Recruiter of the Future, a Qualitative Study in AI Supported Recruitment Process*.
- Johansson, Jennifer, and Senja Herranen (2019). *The Application of Artificial Intelligence (AI) in Human Resource Management: The Current State of AI and Its Impact on the Traditional Recruitment Process*.
- Bhalgat, Karan Hiren (2019). "An Exploration of How Artificial Intelligence Is Impacting Recruitment and Selection Process".
- Kulkarni, Swatee B., and Xiangdong Che (2019). *Intelligent Software Tools for Recruiting*. Vol. 28, no. 2.
- Michaelides, Maria P (2018). "The Challenges of AI and Blockchain on HR Recruiting Practices." *The Cyprus Review*, vol. Vol. 30, no. No. 2.
- Min, Jihyun, et al (2018). "A Comparative Study of Potential Job Candidates Perceptions of an AI Recruiter and a Human Recruiter." *Journal of the Korea Convergence Society*, vol. Vol. 9, no. No. 5, pp. 191–202.
- Nawaz, Nishad, and Anjali Mary (2019). "Artificial Intelligence Chatbots Are New Recruiters." *International Journal of Advanced Computer Science and Applications*, vol. 10, no. 9.
- R, Geetha, and Bhanu Sree Reddy D (2018). "Recruitment through artificial intelligence: A conceptual study." *International Journal of Mechanical Engineering and Technology (IJMET)*, vol. 9, no. 7, pp. 63–70.
- Rab-Kettler, Karolina, and Bada Lehnervp (2019). "Recruitment in the Times of Machine Learning." *Management Systems in Production Engineering*, vol. 27, no. 2, pp. 105–109. Accessed 28 May 2020.
- Savola, Hannimari, and Bijona Troqe (2019). *Recruiters Just Wanna Have...AI? Implications of Implementing AI in HR Recruitment*.
- Sekhri, Alka, and Dr. Jagvinder Cheema (2019). "The new era of HRM: AI reinventing HRM functions." *International Journal of Scientific Research and Review*, vol. 07, no. 3.

- Srirang K, et al (2019). *Leveraging Artificial Intelligence for Effective Recruitment and Selection Processes*.
- Upadhyay, Ashwani Kumar, and Komal Khandelwa (2018). "Applying Artificial Intelligence: Implications for Recruitment." *Strategic HR Review*, vol. 17, no. 5, pp. 255–258.
- Van Esch, Patrick, et al (2019). "Marketing AI Recruitment: The Next Phase in Job Application and Selection." *Computers in Human Behavior*, vol. 90, pp. 215–222.
- Van Esch, Patrick, and J. Stewart Black(2019). "Factors That Influence New Generation Candidates to Engage with and Complete Digital, AI-Enabled Recruiting." *Business Horizons*, vol. 62, no. 6, pp. 729–739,
www.sciencedirect.com/science/article/pii/S0007681319300953,
10.1016/j.bushor.2019.07.004. Accessed 3 Dec. 2019.
- Vedapradha, R., et al (2019). "Artificial Intelligence: A Technological Prototype in Recruitment." *Journal of Service Science and Management*, vol. 12, no. 03, pp. 382–390.
- Wright, James, and Dr. David Atkinson (2019). *The Impact of Artificial Intelligence within the Recruitment Industry: Defining a New Way of Recruiting*.

Figures

- Step 1: Identify the need to recruit
- Step 2: Update the job description, specification and profile/determine the key performance areas of the job/recruitment planning
- Step 3: Determine the key performance areas of the job/recruitment planning
- Step 4: Consult the recruitment policy and procedure
- Step 5: Consider the sources of recruitment (searching)
- Step 6: Choose the appropriate recruitment method (searching)
- Step 7: Develop the recruitment advertisement /strategy development
- Step 8: Place the advertisement in the most appropriate and suitable communication medium/implement a decision
- Step 9: Ensuring availability of application blanks
- Step 10: Screen responses
- Step 11: Recruitment evaluation and control
- Step 12: Reception/ preliminary reception/initial screening interview/preliminary interview
- Step 13: Completing the application form
- Step 14: In-depth selection interview
- Step 15: Background and reference checking
- Step 16: Medical examination and physical/ pre-employment testing
- Step 17: Assessment Centres/work samples
- Step 18: Make a final hiring decision
- Step 19: Make a fair job offer/final decision

Fig. 1: Combined perspectives of sequential steps in the recruitment and selection the process from (Thebe and Waldt 2014)

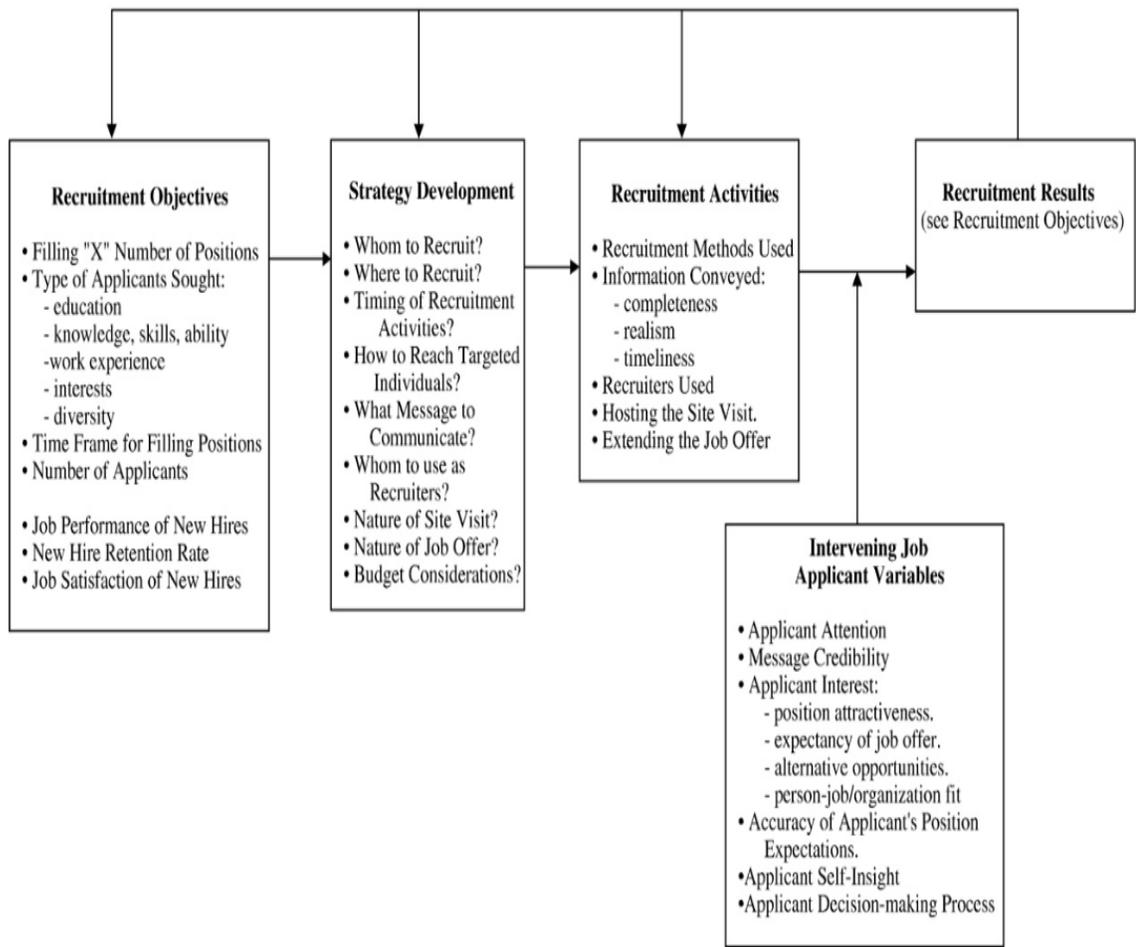


Fig. 2: A model of the recruitment process (reprinted with permission, from Breugh, James A (2008)

Tables

Search result with keywords	Number of selected papers
“AI in recruitment”	22
“AI”	7
“Recruitment process”	5

Table 1. Search results according to keywords

Quote example	Code	Themes
Staffing companies also need to consider the concern of job seekers with regard to exclusion, discrimination, and privacy while encouraging AI-powered tools in the hiring process and find ways to reassure them about neutrality of the machines and make the interface more user friendly and comfortable.	Candidate encouragement	Actor role
Delegating these repetitive tasks to AI, recruiters can focus instead on more creative and strategic matters in their daily routines as HR managers will shift their focus from operational tasks to a leadership role, motivating and cultivating their teams’ potential and skillsets.	Towards strategic HR function	
The quality of hiring increases HR’s needs to select the right people from a big pool of applicants. Garbage in is garbage out. So what you put into it will come out. So if you put the wrong data in the	Improved data quality	

<p>algorithm, the algorithm will not learn what you expected or make the wrong decisions.</p>		
<p>It is about the ethical discussion of what the algorithm does and how do you know that we play fair as an organization. Openness is then very important. It will be increasingly important to develop AI algorithms that are not just powerful and supportive tools, but also be transparent to inspection.</p>	<p>Maintain transparency</p>	
<p>Lee et al (2018), support this view, which emphasized not to forget the 'human' in HR since we still desire personal interaction, and this topic is more than just an efficiency game.</p>	<p>Taking care of empathy and emotions</p>	
<p>Wishkirchen et al (2017) suggests the use of AI within recruitment will remove all bias by focusing purely on facts rather than emotions and sympathies.</p>	<p>Minimize human biases</p>	<p>AI Role</p>
<p>Chatbots help recruiters by dealing with the first stages of recruitment, like asking and replying to frequently asked questions like on employee benefits or company culture, and thus allowing human recruiters to concentrate on the later stages of recruitment.</p>	<p>Changing the HR role</p>	
<p>Technology has continuously enabled recruiters to process more candidates and deliver a higher quality, more cost effective service to both job</p>	<p>Minimize cost</p>	

<p>seekers and employers alike (Okolie, 2017 & Singh, 2003) and AI is expected to be no different.</p>		
<p>AI - based software only needs a fraction of seconds to analyse big amounts of data of candidates and provide understandable results that can be considered by HR's.</p>	<p>Time reduction</p>	
<p>successful in simplifying the work and collect related information in candidates experience, building relationship, to answer questions, identification of right candidates, on - boarding, increasing of applications, scheduling interviews and so on will be align with recruiters to have smooth functioning of process to make business success.</p>	<p>Value creation</p>	
<p>AI can make precise predictions about candidates who would be most suitable for the jobs vice - versa.</p>	<p>Matchmaking between recruiters and applicants</p>	
<p>Chatbots are AI-powered assistants that enable real-time and personal engagement with the candidates. Candidates interact with these AI-powered assistants through text messages, emails or a dialogue box.</p>	<p>Real Time engagement</p>	
<p>Bafaro et al (2017) explains that data analytics tools are the key to enable better decision making and predictions about candidates.</p>	<p>Quick decision making</p>	

<p>Time - consuming administrative duties such as sourcing, screening and interviewing applicants will be handed - over to AI technologies thus giving recruiters and HR manager more space to focus on strategic affairs.</p>	<p>Replacing repetitive and tedious work of HR</p>	
<p>When it comes to candidates who were rejected from the job vacancy, AI systems allow feedback about their qualifications and skills that these candidates can develop further in the future.</p>	<p>Timely feedback</p>	
<p>For job application and selection, artificial intelligence can adopt behavioral and physiological features (e.g., bio - metrics) as a component of the entire decision-making process.</p>	<p>Behavioral Analysis</p>	
<p>When it comes to hiring, one well-known attribute of AI over humans is the ability to make better predictions for things like job performance, productivity and employee turnover.</p>	<p>Prediction ability</p>	
<p>The use of AI does not only change an organisation internally, but it can also impact the recruitment industry and therefore competition rules, by affecting revenue, profitability and talent acquisition.</p>	<p>Competitive advantage</p>	
<p>Augmented intelligence is of immense help in assisting the HR managers for finding the strong candidates</p>	<p>Appropriate candidate</p>	

amongst the giant pool of applicants.		
While the user organizations are the significant beneficiaries, privacy concerns as well as potential inbuilt discrimination are generally overlooked in AI-powered processes.	Data privacy	Potential Risk
GDPR is another data challenge that needs to be considered and with an estimated 80% of recruitment companies not being complicit with the rules, it will heavily impact the industry (Chaker, 2018). IBM (2016) have however commented that the benefits of AI outweigh the risks largely highlighted above.	Data restriction	
The use of such incomprehensible data to base recruitment decisions, therefore, would be completely unethical and unjustifiable. An article in Forbes states that even if companies have no intention to harm or disadvantage candidates in any way, algorithms may make these companies unwilling accomplices in the software's biased decision-making process.	Ethical issues	
Developing, implementing and teaching AI to work in the desired process is costly, and most likely, not error-free	Investment insecurity	

<p>Campolo et al (2017) argued that with increasingly protected data sets there are risks of companies using cheaper non-representative, and therefore less valid, data sets to train AI</p>	<p>Poor data quality</p>	
<p>These stakeholders and partners' collaboration play a crucial role in exchanging knowledge, creativity, best practices and resources, which in turn can be translated into innovation in the HR recruitment process</p>	<p>Collaboration between actors</p>	<p>Adoption</p>
<p>organizations must be transparent and able to demonstrate how your algorithms work to show openness. Organizations should be transparent to can gain trust from their clients and candidates</p>	<p>Trust of AI</p>	
<p>When it comes to the discussion about who's the better decision-maker, the idea of humans versus machines is becoming outdated, and more authors like Boudreau (2014), Jarrahi (2018), and Kaplan and Haenlein (2019) believe that the answer to this equation relies in the fruits of collaboration of both players.</p>	<p>Collaboration between AI and actors</p>	
<p>Since some functions and tasks are outsourced to AI, the employees need to develop complementary skills that go along the new AI system in place (Kaplan and Haenlein, 2019).</p>	<p>Knowledge of using AI tools</p>	

Approximately 70% of HR and recruitment departments suggest technology is improving their hiring decisions (Randstad, 2018)	Positive attitudes	
---	--------------------	--

Table 2. Codes and themes