

ARTICLE

Dimensions of the use of technology and Artificial Intelligence (AI) in Recruitment and Selection (R&S): benefits, trends, and resistance

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Abstract

This study investigates the dimensions of the use of technological devices, including Artificial Intelligence (AI) in Recruitment and Selection (R&S) processes, from the perspective of recruiters from pharmaceutical companies located in the state of São Paulo. A qualitative research was carried out, through a semi-structured interviews with 12 people with experience in R&S before and after the advent of technology. The benefits, trends, and resistance regarding the use of technology and AI in R&S processes were verified. One benefit is the role of technology and AI in reducing the bureaucracy of HR, leaving it with a more strategic and consultative focus, by reducing time and cost in screening CVs and selecting candidates. A trend was that the pandemic brought a paradigm shift in the use of technologies in the R&S process, which should be used, either fully or partially, for a greater range of vacancies. Resistance was found in the skepticism about the assertiveness in candidate selection from the use of technology and AI due to the reduction of human contact. The ambiguous questions about the implications of the use of technology and AI on business diversity were also discussed. Suggestions for future research and research limitations were also presented.

Keywords: Recruitment & Selection. Technology. Artificial intelligence.

Dimensões do uso de tecnologia e Inteligência Artificial (IA) em Recrutamento e Seleção (R&S): benefícios, tendências e resistências

Resumo

Este estudo investiga as dimensões do uso de dispositivos tecnológicos, entre eles a Inteligência Artificial (IA), em processos de Recrutamento e Seleção (R&S) sob a perspectiva de recrutadores de empresas do setor farmacêutico instaladas no estado de São Paulo. Para isso, foi realizada uma pesquisa qualitativa, por meio de um roteiro semiestruturado, com 12 entrevistados com experiência em R&S antes e depois do advento da tecnologia. Foram observados os benefícios, as tendências e resistências com relação ao uso de tecnologia e IA nos processos de R&S. Como benefício, tem-se o papel da tecnologia e IA na desburocratização da área de Recursos Humanos (RH), de modo a tornar seu foco mais estratégico e consultivo, na medida em que reduz tempo e custo na triagem de currículos e seleção de candidatos. Como tendência, verificou-se que a pandemia trouxe uma quebra de paradigma no uso de tecnologias no processo de R&S, a qual deverá ser utilizada, seja de forma integral ou parcial, em uma maior amplitude de vagas. Dentre as resistências ao seu uso, tem-se o ceticismo acerca da assertividade na seleção do candidato por meio da tecnologia e IA, devido à redução do contato humano. Foram abordadas, ainda, as questões ambíguas acerca das implicações do uso de tecnologia e IA na diversidade dos negócios. Sugestões para futuras pesquisas e limitações da pesquisa também foram apresentadas.

Palavras-chave: Recrutamento & Seleção. Tecnologia. Inteligência Artificial.

Dimensiones del uso de tecnología e inteligencia artificial en reclutamiento y selección: beneficios, tendencias y resistencias

Resumen

Este estudio investiga las dimensiones del uso de dispositivos tecnológicos, incluyendo la inteligencia artificial (IA) en procesos de reclutamiento y selección (R&S) desde la perspectiva de reclutadores de empresas farmacéuticas ubicadas en el estado de São Paulo. Para ello, se realizó una investigación cualitativa, a través de un guión semiestructurado, con 12 entrevistados con experiencia en R&S antes y después del advenimiento de la tecnología. Se verificaron los beneficios, tendencias y resistencias en cuanto al uso de tecnología e IA en los procesos de R&S. Como beneficio, está el papel de la tecnología y la IA en la reducción de la burocracia de RR.HH., dejándolo con un enfoque más estratégico y consultivo, ya que reducen el tiempo y el costo en la selección de currículums y selección de candidatos. Como tendencia, se constató que la pandemia trajo un cambio de paradigma en el uso de tecnologías en el proceso de R&S, las cuales deben ser utilizadas, total o parcialmente, para una mayor gama de vacantes. Una de las resistencias es el escepticismo sobre la asertividad en la selección del candidato mediante el uso de tecnología e IA, debido a la reducción del contacto humano. También se discutieron las cuestiones ambiguas sobre las implicaciones del uso de la tecnología y la IA en la diversidad empresarial. Asimismo se presentaron sugerencias para futuras investigaciones y limitaciones de la investigación.

Palabras clave: Reclutamiento y selección. Tecnología. Inteligencia artificial.

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INTRODUCTION

From the First to the Third Industrial Revolution, which occurred in the last 300 years, there were radical changes in societies (Corvalán, 2017). The Fourth Industrial Revolution, underway (Schwab, 2020), is a digital revolution linked to the advancement of innovative technologies that have changed the world quickly and radically, so that digital transformation and Artificial Intelligence (AI) do not only regard computers, robots, and software designed to improve humans' physical ability (Mendonça, Rodrigues, Aragão, & Del Vecchio, 2018).

We also see technological change in the organizational environment, as the speed of the economy has crossed borders and requires consistent processes that result in better efficiency, due to time saving and higher profit for companies (Mendonça et al., 2018). The Human Resources (HR) department has been more and more required to work in line with organizational strategy, and is directly affected by these changes, while supporting the development of the business and the organization amidst this new digital context (Bensberg, Buscher, & Czarnecki, 2019; Jatobá, 2020). According to this last author, the technology that involves the HR area in its various activities is AI, whose digital processes lead to the automation of several tasks, among them Recruitment & Selection (R&S). For Farias, Santos, and Licciardi (2018), R&S innovative methodologies improve organizations' daily life, contributing to their growth. Automating the analysis of candidates' profiles, to identify those that fit job specifications, can bring greater efficiency (Faliagka, Ramantas, Tsakalidis, & Tzimas, 2012).

After the introduction of technologies, the HR area became more strategic, ceased to be bureaucratic and operational, and gave meaning to AI, a technology that collaborates with organizations' growth by facilitating ways of working (Mendonça et al., 2018). According to data from the Panorama HR Brazil 2018 report (HR.Rocks, 2018), which encompasses companies in the healthcare segment - the context of our study -, only 15% mentioned their use of technologies as high, and 50% were in the average; 91% considered that technology for HR should become more strategic, 51% used some software in the R&S process, and 59% had a page on the website to attract talents.

Therefore, data show the relevance of the topic, but academic studies are still incipient and scarce, which justifies deepening it. Based on this context, this paper sought to answer the following research question: What are the dimensions of the use of technological devices, among them AI, in R&S processes, from the recruiter's standpoint? To answer it, we carried out a qualitative research, by doing 12 semi-structured interviews with HR professionals from companies of the pharmaceutical sector located in the state of São Paulo, who occupy different positions in their organizations.

The article contributes to the literature on the use of technology and AI in R&S, since it highlights the importance of using these tools, especially where a cultural fit with the company is an important criterion for candidate selection. Another issue identified was the role of the company's headquarters in implementing technologies and AI during R&S processes. In addition, we found that technologies and AI should be more present in companies' daily life, although interviewees were concerned with the level of human contact that should be kept during R&S processes. Finally, we observed the implications for diversity with the use of technology and AI.

This article is structured as follows: in addition to this introduction, it presents the theoretical framework for approaching the topic on the use of technology and AI in R&S processes; next, it describes the methodological procedures, the results and analysis, and the conclusion.

THEORETICAL FRAMEWORK

Use of technology and artificial intelligence (AI) in R&S processes

We chose to approach the topic based on international and national literature separately, as there are differences in the maturity of the discussion, especially regarding the use of AI during the R&S process.

The international literature

The international literature on technology in R&S processes shows an exponential growth in the number of candidates that seek a job using the web, which has led to a large number of resume offers and a small number of professionals involved in candidates' selection (Faliagka et al., 2012). For Pérez and Falótico (2019), a good part of large and medium-sized companies use technology in R&S processes. These technologies involve recruiting candidates through emails, interviews, video conferences, and doing tests on the internet or using a software. Malik and Mujtaba (2018) present the technology of electronic recruitment (E-Recruitment), which consists of using companies' websites, online newspapers, job sites, online radio stations, and interviews by Skype or Viber.

In addition to these technologies, companies also use AI, which is a computer-enabled system designed to process data for getting results similar to human work in companies, using the ability to learn, make decisions, and solve problems (Geetha & Bhanu, 2018). It is the science of reproducing the intelligence of human beings by using computers. According to Barman and Das (2018), these resources can be accessed through solutions proposed by HR Techs, which are already more than 125 in the world and use evolving technologies. They are able to incorporate cloud computing, metrics, robotics, automation, and large-scale application of AI. However, these solutions consist of tools, and human competence will define their efficiency.

According to Social Big Data, 96% of recruiters say that AI processes increase assertiveness, reducing employee turnover and reaching more talent groups (Pérez & Falótico, 2019). AI reduces the cost of hiring, due to the shorter time the position is available and to less workforce needed for completing the selection process (Faliagka et al., 2012).

Not only is resume selection through AI a recent resource, but there was also progress in the R&S process with social networks, automated and videotaped interviews – the so-called asynchronous interviews (Forman, Glasser, & Jones, 2020) -, games for detecting competencies, in addition to synchronous video conference interviews (Gee, 2017). Data show improved efficiency of R&S process with the use of AI for candidate profile analysis on social networks (Faliagka et al., 2012). In general, international literature shows that AI enables processing a higher volume of data, thereby finding the right candidate for the right place (Collins, 2001; Upadhyay & Khandelwal, 2018). This is a relevant aspect, as people are a source of competitive advantage (Boxall, 1996; Boxall & Steeneveld, 1999), due to their competencies (Bartlett & Ghoshal, 1997; Prahalad, & Hamel, 2000).

Another positive element is that AI responds to candidates' applications within 24 hours, and provides feedback on their qualifications and skills, which helps improving them, and consists of a positive experience. Hence, recruiters address more strategic issues, becoming talent consultants. However, AI systems need to be programmed properly in order to avoid unconscious biases (Upadhyay & Khandelwal, 2018).

It is worth mentioning the importance of data processing; if data are not inserted and analyzed correctly, the result can also be skewed (Blommaert, Coenders, & Tubergen, 2013). The authors mention an example in the Netherlands, during a process involving male and female candidates, three occupational levels, five industries, and ten geographic regions. The results showed strong evidence that candidates with Arabic names were less searched, despite gender, education, age, region, or sector. According to Ahmed (2018), this prejudice can be found in both job descriptions and resume analysis, but algorithms can be developed to help recruiters recognize and remove biases, allowing the selection of a wide range of candidates.

As a negative point regarding the use of technologies and AI in R&S processes, Blommaert et al. (2013) emphasize that it can restrict attending people who are not familiar with technologies, as well as individuals who do not have access to the internet.

The international literature also draws attention to the occurrence of cybervetting, when the internet is used during the R&S process. Cybervetting is *the process of conducting online research on candidates* to achieve different information, which can involve their family, daily life, hobbies, opinions, and much more (Berger, 2015; Backman & Hedenus, 2019). For Berkelaar and Harrison (2016), cybervetting is the way of getting online data, whose goal is to analyze an individual's fitness for a specific role. Recruiters assess candidates both based on information from social media, and also from the lack of information, which can be detrimental to the candidate, but not eliminate him/her.

According to The Reppler Effect (2011), based on a survey of 300 recruiters, 91% said that they used social networking to get information on potential candidates, and almost 50% did so as soon as they receive a resume. Another data is that 69% of the recruiters surveyed had already rejected candidates based on what they posted on social networks. Another survey, conducted by CareerBuilder (2018) shows that 70% of American employers use some type of social media to search candidates during the selection process, around 50% check their current employees on social media, and almost 35% have reproached or fired employees for posting online content considered inappropriate. Nearly half of the recruiters said that if they couldn't find the candidate online, there was a lower chance of calling him/her for an interview. According to Melton, Miller, Jensen, and Shah (2018), a candidate that is not active on social media shows that, maybe, he is not well connected with people, which, despite creating an image of less personal skills, does not disqualify him/her. Also, in the survey conducted by CareerBuilder (2018), almost 30% mentioned that they liked to gather more information through social media before calling up the candidate.

The international literature still discusses the ethical issue related to cybervetting. A comparative study conducted in the UK and Australia showed that 60% of the employees argue that employers should not search information on social networks, even if privacy settings are open. Canadian university students, on the other hand, hold the profile owner responsible for the content posted; that is, if privacy settings are not active, other individuals can access their information (Backman & Hedenus, 2019).

The Brazilian literature

National literature addresses the topic of technology in R&S processes mostly from the perspective of the advantages of its use.

According to Avelar, Silva, and Saraiva (2021), in a competitive environment, HR professionals who work with R&S find in technology a powerful support to their work. One of the advantages explored by Cappelli (2001) concerns the estimated cost of hiring a new employee through the Internet, which is twenty times lower compared to the costs of a process without using the web. In addition, there is a significant time saving. Therefore, posting job openings online, getting scanned resumes, and searching profiles on websites are all ways of reducing cost and time. Lorenz, Oliveira, and Silva (2019) also agree that the selection process involving technology brings greater agility, effectiveness, and assertiveness. However, technological resources should not be used in isolation, and the recruiter must be involved. In addition, some companies are delegating to line managers autonomy for hiring candidates, without the interference of the company's HR area. Online recruitment becomes a facilitator, decentralizing, in turn, the role of the person responsible for hiring (Cappelli, 2001).

Ferreira (2020) explores the advantage from the perspective of reducing the manual work done by recruiters, since the optimization of processes in the screening phases makes it possible to reach a higher number of candidates and spend less effort and time in the next stages of the process. Hence, there is a process facilitation, making HR more agile (Mendonça et al., 2017); thus, more strategic (Lima & Rabelo, 2018).

The highlight of the digital selection process is to provide both a greater range for searching candidates, without border restriction, and a higher possibility of accessing diversity (Costa, 2018). Through social media, it is possible to reach many people with a single posting of an available vacancy and, at the same time, analyze the candidates interested in the vacancies –

all this before establishing a personal contact (Pondé, 2019). Costa (2018) explains that operational vacancies enable including completely online processes, with the application of personality, behavioral, and technical knowledge tests. For more senior and complex positions, the online phases are eliminatory, but with on-site processes. Top management and C-Level positions do not have online procedures.

For Gaspar and Schwartz (2017), the internet became a support tool that allowed a drastic evolution of the R&S process, since it included simulations and online games, software simulation and programming systems to assess candidates' practical knowledge, tools for voice analysis, diction, and grammar over the phone, and the identification of the online social track through social networks and online interviews. According to Avelar et al. (2021), technological advances such as AI tools, machine learning, computer vision, blockchain, and virtual reality, among others, are revolutionizing companies and markets through process digitalization. Literature does not widely address the use of AI in R&S processes, but Ferreira (2020) observes that this is a resource that provides greater transparency in recruitment processes, avoiding biases at the time of screening and selection, and improves the candidate's understanding of the process and its goal. The process tends to be more impartial and fairer, thus providing the same opportunity to all competitors for the position.

Still on the use of AI in R&S processes, Avelar et al. (2021), in a study on Brazilian HR Techs, identified that this technology, in addition to reducing time and cost, allows the centralization of information (data management) and data crossing. These attributes improve the process and facilitate disseminating and attracting candidates that fit the vacancy. According to Cepellos (2019), HR Techs are startups that use technology in order to improve practices, from R&S to performance evaluations. They are capable of streamlining bureaucratic and routine operations, contribute to a candidate's better experience, and use data to indicate top performers, facilitating the search for new talents with similar profiles. Avelar et al. (2021) identified four HR Techs (in 2019) with solutions for R&S, and found that the difficulties for using HR Techs' services referred to the adequacy of the solution to expectations, especially those regarding a more assertive recruitment, both for reducing expenses with turnover and dealing with the lack of test customization.

Silva and Barreto (2019) address the presence of AI-based technologies during the R&S process through social networks, both those created for the corporate environment, such as LinkedIn, and those not oriented specifically to this purpose, like Facebook (used to assess a company's reputation and engage people with a brand), Twitter (used to advertise vacancies through hashtags aiming to reach specific groups), and WhatsApp (used to advertise vacancies and establish a network).

Regarding the national literature on cybervetting practice, the study by Biberg (2019) stands out, by showing that social media are very important for the interaction and assessment of candidates in Brazilian companies. Regarding R&S, through social networks recruiters can check candidates' behavior outside the work environment, which can be detrimental to the process, since individuals can act in different ways, at work and in their personal life.

METHODOLOGICAL PROCEDURES

This study sought to answer the following research question: What are the dimensions of the use of technological devices, including AI, in R&S processes, from the recruiter's perspective? To answer it, we carried out a qualitative research, using 12 semi-structured interviews with HR professionals from companies of the pharmaceutical sector, located in the state of São Paulo, who hold different positions, and have worked for more than five years in R&S.

According to Creswell (2007), qualitative research is used when we want to explore a problem or question. Exploration involves studying a group or population and identifying variables that can be measured. For Godoy (1995), when the study is descriptive and aims to understand the phenomenon in a broad way, a qualitative approach is more appropriate. Thus, we decided that the descriptive qualitative research methodology, with semi-structured interviews, was the most appropriate for answering the research question.

According to Gil (1987), an interview is a technique in which the interviewer introduces himself to the interviewee and asks questions in order to get information of interest to the process. In other words, one side provides data and the other obtains the information. The interview is a data collection technique widely used in the social sciences, very appropriate to bring information on what people know, believe, expect, feel, want, aim at, and have accomplished. In our case, this method was suitable to identify the dimensions of the use of technology and AI during R&S processes.

We chose the Brazilian pharmaceutical sector because of its great representation in the global market: from around 2% to 8% in revenue, in the 20 major economies' ranking (Sindusfarma, 2020). According to data from the Statistical Yearbook of the Pharmaceutical Market, of the Executive Secretariat of the Drug Market Regulation Chamber, of the National Health Surveillance Agency (Anvisa), in 2019 the pharmaceutical market reached the value of R\$ 74.6 billion in sales (Verdélío, 2021). The state of São Paulo has the highest concentration of pharmaceutical industrial companies, which corresponds to 56.25% of the total number of firms in the industry, and 76.85% of Brazil's revenue. This representation shows a high relevance in its competitiveness and, in turn, the need to attract and retain talents, since competitive advantage is increasingly dependent on professionals and their competencies (Bartlett & Ghoshal, 1997).

For the interviews, we considered professionals of both genders, over 18 years old, who were involved in R&S process through technological devices (AI, software, internet, video conferences, social networks), with more than five years of experience in R&S, regardless of the position held, but who also had knowledge of the traditional R&S process, without the use of technological devices. In order to ensure that the interviewees knew about the topic that would be explored, we asked them previously about their ability to contribute to the research. The idea of including recruiters who had experience with traditional recruitment and with technological devices was to compare the two forms of selection process. We reached interviewees through the contact network of one of the study authors; from there, we applied the snowball technique. We considered as a criterion for closing the interviews the degree of saturation and repetition of contents from different participants. Theoretical saturation is the stage of qualitative data collection in which the researcher, due to sampling and data analysis, understands that no new situations occur, all the theory ideas are strong, and no additional information is necessary (Given, 2008; Ribeiro, Souza, & Lobão, 2018).

The interviews took place between 04/20/2021 and 06/18/2021, during the second year of the COVID-19 pandemic, which forced us to do Zoom interviews. They lasted one hour, on average, and were recorded and transcribed (Bardin, 1977).

The interview script included 25 open questions that sought to investigate the goals of the company and of the HR area; how the R&S process takes place in the company; what are the characteristics of the available vacancies; the changes in the selection processes in recent years; how AI is used in R&S processes; what are the benefits and disadvantages of technologies in R&S processes, for the company and for the candidate; what are their impacts; what is the motivation for using AI in companies; and the influence of the COVID-19 pandemic on the implementation of technology in R&S processes, among other aspects related to the topic. To ensure the respondents' confidentiality, we used pseudonyms, shown in Box 1, which presents their characteristics.

Box 1
Interviewees' characteristics

Interviewee	Company origin	Time of experience in HR (years)	Time of experience in R&S (years)	Position
Joana	Multinational	11	11	Talent Acquisition Manager
Noemi	Multinational	7	7	Talent Acquisition Consultant
Gabriela	Multinational	15	5	HR Manager
Tatiana	Multinational	23	6	HR Associate Director
Haroldo	National	10	10	HR Coordinator
Renata	Multinational	34	30	Head of HR
Gaia	Multinational	10	10	HR Senior Analyst
Paula	Multinational	17	17	Recruiter
Bárbara	Multinational	18	16	Talent Acquisition Coordinator
Natalia	Multinational	14	14	Talent Acquisition Coordinator
Ester	National	17	17	HR Business Partner
Alexandra	Multinational	15	15	Talent Acquisition Latam Lead

Source: Elaborated by the authors.

The interviews were conducted by the article’s first author, who was also responsible for the initial contact and selection of respondents. After data collection, we started the content analysis process (Bardin, 1977), by analyzing meanings, which gave rise to a thematic analysis. We used the AtlasTi tool, web version, for coding the interviews. The focus of the analysis was based on the 47 main codes, which are more directly linked to the questions and goals initially proposed. After encoding, we ran the analysis to find the intermediate categories, which emerged after grouping the main listed codes. Following the analysis and grouping of each code, we developed and analyzed the guiding concept. From then, 8 intermediate categories emerged. After analysis, grouping, and development a new guiding concept, these categories gave rise to four final categories: (a) benefits of technology during R&S, for the company and the candidate; (b) trends and resistances to the use of technology during R&S; (c) benefits of AI during R&S, for the company and the candidate; and (d) trends and resistances to the use of AI during R&S. All categories emerged from data analysis, and are presented in the next section.

RESULTS AND ANALYSES

In this section we discuss the results in light of the theoretical background. The discussion follows the topics that emerged from the thematic analyses.

Technology benefits during R&S, for the firm and the candidate

Technology, such as a video interview, is good for the candidate and for the professional responsible for the R&S process. As an advantage for the candidate, he/she does not need to travel to the interview place, and, for the recruiter, it saves time, by scheduling sequential interviews (Belmont, Pereira, Houzer, & Caldeira, 2015).

The video interview also brings the benefit of cost reduction for the company and for the candidate (Cappelli, 2001), who saves on transportation and meal costs.

The selection process? I think it is much easier for optimizing the agenda, especially for the candidate. Previously the candidate had to [...] If it was a one-hour interview, he needed, at least, 30 minutes before and 30 minutes after, and if we are dealing with a professional level, this person eventually works, many of them work; so, for the candidate it is much simpler to do the process online, there is no travel time. And for us, we do not need to use those dynamics that require an available room (Noemi).

According to interviewees, technology in the R&S process is a way to debureocratize and help HR to be more agile in hiring talents, since it decreases the operational burden (Belmont et al., 2015). This allows HR to be increasingly strategic. Such findings are in line with the literature (Farias et al., 2018; Mendonça et al., 2017).

I refer to the context of reducing operational burden. If we have an intelligent system, easy to use, easy to handle, without too much bureaucracy, we save recruiter's time, professionalize the process, and have a much better impact on the market - both for the brand and for the candidate's experience; we minimize the possibility of mistakes and also provide a good interface. All of this helps a lot (Noemi).

Regarding the candidate's experience and potential advantages for participants, interviewees mentioned that, for the one who was selected, the experience of R&S using technology may have been beneficial, but those who were not chosen may have been frustrated. It is important to recall that national and international literature have little discussed the candidate's perspective, although it is an important part of the process.

Selected candidates might have a more positive experience because they will say "Wow, the process took one month while it used to take three". Hence, this person gets a more positive experience. On the other hand, I have the feeling that other candidates are more frustrated (Joana).

Trends and resistances to the use of technology during R&S

During the interviews, we observed that technology is often used for filling all positions. But moving up the organizational hierarchy, the use of technology is restricted, and more human contact is established during the R&S process.

I know that video is used for positions up to the analyst level, and above that you start doing face-to-face interviews, until Talent Acquisition (Joana).

However, this study identified that, during the COVID-19 pandemic, the video interview was used for almost all positions, indicating that this process will be widely adopted. Interviewees mentioned that previously most professionals were prejudiced against video conference interviews, due to the lack of eye-to-eye contact and the candidate's body language. However, the relevance that virtual interviews gained during the pandemic broke the paradigm of many recruiters, who mention that almost 100% of the post-pandemic process will be virtual, leaving the in-person interview only for the last stage, as well as for onboarding. Others believe in a hybrid model, as we infer from Barbara's speech:

The probability that it came to stay is high. The remote selection process does not lose in quality, in richness of details, or information from candidates. On the contrary, I can be in São Paulo and do the interviews from another location, if we think about the sales force or a candidate who is traveling. We are able to adapt to the needs of both the company and the candidate. Saying that it came to stay 100% is too early, but it is a fact that we can adopt a hybrid model (Barbara).

Despite the interest for implementing technology to facilitate R&S, there is a great concern of all interviewees with the humanization of this process, which can be understood as a resistance to its wider use. However, having technology in the selection processes does not mean abandoning human contact, which can happen through a phone or video call, to explain the stages of the process, even if they are automated.

In a selection process, the human factor must exist. Obviously, you can put a virtual assistant to do the interview, but I think that, in Brazil, the eye to eye issue, the welcome, the humanization of the process, are still very important (Noemi).

Also, technology use can be affected by the cultural factor, which has not been addressed in national and international literature; therefore, it is important to consider it, since it can influence or not technology adoption in R&S.

Benefits from Artificial Intelligence during R&S, for the firm and the candidate

Throughout the interviews, we addressed the specific benefits of AI-based technologies during the R&S process. Candidate screening is the moment in which, unanimously, interviewees understand the importance of AI implementation, because the number of candidates at this stage is very large. With the use of AI, it is possible to use criteria that facilitate the selection of candidates for the next stage.

When we advertise this position, we put pre-screening questions. So, when I have to align with the hiring manager, I ask him: "What is mandatory? An example: "I cannot introduce you to a person that doesn't speak Chinese; he can be the Pope, but won't be accepted for that position. So, we put: "Do you speak Chinese?" And there is "yes" and "no"; if the person says "no", he/she doesn't fit, right? So, we make these pre-screening questions, in addition to the person's resume. And the brain of our system will classify these people by A, B, C, D [...]; this is called Hired Score (Joana).

At the screening moment, besides agility, AI provides transparency to candidates, since all of them are analyzed, which brings them and the company a sense of justice. Ferreira (2020) observes that AI avoids biases and errors in this stage of the process.

In addition, I can guarantee something that I think is very important for a selection process, which is the sense of justice: people who applied were assessed, went through a tool filter, and presented the most important for this first stage, which is the resume. [...] To ensure that people who have interest in the company are evaluated equally (Haroldo).

Another finding refers to the specific use of LinkedIn. It was evident that all interviewees include this social network as an essential resource in a passive or active R&S. Passive, when companies post vacancies, and active, when they search for talents not found among the resumes sent. The active search for talents takes place through filters and keywords, which is effective, according to interviewees:

We use LinkedIn to advertise vacancies and active search, a real candidate hunting (Bárbara).

Interviewees also commented on the importance of LinkedIn Recruiter, which allows the use of more precise filters, quickly and efficiently. However, not all companies make the tool available, and, in some cases, they rotate the license among countries, due to the cost and need of the moment. Others use their personal profile for the search, a resource that is not so efficient. According to Pondé (2019), younger candidates, above 18 years old and below 40, when looking for a job, most often use Facebook (97.78%), then Instagram (93.33%), and in third place, LinkedIn (84.44%). This is opposite to what we found in the study: all recruiters use LinkedIn as a source of talent search. Few mentioned other social networks.

Interviewees also mentioned using AI in situations where it is important to identify the candidate's cultural fit to the company, since it allows including the firm's culture as a criterion, according to a survey done with current employees.

Gupy's system includes the culture issue, the cultural fit for 100% of the external candidates. We have the company's profile [...] At the end of last year and beginning of this one, we built a sample with more than 500 employees indicated for performance; as if it were the company's portrait to achieve the design of this cultural fit, and also do this analysis together with the market. Hence, when the candidate fills in his registration, he/she already answers this cultural fit, and then we just cross-check the data to see his/her adherence (Haroldo).

Another issue discussed by interviewees regards the flexibility and convenience of asynchronous videoconferences with AI, since candidates can record their interviews if they deem most appropriate, regardless of the recruiters' agenda. Therefore, the use of AI provides greater autonomy to the candidate and the company. Moreover, this tool enables comparison per question asked, rather than comparison between candidates.

Then the candidate will do it when he thinks it's better! [...] We use HireVue, a global tool. I indicate the questions I want to ask and the person receives a link and is being recorded. He/she gets the first question and answers, then the second, and answers. Later I receive these recordings and can assess them. And I can evaluate how each candidate answered each question (Tatiana).

Through the interviews, we identified that AI, when used to facilitate the screening of resumes and the execution of psychological and behavioral tests, is more present in processes for operational positions (Costa, 2018). The fact that AI is more used for these positions is directly linked to the volume of vacancies and the number of resumes received (Faliagka et al., 2012); this provides time saving and does not require a high number of professionals for the screening (Mendonça et al., 2017), since automation brings speed and facilitates processes, making HR more agile and strategic (Lima & Rabelo, 2018).

However, we observed that, when it comes to the LinkedIn social network, it is used for all positions, from the most operational to the most strategic, in active search and talent mapping (Biberg, 2019). According to interviewees, the active search on LinkedIn generates a contact with the candidate, through phone, email or WhatsApp message, which humanizes the process. The active search seeks the appropriate profile, but does not involve searching the candidate's behavior on any social network (Backman & Hedenus, 2019).

So, in the Recruiter's filter, we put the position, the level of English, if needed, keywords, the target companies or the target sector, we include these data to make a mapping when we need it. [...] So, this LinkedIn resource is pretty cool, it brings a complete report based on the prerequisites you put [...] So, for example, I am the recruiter, but normally I have a sourcer that helps me in resume screening, in this active mapping, in approaching the candidate by phone (Noemi).

Diversity was also a topic present in all interviews, and has been gaining relevance in companies, being a key performance indicator for hiring. Interviewees called attention to implementing the filter in the AI system carefully, in order to avoid that people from minority groups are left out of the selection process. The diversity issue is so relevant that companies acquire tools, such as Textio (Ahmed, 2018; Albert, 2019), that enable developing a neutral language in the description of ads, a way to overcome the prejudices mentioned by the Institute for Employment Studies (2019), which pass through a human being programming, who can impose his/her biases.

Cybervetting, another item brought up by interviewees, although mentioned in the literature as a common practice in the R&S process (Biberg, 2019), is not approved by the interviewed professionals, who classified its use as unethical. Inspecting a candidate's life through social media does not add value to the R&S process.

Trend and resistances to the use of Artificial Intelligence during R&S

Interviewees did not show concern with AI replacing their jobs, and understand that these resources can help make the recruiter more efficient by having a more consulting than operational role (Rab-Kettler & Lehnervp, 2019); in that case, the hiring manager will handle the R&S process (Cappelli, 2001). This is in line with Upadhyay and Khandelwal (2018), who argue that if AI is responsible for repetitive tasks, recruiters can focus on more strategic issues.

LinkedIn is helping me as a recruiter and not taking away the recruiter's job [...] I think artificial intelligence is there to add, improve the work, the efficiency, the effectiveness of this recruiter and his/her life – thinking on how he/she spends this time (Joana).

A point mentioned by all interviewees is the need for filling positions quickly, the time to fill, an important key performance indicator, which affects the screening of candidates for simple or complex positions, releasing the R&S professional from the operational focus to invest his/her time in a more strategic activity.

Despite the trend to increasingly use technology in R&S processes, interviewees reported resistance to adopting this resource. However, technologies were more linked to system implementation in multinational companies, as it is difficult to use a new tool only in a single branch. Headquarters must understand the need of subsidiaries around the world to implement automated systems locally. Usually it is a top down process, from headquarters to subsidiaries.

The (company) is very inflexible; so, probably, I would have many difficulties, I would have to show first to the IT area that this tool is reliable, that it does not violate [...] Mainly because a while ago a hacker broke into our network. So, things became much more difficult... for hiring local systems (Renata).

In addition, interviewees reported that the R&S process can harm certain candidates who are not found by the algorithms, because they do not master technological resources. In this case, professionals are left out of the labor market for a certain period and cannot even explain the reasons, since they were not selected by the tool (Biberg, 2019; Costa, 2018). Therefore, algorithms can skew the selection of candidates, since it strengthens the choice of homogeneous candidates, with the same characteristics. AI demands that candidates have technology knowledge and use keywords that will be captured by the algorithms, thus requiring from them “technological savvy”.

But I think you reinforce certain labeling biases: you will always approve the same type of profile, and when you train this AI and show it what you are hiring, you replicate that model. So, you will have people who will stay out of this algorithm, without you having any control over it, because this intelligence is learning from something that is being reinforced, right? [...] If you have an AI that sees certain characteristics that this candidate doesn't have, he will never be considered, right? If you don't have someone who minimally knows what keywords are used in these algorithms, who is not technologically smart, that candidate may lose a lot of job chances (Alexandra).

Hence, AI adoption affects diversity, as it may exclude certain candidate profiles. Interviewees also showed lack of confidence about AI choosing the right person.

I don't know if we will bring in the right people, sometimes we might lose some talent. And when you have the human eye for a pool of resumes, it's much better than relying on these technologies [...]. Some people sell their resumes well and others don't, right? And, sometimes, the latter don't have a very elaborate resume with keywords. Hence, we can lose the opportunity to meet this kind of person (Gabriela).

CONCLUSION

This paper aimed to evaluate the dimensions of the use of technology devices, among them AI, on R&S processes, from the perspective of recruiters of companies of the pharmaceutical sector, in the State of São Paulo. We achieved some results similar to other researchers', such as the advantage of using technologies and AI during the screening process of resumes (Ferreira, 2020; Pondé, 2019), time saving (Belmont et al., 2015), and cost reduction (Cappelli, 2001). We also noted the possibility of HR becoming more strategic with the use of technologies and AI, as less time will be spent with R&S processes (Lima & Rabelo, 2018).

Our results bring some practical and theoretical contributions to the field of People Management, on the use of technologies and AI in R&S processes, which were not addressed by other researchers. One of the theoretical contributions is the main role of the company's headquarters for the implementation of technologies and AI during R&S processes. Based on the data, in a multinational company the adoption of these tools is affected by headquarters' decision. Therefore, the lack of autonomy hampers their use by the subsidiaries, despite the evidence of benefits. This point allows a better understanding of the factors that influence the adoption of these resources in companies.

Another theoretical contribution concerns the increased use of technologies and AI in R&S processes during the COVID-19 pandemic, which shows a trend in the field. Unlike Costa's (2018) finding, this study showed that video interviewing was used in R&S processes for almost all positions, with evidence that it will be largely used, except in the last step of the process, for higher positions. However, despite this trend, all interviewees showed concern about humanization in R&S processes. We observed the influence of the country's culture on the adoption of technology and AI in R&S process, since human contact is very important for Brazilians. One resistance is linked to the belief that these resources can keep recruiters away from candidates and compromise assertiveness during the selection. Hence, a country's culture can affect the degree of adoption of technology and AI in R&S processes, an aspect that was not considered in national and international literature so far.

An additional theoretical contribution, which we consider the most significant of the study, refers to the diversity topic, little discussed in the international and national publications. According to interviewees, technology and AI bring ambiguous issues on diversity. Throughout the interviews, we checked that technology, and especially AI, can hinder the selection of candidates who belong to minority groups, and are little represented in companies. This can happen because there is the risk of algorithms biasing the choice of candidates, by selecting individuals with the same attributes. They claim that algorithms can select people similar to those who already work in the firm and are considered appropriate, since they have a cultural fit and competencies that lead to good organizational performance. Therefore, the company becomes more and more homogeneous. This is worrying, if we consider Brazilian organizations, which, in general, value diversity in speeches, but not in business practices (Saraiva & Irigaray, 2011).

On the one hand, some interviewees say that firms should pay attention when implementing the filters used in the AI system, in order not to exclude candidates and replicate social prejudices. Hence, depending on how these resources are used, diversity can be even more compromised. On the other hand, interviewees mentioned that it is also possible to use technologies to minimize biases, for example, with the use of neutral language systems that seek to attract candidates of all genders. In this case, we should pay attention to how these resources are used, considering the diversity dimension in business.

Another item raised by interviewees was the increasing need for candidates to use technological resources to participate in the selection process. However, this use requires what they call "technological savvy"; candidates must choose strategically the keywords to use in resumes and interviews, so that they can be found by algorithms and continue in the selection process. Therefore, it is not sufficient to have access to technologies, but understand how to use them strategically, a knowledge that is not widely spread. This aspect can be considered both a theoretical contribution, since it was not addressed in previous studies, and a practical contribution for candidates, as a warning for those who want to enter the labor market.

Besides the inappropriate use of technology by candidates, another factor that can hinder a successful outcome in the selection process is the lack of access to technological resources, which prevents some of them from participating. This element is even more relevant if we consider the Brazilian reality, where digital exclusion hinders the access of socially vulnerable people

to the world of work. According to a survey conducted by PwC and Locomotiva Institute (2022), there are 49.4 million people in Brazil who are fully connected, and who belong mostly to classes A and B, are white and educated; 44.8 million are partially connected, belong mostly to classes C, D, and E, are black and less educated; 41.8 million are under-connected, who mainly belong to classes D and E, are black and less educated; and 33.9 million Brazilians who are elderly and illiterate.

Therefore, there is an “invisible exclusion”, where the candidate, even if seeking access to the position by other means, is not considered, because he/she is already out of the selection process beforehand. From this perspective, we can say that the use of technology and AI can contribute to increase social inequality, although companies seek to use filters that enable selecting different candidates. There will always be a part that will be disregarded in the selection process. Another aggravating factor is that, according to interviewees, technology and AI are more present in the R&S process for operational vacancies, which are mostly taken by people from lower social classes.

This study still brings another theoretical contribution: although literature shows that recruiters use cybervetting in R&S processes (Biberg, 2019), interviewees said that they do not use this practice, and consider it unethical. Since we focused on the pharmaceutical sector, which is highly regulated, with very strict compliance procedures, we can assume that this choice has influenced this result.

A practical contribution refers to the emphasis given to the social network LinkedIn, during the active or passive R&S process. Through this tool, it is possible to actively find candidates, saving time. Its use reaches all positions, from operational to strategic. This finding can help candidates who are looking for an opportunity, as it shows the need and relevance of having a profile in this social network, in order to have a greater chance of being found by recruiters.

Although interviewees preferred to use this tool when searching for talents, Pondé (2019) observes that younger candidates, above 18 years old and below 40, looking for a job, use most frequently Facebook (97.78%), then Instagram (93.33%), and in third place, LinkedIn (84.44%). We can assume that the sector chosen for the research influenced this result; candidates must have specific attributes for working in the pharmaceutical industry, and LinkedIn can contribute to identify these professionals.

In addition to the contributions, the study also has limitations. One of them regards the small number of companies that use AI, besides LinkedIn, in their R&S processes, which hindered a deeper understanding of the topic. This was also due to the fact that a large part of the universe of companies surveyed were multinationals, which have greater difficulty for approving the purchase and implementation of R&S processes involving technology and AI by each subsidiary. Another limitation refers to choosing just one sector, which limited a better understanding of how technologies and AI are used by other companies, from other industries, in Brazil.

As suggestions for future studies, to carry out similar research with companies in other industries, to compare the use of technology and AI in R&S processes. We also suggest investigating the use of technology and AI in other human resources subsystems, such as in learning and performance evaluation processes. Another issue to consider is listening to candidates’ perspective, both those who were selected and those who did not get the position in R&S processes that use technologies and AI.

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Vanessa Martines Cepellos: Conceptualization (Supporting); Data curation (Supporting); Formal Analysis (Lead); Funding acquisition (Equal); Investigation (Supporting); Methodology (Supporting); Project administration (Lead); Resources (Equal); Software (Supporting); Supervision (Lead); Validation (Lead); Visualization (Equal); Writing – original draft (Supporting); Writing – review & editing (Lead).