



ARTIFICIAL INTELLIGENCE AS A SUPPORTING TOOL IN STAFF SELECTION FOR BUSINESSES IN THE CONSTRUCTION SECTOR

Inteligencia artificial como apoyo en la selección de personal en empresas del sector de la construcción

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ABSTRACT

High staff turnover, influenced by the temporality and complexity of projects, poses significant operational and economic challenges. This research analyzes the integration of artificial intelligence (AI) in talent acquisition processes, given the existing relationship between staff selection and turnover. The main objective is to particularly focus on the construction and project management sectors. Through a bibliometric analysis and a systematic review based on the PRISMA guidelines, trends, tools, and applications regarding AI in recruitment are identified. The results underscore the potential of AI for automating tasks, optimizing the evaluation of candidates, and improving decision-making. However, some associated risks are recognized, such as the handling of biases, ethical concerns, and the need for clear regulations. This research demonstrates that AI can transform staff selection processes by improving their efficiency and aligning candidate selection with organizational objectives. In addition, it provides a basis for future research in sectors such as construction, where characteristics demand innovative and strategic solutions.

Keywords: talent acquisition; artificial intelligence; systematic review; construction sector.

RESUMEN

La alta rotación de personal, influenciada por la temporalidad y la complejidad de los proyectos, representa riesgos significativos tanto operativos como económicos. Esta investigación analiza la integración de la Inteligencia Artificial (IA) en los procesos de adquisición de talento, debido a la relación que existe entre la selección y la rotación de personal, principalmente se pretende dar un enfoque particular en el sector construcción y la gestión de proyectos. A través de un análisis bibliométrico y una revisión sistemática basada en las directrices PRISMA, se identificaron tendencias, herramientas y aplicaciones de la IA en el reclutamiento. Los resultados destacan el potencial de la IA para automatizar tareas, optimizar la evaluación de candidatos y mejorar la toma de decisiones. Sin embargo, se reconocen desafíos asociados, como el manejo de

sesgos, preocupaciones éticas y la necesidad de normativas claras. Esta investigación demuestra que la IA puede transformar los procesos de selección de personal, aumentando la eficiencia y alineando la selección de candidatos con los objetivos organizacionales. Además, proporciona una base para futuras investigaciones en sectores como la construcción, donde las características particulares exigen soluciones innovadoras y estratégicas.

Palabras clave: adquisición de talento; inteligencia artificial; revisión sistemática; sector de la construcción.

1. INTRODUCTION

The current global context, marked by sanitary, climatic, economic, and geopolitical challenges, has generated an economic slowdown, high inflation, and market disruption. These conditions directly affect organizations and their workforce, increasing uncertainty and hindering operational sustainability [1-3]. One of the issues caused by this context is employee turnover, a relevant phenomenon in the construction sector, whose impact is amplified by the temporary nature and the complexity of projects [4-8].

The high turnover of human talent in this industry represents a significant operational risk derived from the cycle of staff separation, recruitment, and training, which affects organizational efficiency and diverts resources from strategic activities such as risk management, decision-making, and goal achievement [4-5, 9-10]. This scenario compels companies in the sector to adopt more robust strategies for human talent management, prioritizing the retention and development of key competencies among their employees.

In this context, the need to implement innovative mechanisms to optimize staff selection and retention arises. Beyond technical skills, it is crucial to identify competencies such as adaptability and resilience, which are essential in tackling the volatility of the current context [2-3]. In this sense, artificial intelligence (AI) emerges as an innovative tool with the potential to transform talent management. Its ability to automate tasks, reduce times, and improve precision in the evaluation of candidates positions it as a strategic solution [11-13].

This study analyzed the integration of AI into staff selection processes, with a focus on the construction and project management sector. To this effect, we identified the documented research on the use of AI in staff selection within the aforementioned sectors. Based on this analysis, case studies were explored which evidenced the application of AI in the acquisition of talent, identifying the tools employed and the stages of the selection process that benefited through the inclusion of AI-based techniques.

2. METHODOLOGY

The proposed methodology was implemented in several stages, starting with a bibliometric analysis to determine scientific production metrics and map the development of the topic under study. In parallel, we employed the PRISMA method (Reporting Items for Systematic Reviews and Meta-Analyses) for the qualitative analysis of specific documents obtained from the Scopus database, which provides metadata for different scientific journals in various categories and excludes non-scientific sources [14]. [Figure 1](#) presents the flowchart of the applied methodology.

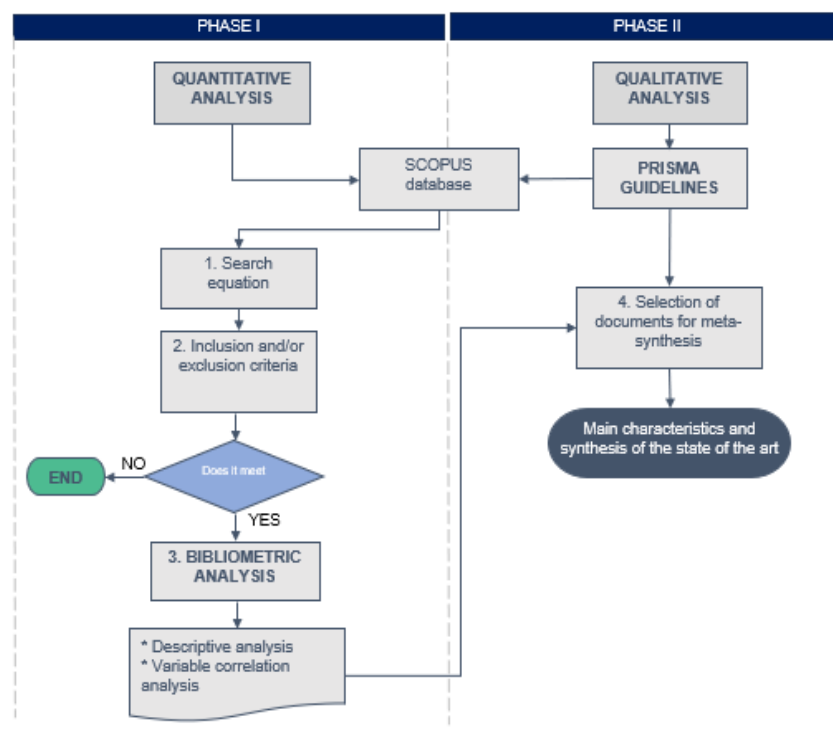


Figure 1. Methodological development.

A. Phase I: Quantitative Analysis

To carry out the quantitative analysis, secondary data were employed, which were extracted using a search string with a combination of keywords. In addition, a dataset was established based on the inclusion and exclusion criteria presented in Table 1.

Table 1. Criteria used in the selection of scientific products (Scopus)

Criterion	Value
Keywords	Talent acquisition, personal selection, artificial intelligence, machine learning, AI, project management
Search within	Title, abstract, keywords
Observation period	Five years (2018-2023)
Document types	Articles, books, book chapters
Language	English and Spanish
Search string	(TITLE-ABS-KEY("talent recruit*") OR TITLE-ABS-KEY("talent acquisition") OR TITLE-ABS-KEY("personal selection") AND TITLE-ABS-KEY("artificial intelligence") OR TITLE-ABS-KEY("machine learning") OR TITLE-ABS-KEY("AI"))
Documents	37

The search string, containing a combination of keywords encompassing the desired approach, yielded only one document, as a result of using the term *project management*. As this is an emerging topic, there is little literature and scientific research specifically addressing staff selection via AI within the context of human resources in project management. Therefore, this term was excluded from the keyword list.

With the help of the Biblioshiny tool by Bibliometrix, we conducted a descriptive analysis that considered relevant variables and metrics such as publication type, citations, sources, and authors. Then, we performed a correlation analysis between variables, identifying co-occurrence maps and networks based on data clusters or groupings with similar patterns.

B. Phase II: Qualitative Analysis

We conducted an analysis of the state of the art on scientific knowledge related to the use of AI in the staff selection process, following the guidelines and tools of the PRISMA model, which presents some items to be considered in conducting systematic reviews [15], in order to obtain the significant characteristics and results of the scientific production associated with the topic that have been documented to date. [Figure 2](#) indicates the process followed to obtain the most relevant articles, which were later analyzed.

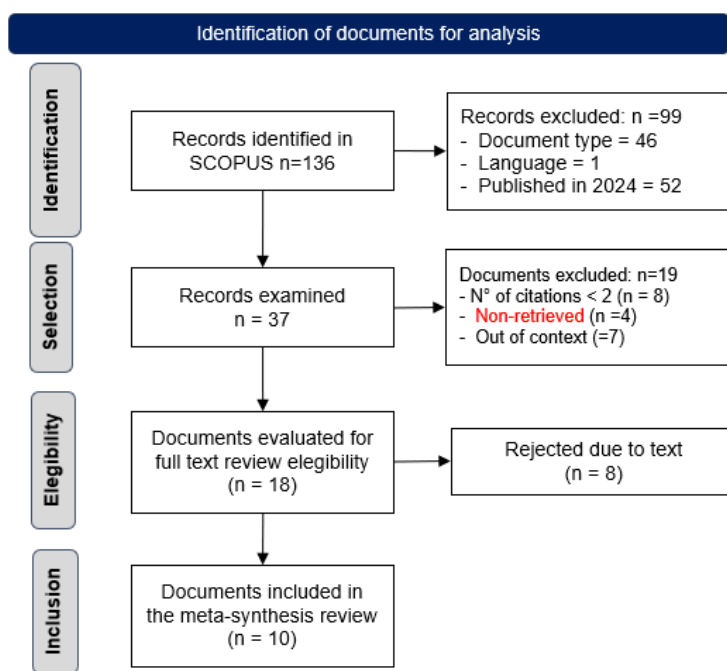


Figure 2. PRISMA flowchart for the literature review.

3. RESULTS AND ANALYSIS

After the exclusion process, 37 documents were found, which were produced between 2018 and 2023, published in 36 sources, and authored by a total of 112 people. On average, each research work had three authors. Likewise, scientific research papers were evidenced to be the most commonly produced document type, unlike books and book chapters on the topic under study. [Table 2](#) presents a summary and the most relevant information from the metadata obtained.

Table 2. Most relevant bibliometric data

Description	Result
Annual growth rate (%)	49.63
Average age of the documents	2.49
Average citations per document	16.78
References	2055
Content of the Document	
Plus keywords (ID)	99.00
Author keywords (DE)	129.00
Authors	
Authors	112.00
Number of one-author documents	4.00
Author Collaboration	
One-author documents	4.00
Co-authors per documents	3.08
International co-authorship (%)	13.51
Document Types	
Article	27.00
Book	1.00
Book chapter	9.00

Interest in studying and documenting the application of AI in the staff selection process has increased in recent years. An annual growth of 43.63% in scientific production on this topic was identified, demonstrating an increasing trend in the publication of articles, as evidenced in Figure 3, from which it is also inferred that the articles produced in 2020 have been cited more frequently than more recent publications.

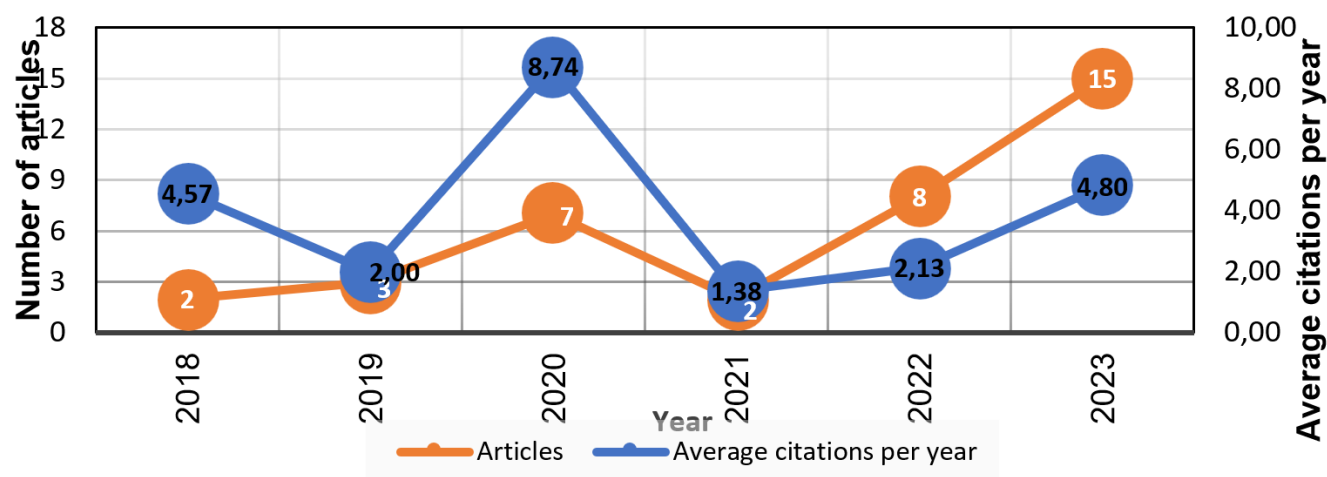


Figure 3. Annual scientific production and average citations per year

The areas of knowledge that have shown more interest in projecting the use of AI in staff selection are: informatics, business management, social science, economics, and engineering. Other healthcare disciplines have conducted at least one study related to AI-driven mechanisms in human resource management, as shown in [Figure 4](#).

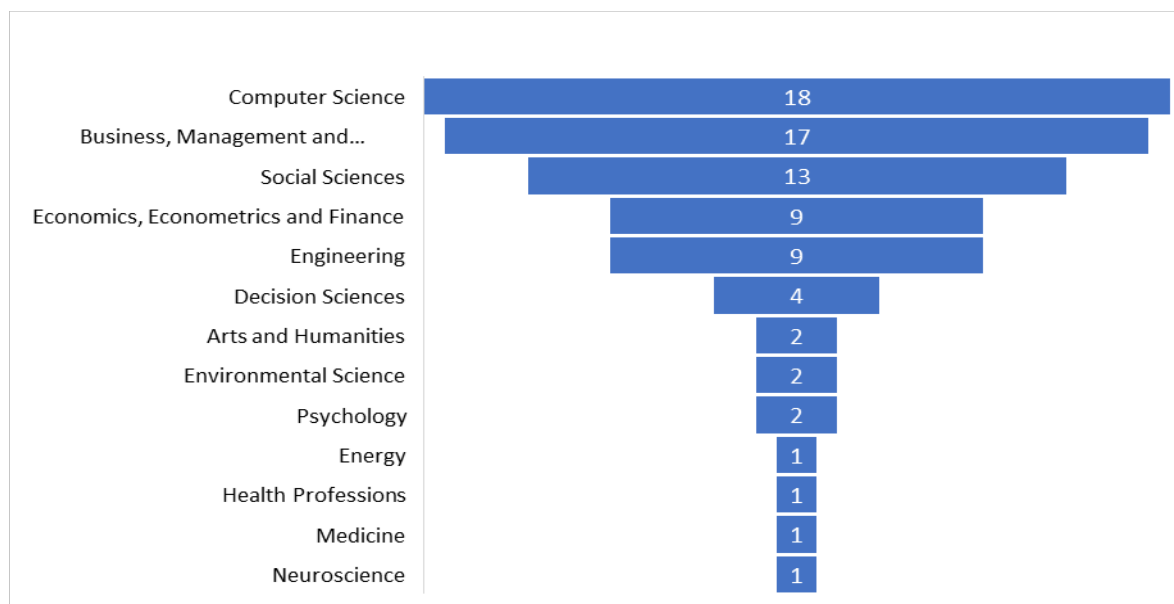


Figure 4. Research Areas.

The institutions with the largest number of authors documenting the topic of interest are located in Asia, in countries like China, Malaysia, and India, at Nanjing University, INTI International University, and Symbiosis International University. It was found that, out of the 44 institutions with at least one author affiliation that produces articles on the studied subject, 55% are located in Asia, out of which 41% are mainly located in India; 23% in Europe; 14 in North America, led by the United States, representing 11% of the total number of institutions; and 7% in Oceania and 2% in Africa, represented by Australia and South Africa, respectively ([Figure 5](#)).

The contributions made by different countries offer valuable information about the factors that have influenced the development and current state of this research field. Social, political, economic, or cultural aspects may significantly influence and foster scientific production on the subject. It is worth delving into India's global context, as it is the country with the largest number of articles produced and the one exhibiting the most collaboration between scholars studying AI as a staff selection tool. India evidences predominance through the red set or cluster with the largest number of collaborations; it leads in this regard, having cooperated with the United States and Norway. Germany has also shown interest in developing knowledge in relation to AI-driven staff selection processes, joining efforts with Poland and Australia.

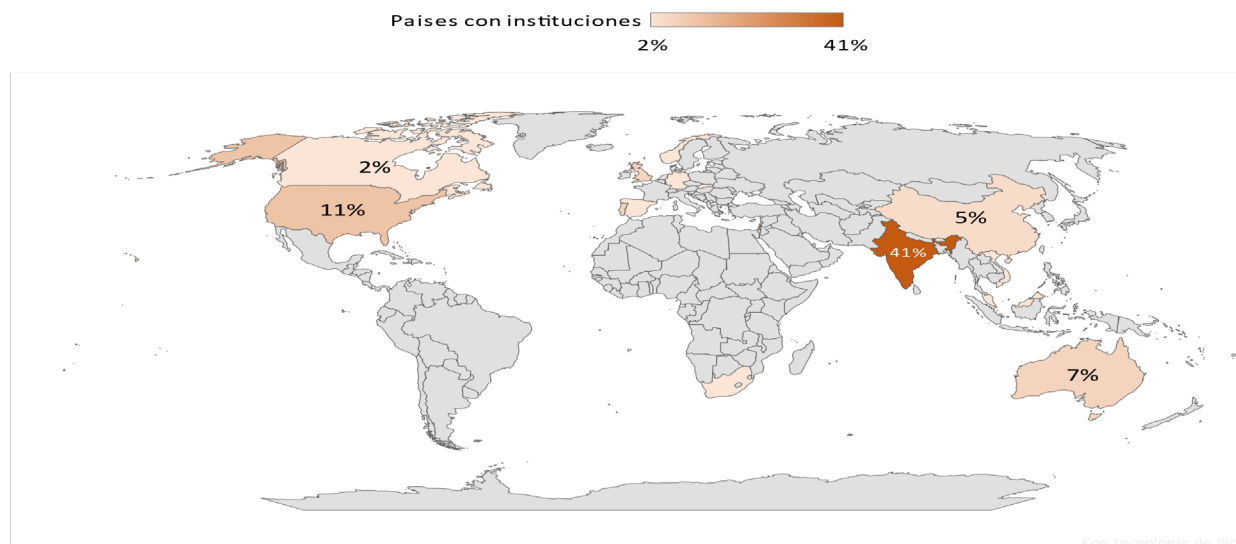


Figure 5. World map representing the percentage of institutions with author affiliations

As for the sources that have published scientific articles on the studied topic, *Benchmarking: An International Journal* stands out. This journal publishes academic research exploring the way in which different industries use benchmarking, a comparative evaluation technique [16] involving continuous and systematic processes, services, and products assessment within an organization, making comparisons against other businesses regarded as leaders in the market. The goal is to identify the best practices helping other companies to stand out in terms of efficiency, productivity, quality, or customer satisfaction and applying them to improve the performance of one's own organization [17].

Other scientific journals from Asia stand out which explore topics related to the impact of technology on organizations, such as the *Asia Pacific Journal of Information Systems* (APJIS) or the *Asia-Pacific Social Science Review*, which present multidisciplinary publications, albeit with a special focus on the Asia-Pacific region.

Other sources dedicated to research on the practical use of AI in diverse disciplines are included. One of them is the *Applied Artificial Intelligence* journal, which addresses different topics of study related to AI systems and tools to solve a diversity of tasks, while discussing the social impacts of said technology's use.

The convergence between AI and staff selection has encouraged scholars and researchers to assist one another in laying the foundations of the studies conducted to date, thereby forming a co-citation network around the subject (Figure 6). This research revealed that the authors van Esch and Bersin [18] have the largest number of citations, indicating that their work has been fundamental for shaping the field of AI and staff recruitment. Both of them are scholars affiliated with institutions in the US, focusing on the use of technology in business strategy and human resources management.

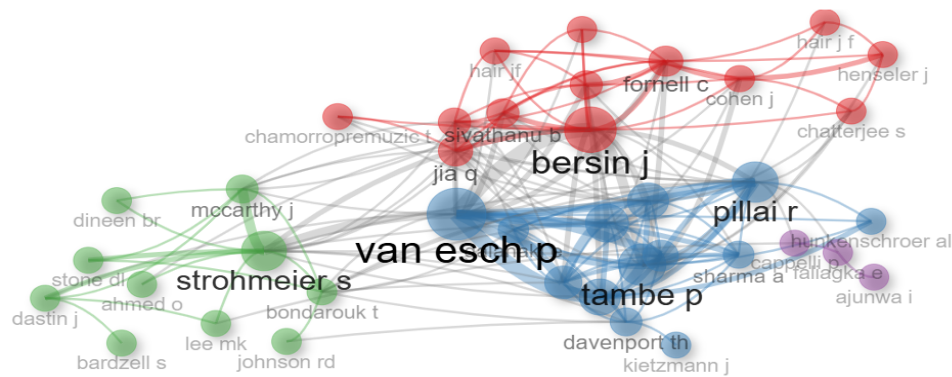


Figure 6. Network of co-citation between authors

On the other hand, an analysis of the relationship between the words most frequently utilized by the different authors of the documents produced evidences the formation of groups of terms and links between them, as shown in Figure 7. With a minimum occurrence of five times per word, four clusters are identified. The red cluster groups the most frequent descriptor, i.e., *artificial intelligence*, which is closely related to *human resources*, *talent management*, *talent acquisition processes*, *electronic selection*, *automation*, *digitization*, and *electronic human resources management* (or e-HRM). In turn, the grouping of these terms forms a strong link with the group of words represented by the *talent acquisition* descriptor, which also exhibits a considerable frequency and is closely related to *technology*, *digitization*, *equity*, *eligible candidates*, *AI and contracting*, and *AI and quality*. The relevance of this research is confirmed by the fact that there is a significant relationship between the application of AI and talent acquisition processes within the selected documents.

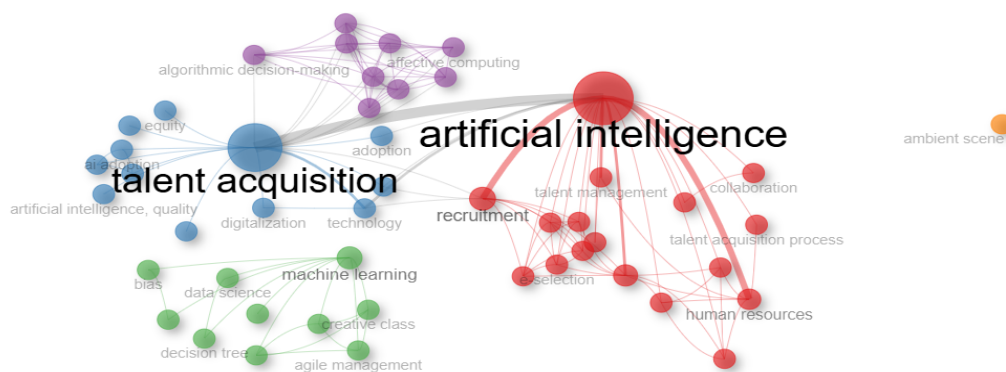


Figure 7. Co-occurrence network for the authors' keywords

With the aforementioned descriptors, a thematic analysis was conducted, as shown in Figure 8. Here, the x-axis defines the degree of relevance of the keywords used by the authors, and the y-axis indicates the level of development or the number of publications on the subject [19-20].

The upper right quadrant shows the subjects where the community of scholars and researchers has joined efforts to promote a key issue with great relevance in the global context, *i.e.*, the convergence between AI and the field of human resources, talent management, staff recruitment, and e-HRM. On the other hand, the lower right quadrant shows a basic and transversal theme: technology in talent acquisition. This subject is regarded as the foundation for advancing other studies.

Finally, the lower left quadrant contains the concept of *machine learning*, regarded as an emerging topic, and the upper left quadrant encompasses talent acquisition processes, which is a niche subject.

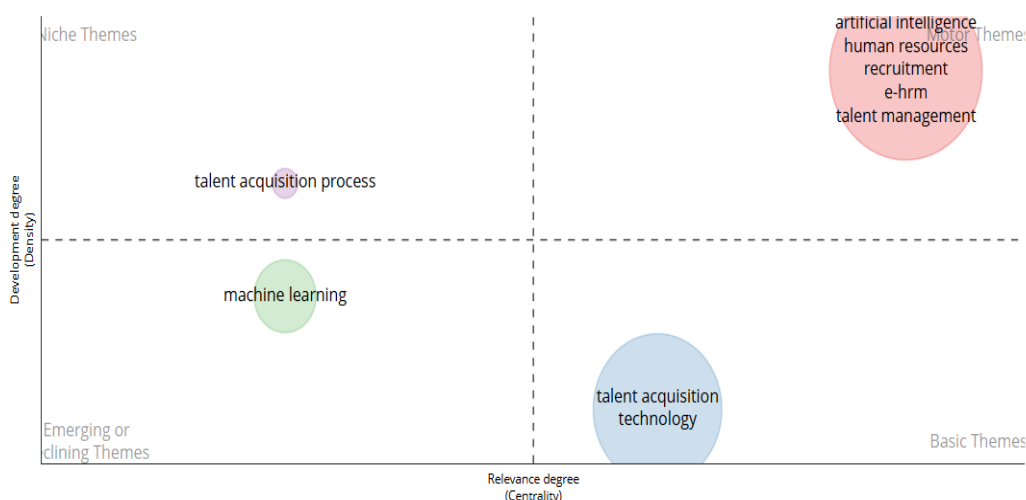


Figure 8. Thematic map

The main characteristics found in the scientific production related to this topic and thus far documented allow answering the question proposed at the beginning of this research, with a focus on its three objectives, which are fundamental for understanding the context and applicability of AI in staff selection processes within organizations.

The different works analyzed in this research agree that, in recent years, organizations have positioned the attraction, selection, and retention of talent as a strategic focus, given the significant value provided by human capital with excellent skills. This aspect is regarded as a commercial advantage for achieving organizational success [18, 21-22].

Likewise, the studies agree that talent selection is a challenging task, as it is limited by the analytical skills, vision, and internal biases of the decision-maker [23]. They estimate that the incorporation of AI into the process would allow optimizing these tasks more efficiently since recruiters would be able to analyze large volumes of data to identify the most suitable candidate in a shorter time while improving the quality of the decisions made during the selection process [24]. By facilitating predictions and analyses based on existing data, AI contributes to more informed decision-making [11, 25]. However, the process will always necessitate the understanding and humanistic approach inherent to the people responsible for the final decision. Therefore, AI constitutes a significant support tool, not a replacement within the selection process [26].

Different authors converge in stating that the effective implementation of AI in staff selection processes requires technical expertise, adequate infrastructure, and a strategic allocation of resources [12-13, 25]. The leaders and employees involved should develop key skills such as willingness to change, adaptability, and the promotion of transformative initiatives. It is fundamental for these professionals to understand that decision-making will be supported by data analyzed by AI in real time, which will significantly transform the dynamics of the selection process [13]. To ensure fair and ethical processes, both AI developers and decision-makers must acquire specific competencies that reinforce these principles [27].

Given this landscape, some authors highlight the ethical implications of the process, emphasizing the need to establish clear rules to regulate the use of AI in candidate selection [28-31]. Nevertheless, recent studies have identified a gap in the literature, as more research attention is needed regarding equity in the application of AI in this domain [27]. Likewise, they point out the importance of delving into the impartiality of AI's algorithmic decision-making, as this is a subject that raises complex legal issues and challenges many of the fundamental principles of law [32-33]. In this regard, the different articles analyzed conclude that laws and regulations must change to protect people from discrimination and protect their privacy.

On the other hand, regarding the existing application models, recent studies have addressed different cases where AI has been utilized in at least one stage of the staff selection process, in order to demonstrate that said technology is an ally in optimizing decision-making and generating substantial savings in acquiring new talents [11, 13, 34]. Studies have focused on comparing predictive models driven by supervised and unsupervised machine learning algorithms vs. standard or traditional techniques that do not employ AI in the selection process of a candidate. The following are the main findings extracted from the case studies documented and analyzed in this research:

Ghosh and Braskar [34] addressed the use of AI and data analytics techniques in the staff selection process. They indicated that AI, employed for analyzing large volumes of data on applicants, allows automating tasks within the process, e.g., filtering the candidates who match the requirements and optimizing the evaluation of the applicants' competencies for a specific vacancy. In addition, they demonstrated how the use of AI can support predictive analyses that project the suitability of a candidate for a particular position, based on historical data and patterns for training the AI model. In this vein, they concluded that AI is an allied tool that can support recruiters' in making more informed and personalized decisions. This is regarded as a benefit in industries where the availability of qualified talent and business needs are constantly changing and demanding.

In this sense, Sridevi and Suanthi [27] focused on demonstrating that AI-based solutions can help businesses in any industry to more efficiently match candidate profiles with the vacancy descriptions issued by an organization, thereby optimizing the selection process. To reach this conclusion, the authors collected large datasets including detailed descriptions of job positions and candidate profiles obtained from job platforms. They applied natural language processing (NLP) to analyze the textual content of both the job descriptions and the candidate profiles. This allowed extracting important information, such as the skills, competencies, and relevant experience of both sides. Afterwards, they used AI algorithms within a predictive machine learning model to measure the compatibility between the profiles and the job offers. The model learned from historical hiring data and the results of employees in the hiring companies. The authors validated and analyzed the precision of the algorithms, comparing AI predictions against real results in terms of work performance and candidate fit from hires made through job platforms. If the model was capable of accurately predicting which candidates were better suited for the roles, it was considered successful. Thus, the study demonstrated the effective implementation of AI

in the process of identifying an adequate candidate for a specific vacancy.

On the other hand, Hilliard and Intel [30] developed a model based on AI algorithms that allow analyzing and interpreting the results obtained from gamification tests applied to candidates in order to understand their soft skills and/or personality traits. This type of assessment consists of presenting images that the participants must choose or classify, instead of responding to questions orally or in writing, as is done in traditional questionnaires. AI intervenes in the analysis of the selected image and interprets the choice to predict the participant's personality traits according to five ranges (the Big Five model): conscientiousness, extraversion, agreeableness, neuroticism, and openness to experience. This model can be applied to the selection process at the candidate skills assessment stage.

With the above, it is identified that AI is applicable at different stages of the selection process, that it depends on specialized personnel for a correct implementation; on the knowledge, expertise, good judgment, and ethical principles of the people in charge of making final decisions regarding the selection of the candidate; and on the physical and financial resources allocated to this effect.

4. DISCUSSION

The analyzed articles demonstrate researchers' theoretical support and interest in bringing attention to the evolution of and the state of the art on the development of AI. This suggests that the authors strive for widespread knowledge of the different uses of this technology and its relevance in the global and digital context.

We identified little collaboration between countries regarding scientific production in relation to the topic under study. It is therefore necessary to redouble efforts involving scholars and authors interested in conducting research on the integration of AI into staff selection for organizations in any industry. In addition to the above, the existence of a marked collaboration network between countries was not evidenced, highlighting the absence of this type of research in Latin America.

A niche topic was established to determine the aspects motivating academic institutions and businesses in Asia to lead in the implementation of AI in human talent management, specifically in talent acquisition. In this scenario, researchers have the possibility of analyzing and understanding how the patterns of countries influence and relate to each other.

As a fundamental part of the research on the integration of AI into the talent acquisition process, it is necessary to understand the perception of those participating in selection processes [35]. In this vein, some articles examine primary sources to determine the position of recruiters, executives, job offer candidates, and managers with regard the use of AI in these processes. All the analyzed texts recognize the potential of AI in the staff selection process, and they agree that selection methods using AI attract organizations due to their greater speed and improved efficiency in comparison with traditional selection and evaluation techniques [34-36].

As for the temporal evolution of the keywords and the relevance of the most frequently used descriptors, we observed a growing interest in the integration of technologies such as AI into digital tools associated with e-HRM. This approach aims to optimize the acquisition of talent in the current context of the war for talent [37] by improving the efficiency of repetitive tasks and allowing organizations to generate value by hiring and retaining qualified personnel.

5. CONCLUSIONS

This research showed that, although the number of studies on AI and staff selection for different industries has increased in the last five years, none focus on the construction sector, let alone delve into the use of this tool in human resources management and work team formation in the context of project management. This is a topic to be studied in future research, given the particularities of the sector, which could benefit from the integration of technology, as it has proven to be quicker than traditional processes in the acquisition of employees.

The implementation of AI in human talent management, specifically in its selection, is still in the early stages of development. Nevertheless, this study demonstrated the theoretical and practical importance of research in the context of the war for talent. This work provides organizations in different industries with an overview of the research conducted and documented to date in relation to the use of AI in the staff acquisition process. However, we identified that, although a thorough review of the studies published and reviewed by expert peers in the subject, it is essential to acknowledge the limitations derived from consulting a single database for metadata extraction and meta-synthesis. It would be enriching for future research works to establish comprehensive coverage based on the review of multiple databases.

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