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AUTOMATION AND HUMAN TALENT IN THE DIGITAL ERA: CHALLENGES AND OPPORTUNITIES FOR MANAGEMENT IN SMES

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ABSTRACT
The study explores the impact of automation on human resource management, analyzing how it influences the evolution of work structures, skill development, and continuous training, as well as the ethical and social challenges of the future of work. The objective was to review recent advances in automation in this field through a narrative review of scientific articles published between 2020 and 2024. The results indicate that, although automation improves efficiency and competitiveness, it also presents challenges such as resistance to change, the need for ongoing training, and the lack of a regulatory framework that protects privacy and ensures fair decision-making. In conclusion, the implementation of automation requires a comprehensive strategy that combines operational efficiency with social responsibility, promoting an ethical and inclusive integration of technology that supports human talent development in a fairer and more competitive work environment.

Keywords: Automation, human resources, talent management, ethical challenges, technological changes

INTRODUCTION

Automation driven by artificial intelligence in small and medium-sized enterprises (SMEs) represents a promising yet challenging field. As technological advances continue to expand, their impact on human resource management, data analysis, and automated systems has become increasingly evident. Human resources departments have undergone profound changes in how they manage both administrative and strategic tasks.

According to Olóriz et al. (2022), the automation of administrative processes and the digitization of information aim to achieve objectives such as optimizing administration and reducing the time between a service or product request and the response to that demand. The automation of administrative processes in companies today increasingly incorporates AI, which is emerging as a field rich in possibilities (García and Vera, 2023).

However, these benefits come with significant challenges, such as resistance to change, the protection of sensitive data, and the need to redefine employee skills to adapt to the new technological reality. In this context, it is crucial to analyze how automation can be effectively implemented in SMEs, ensuring that organizational culture and employee well-being are maintained while taking advantage of the benefits these innovations bring. This initial analysis opens the door to a more detailed study of the impact of automation in the work environment. Currently, the digital transformation process is reaching a large part of business organizations seeking to expand their operations into new markets. However, many SMEs still do not understand the profound change occurring, which leads them to overlook its benefits and the importance of this process (Calle, 2022).

The issue lies in how automation impacts human resources and the labor market in general. On one hand, it can increase efficiency and reduce operational costs, but on the other hand, it generates uncertainty about the future of many jobs, the redefinition of professional roles, and the development of new skills (Pinto et al., 2023). Mas (2022), cited in Pinto et al. (2023), examined the impact of robotics and artificial intelligence on the labor market in Spain, based on survey data from companies and workers. The research revealed that although automation can improve efficiency and reduce labor expenses, it also presents challenges related to worker displacement and job restructuring.

Furthermore, it is proposed to analyze in depth the new work models and emerging forms of corporate control. In this context, companies increasingly use digital algorithms to make automated decisions. As a result, the most subjective and human aspect of labor relations is being replaced by systems that seek to provide objective answers through the analysis of various types of data. According to Espinoza (2022), organizations need to develop a well-defined strategy to integrate artificial intelligence into human resource management, ensuring that it aligns with the company's objectives and considers ethical and social implications.

On the other hand, one of the challenges for the human resources area in adapting to automation is reorganizing its processes, moving away from traditional, more mechanized management to become a dynamic area that anticipates the future and is prepared for changes and new demands from both organizations and individuals. This implies the development of innovative strategies within a new business model, in which innovation is synonymous with technology.

According to Socarras et al. (2023), every new implementation entails certain limitations, such as the digital transformation within a traditional management model. While automation represents a significant advancement for industries by promoting efficient management across all areas, human resource management has followed an ambiguous administrative model. It is necessary to analyze the current model and the aspects that need updating to keep pace with major international industries that leverage digitalization for continued growth.

Negrín and Ortún (2024) mention that it is essential to develop new models that allow for more innovative processes and that value human talent, creating added value. Additionally, there is another factor that hinders the rapid advancement towards adapting to new technologies: unlike other countries in the region, our country lags behind in technological knowledge due to a lack of greater emphasis on technical training in this field, which is fundamental for national development (Copaja and Esponda, 2019).

The purpose of this research was to explore and analyze recent advances in research on automation and its impact on the field of human resources, identifying current perspectives on how automation is transforming work within organizations, as well as the challenges faced by human resources departments regarding adaptation to these technological changes, talent management, training, and skills development, among other aspects.

Automation in human resources involves the use of technologies to optimize tasks such as payroll, recruitment, and performance evaluation. According to Bermúdez (2020), various types of automation have been developed to meet the demands of companies choosing to incorporate technology, resulting in a reduction of operational costs. Meanwhile, Mardones (2024) pointed out that technological progress has considerably transformed roles and responsibilities in the workplace, creating challenges for personnel management in light of the new model emerging with the rapid pace of these advances.

This context forces organizations to adjust and modify their human resource strategies to maximize talent and efficiency. According to Calle (2022), this also involves an organizational transformation that shifts guidelines, processes, and products toward a virtual environment, involving cultural changes within the organization as well as changes in employee behavior, competencies, and skills, with the main objective of satisfying the consumer. Likewise, Espinoza (2022) emphasized the importance of organizations establishing a clear strategy for integrating artificial intelligence into human resource management, ensuring it aligns with business objectives and considers ethical and social implications.

To achieve success, companies must focus on the human talent they possess, as it is fundamental for executing the organization's tactics and techniques. Human resources, considered the essence for achieving innovation, cannot be replaced by an automated machine (Idrovo et al., 2023).

Automation and artificial intelligence have introduced major changes to the traditional work structure, creating a need to understand how these advances impact personnel, who may feel displaced from their profession. Industry 4.0, explained by Del Carmen et al. (2020) as the adoption of intelligent tools (software and sensors) in companies to optimize production and management processes, is also known as the Fourth Industrial Revolution due to its effects on companies, workers, and customers.

Del Carmen et al. (2020) also pointed out that, over the past decade, there have been cases of worker displacement, especially in large industries seeking efficiency and cost reduction through process automation—a strategy known as reverse logistics. This phenomenon has benefited certain groups, while others have been adversely affected.
Sánchez (2021) asserted that up to 47% of jobs in the United States could disappear in the coming decades due to automation and the incorporation of AI in work units. This highlights current changes and anticipates future impacts.

However, automation should not be seen as a threat to workers but rather as a complement within industries, employing machines for repetitive or hazardous processes while being supervised by specialists. Carro and Sarmiento (2022) emphasized that the development of human capital in a country depends both on its educational system, which provides knowledge across various disciplines, and on attracting high-quality talent from other regions.

Regarding legal and regulatory aspects, the increasing autonomy and decision-making capacity of artificial intelligence have generated legal disputes, leading to challenges in its implementation being addressed more from a legal perspective than an ethical one (Parra & Concha, 2021).

Torres (2023) stated that artificial intelligence, along with advances in robotics and other emerging innovations, is transforming the nature of our work activities. The widespread incorporation of robots can eliminate jobs without guaranteeing the creation of equivalent new opportunities, which could widen the inequality gap in society. The most affected sectors include manufacturing, transportation, healthcare, storage, and logistics (Goñi, 2019).

A recent study compared the performance between a robot and a worker, revealing that the robot could perform the work of 2.5 people at a significantly lower cost. However, its efficiency was questioned, as the software did not fulfill similar functions to the worker. Likewise, the conflict between the right to business freedom and the right to work was evaluated, concluding that the public interest in preserving employment should prevail (Parra and Concha, 2021).

Human resource management has evolved within the technological context and is now also known as HR 4.0. Llanes et al. (2022) indicated that the current context is characterized by digitization and automation, processes driven by disruptive technologies such as big data, the Internet of Things, cloud computing, artificial intelligence, and augmented and virtual reality, emphasizing the importance of Industry 4.0. These advances demand flexible human management strategies capable of attracting and retaining key talent for business growth (Cardozo, 2021).

Human resource management requires professionals to prioritize employee well-being, balancing the demand to stay technologically updated with the care of emotional and psychological well-being at work (Mardones, 2024). Traditional roles in human resources have changed; today, the function is more agile, people-focused, and adaptable to technological advances.

According to García and Vera (2023), automation encompasses not only technological advances but also ethical and regulatory issues that affect labor equity by redefining roles and skills in the market. Pedraja and Rejas (2017) highlighted that human capital training represents an unavoidable challenge in both the social and economic fields, as a clear response to the growing advancement of the knowledge society.

Granados (2023) studied how artificial intelligence impacted employees affected by automation, emphasizing its socioeconomic implications. Rodríguez et al. (2023) analyzed how gender inequality intertwines with automation, presenting additional challenges to achieving labor equality.

Torres (2023) mentioned that artificial intelligence poses both threats and challenges for employees. Among the threats are the possible elimination of jobs, the inability to protect personal data, and discrimination in selection processes. On the other hand, the challenges include the need for continuous training to manage advanced technologies.

Organizational adaptation to automation is crucial, as technology constantly evolves, requiring IT management to stay updated to ensure competitiveness in the market (Uribe and Jiménez, 2024).

Finally, in an environment marked by digitization and rapid evolution, global leadership is key to organizational success. Muñoz (2024) pointed out that artificial

intelligence and automation are reshaping global leadership, leading to a transformation necessary to operate successfully in technological and globalized markets. Effective management of cultural diversity, communication, and adaptability are essential to lead in the Fourth Industrial Revolution.

Thus, organizational adaptation and digital leadership are fundamental for the technological transformation that defines today's business landscape.

METHOD

This research consisted of a narrative review on automation in human resources. Brito et al. (2021) stated that a narrative review is defined as a bibliographic review that gathers, analyzes, synthesizes, and debates published information on a topic, incorporating a critical analysis of the findings presented in the literature. To achieve this objective, academic databases such as Scopus, Google Scholar, Redalyc, ProQuest, and EBSCO were reviewed, which allowed for an accurate approach to the study's problem (Vizcaíno et al., 2023).

Keywords such as "automation in human resources," "artificial intelligence in SMEs," "Industry 4.0 and human resources," "labor impact of automation," and "ethical challenges of artificial intelligence," in both Spanish and English, were used, broadening the scope of the review. Strict inclusion criteria were applied, selecting studies published between 2020 and 2024, following Hurtado's (2024) recommendation, who emphasized the importance of using updated data to make relevant decisions in changing environments. Regarding exclusion criteria, articles outside the temporal range, duplicates, or those not directly related to the researched topics were discarded. Documents with lower methodological rigor, such as editorials and letters to the editor, were also excluded.

To optimize the search, Boolean operators like "AND" and "OR" were employed to refine the results. Finally, a content analysis was performed exclusively with scientific articles, in which the main themes of each study were identified and categorized.

Based on this methodology, summaries were prepared highlighting the contributions of each article in relation to the research objectives. In an initial selection phase, 100 articles were identified; after a preliminary review, 55 were discarded for not being relevant to the study's objective. Subsequently, from the remaining 45 studies, a second review was conducted in which 30 works that met the established selection criteria were included.

RESULTS

The results obtained indicated that automation in the human resources area had a significant impact on efficiency and cost reduction for SMEs. According to Bermúdez (2020), the implementation of technologies in administrative functions, such as payroll management and recruitment processes, considerably reduced the operational burden. This change not only optimized resource use but also allowed SMEs to focus their efforts on strategic functions that drive organizational growth. This perspective was supported by Pinto et al. (2023), who emphasized that the agility and flexibility achieved through automation improved response times, facilitating more efficient human resource management aligned with business objectives.

From an ethical perspective, the use of AI in human resources posed challenges related to employee privacy and fairness in decision-making. Espinoza (2022) mentioned that although the benefits of automation were evident, it was necessary to develop clear policies

that addressed both its advantages and its social and ethical implications. Similarly, Parra and Concha (2021) suggested that regulations and legal frameworks should be adapted to face these challenges, given the increasing autonomy that AI has in critical decision-making processes.

Table 1 presents the results of the bibliographic selection, structured with essential elements: author and year, research title, objective, and main findings. These studies offer a comprehensive analysis of how automation and artificial intelligence impact human resource management, highlighting both the advantages and challenges in terms of efficiency, technological adaptation, and skills development in the workplace.

Table 1
Results of the Bibliographic Selection for the Study

Author(s) and Year	Title	Research Objective	Findings
(Olóriz et al., 2022)	Automation of Administrative Processes and Information Digitization	Analyze how automation and information digitization can improve efficiency in human resource management.	Automation allows for a significant reduction in response time between request and execution, optimizing processes and freeing up resources for strategic tasks within SMEs.
(García y Vera et al., 2023)	Automation of Accounting Processes through Artificial Intelligence in SMEs.	Artificial Intelligence in the Accounting Processes of SMEs.	Accounting automation is promising but faces ethical and regulatory challenges. Implementation requires careful adaptation to comply with regulations and effectively manage data.
(Calle, 2022)	Digital Transformation in SMEs: Benefits and Challenges	Evaluate the impact of digital transformation on SMEs and their understanding of the benefits of automation.	Many SMEs still lack a full understanding of the benefits and challenges of automation. However, digital transformation is essential for increasing their competitiveness in an increasingly technology-driven market. To ensure effective adoption, it is crucial to invest in education and promote adaptation to the use of new

			technologies within the organization.
(Pinto et al., 2023)	Impact of Automation on Human Resources and the Labor Market	Analyze how automation affects human resources and the labor market, including the redefinition of roles and skills.	Automation enhances efficiency but raises uncertainties about the future of employment. Workers need to develop new skills to adapt to changes in their roles.
(Espinoza, 2022)	Strategies for Integrating AI into Human Resource Management	Explore the importance of a well-defined strategy to integrate artificial intelligence into human resource management.	Organizations need strategies that align AI with business objectives, while considering the ethical and social implications of automated decision-making.
(Socarrás et al., 2023)	Limitations of Digital Transformation in Traditional management Models	Evaluate the limitations and challenges of implementing automation in traditional management models.	Digital transformation improves human resource management but requires updates and analysis of the current model to achieve an internationally competitive level.
(Torres, 2023)	Threats and Challenges of AI in the Workplace	Analyze the challenges and threats that artificial intelligence poses to employees in the workplace.	AI poses threats such as job displacement, insufficient data protection, and potential discrimination. On the other hand, it requires continuous training to manage advanced technologies.
(Mardones, 2024)	Challenges in Human Resource Management in the Era of Automation	Explore the challenges in personnel management due to rapid technological advances.	Technological progress is transforming roles and responsibilities, requiring adaptive human resource management that is prepared for new business models.

(Negrín y Ortún, 2024)	New Models for Innovation in Human Talent Management	Propose innovative models that optimize the use of human talent in automated environments.	The creation of innovative models that harness human talent is essential to meet the rapid adaptation demanded by automation in the labor sector.
(Parra y Concha, 2021)	Legal and Regulatory Aspects of Automation and Artificial Intelligence	Examine the legal and regulatory challenges that arise with the implementation of artificial intelligence in the workplace.	The autonomy of AI systems in the workplace poses legal and ethical challenges, especially regarding privacy and fairness.

Table 2 outlines the impact of the Fourth Industrial Revolution on human resource management (HRM), addressing categories that reflect the emerging changes and challenges in the workplace. This analysis made it possible to understand how HRM must evolve to effectively manage a workforce facing new realities and labor structures.

Table 2

Impact of the Fourth Industrial Revolution on Human Resource Management

Category	**Specific Aspects**
Role Change in Human Resource Management.	Human Resource Management must adapt to a dynamic and complex context, moving away from traditional practices toward a more flexible approach.
Atypical Employment Challenges for Workers.	Increase in non-permanent jobs (temporary, part-time, freelance) requiring new forms of management.
Differentiated Leadership	Pressure to adapt to a shared economy and the need to develop professional resilience in the face of disruptions.
Work Engagement.	Leadership for atypical employees must consider irregular interaction patterns and different risk preferences.
Role of Universities	Need to foster engagement among both permanent employees and the contingent workforce.
Gap between Theory and Practice.	Importance of academic research to develop tools and models applicable to the new Human Resource Management.
Meaningful Experience.	Gap between academic knowledge and professional practices, resulting in a low adoption rate of academic findings.
Renewal of the University Curriculum.	Talent attraction and retention depend on providing compelling work experiences rather than competing in the talent war.
	Inclusion of relevant disciplines (advanced accounting, analytics, etc.) in the training of Human Resource professionals.

Taken from Cardozo (2021)

DISCUSSION

According to Cardozo (2021), HRM must adapt to the changes imposed by the Fourth Industrial Revolution, which implies developing new competencies to effectively manage a transforming workforce.

The studies analyzed in this review highlighted how the automation and digitization of administrative processes optimized human resource management. Olóriz et al. (2022) and Vera et al. (2023) agreed that automation not only reduced response times but also improved processes. This positive impact was especially relevant in small and medium-sized enterprises (SMEs), which benefited from the productivity improvements that digitization can offer. However, studies such as Espinoza (2022) pointed out that the lack of knowledge about the benefits of these technologies remains an important barrier, indicating that automation is still not universally understood or implemented. A lo largo de los artículos revisados, se observó una diversidad en los enfoques metodológicos que resaltan diferentes facetas de la automatización. Por ejemplo, Espinoza (2022) y Socarrás et al. (2023) hey employed methodologies that demonstrated how operational efficiency could be improved through technological integration in specific processes; meanwhile, Pinto et al. (2023) and Torres (2023) examined the impact of automation from a social perspective. The comparison of both approaches revealed that a comprehensive implementation of automation should consider both operational benefits and social impacts.

The studies by Calle (2022) and Negrín and Ortún (2024) addressed key aspects of automation but did not present a temporal analysis that would allow for the evaluation of the sustainability of changes over time. In addition, a research gap was identified regarding automation in specific contexts, such as SMEs, where limited resources can make the implementation of new technologies more challenging. This gap in the literature suggests the need for further studies that examine the implementation of automation in different contexts and sectors, taking their particularities into account.

The findings of this review indicated that, for SMEs, automation in human resources could be an invaluable tool to improve their competitiveness. However, effective implementation requires a comprehensive strategy that includes staff training and process adaptation. Espinoza's (2022) research suggested that a well-designed strategy could minimize resistance to change. Galindo (2019) provided a valuable perspective on the need for specific regulations to ensure the ethical use of artificial intelligence in human resources, considering privacy and fairness in decision-making. These practical recommendations reinforce the importance of SMEs adopting automation in a planned and ethical manner.

Likewise, the need for technological training for SMEs was discussed, as noted by Calle (2022), who pointed out that the vast majority of small businesses are unaware of the advantages and challenges of automation, highlighting the urgency of digital transformation to improve competitiveness. In this regard, Pinto et al. (2023) mentioned that automation generates uncertainty about the future of employment, as it can modify conventional roles and functions, creating the consequent need for employees to develop new skills.

Regarding the evolution of roles in the area of human management, Mardones (2024) emphasized that digital transformation brings changes in responsibilities within companies, requiring flexible and adaptable human management. In this sense, Negrín and Ortún (2024)

agreed on the need to create new and innovative management models that harness human talent to respond to the demands of automation in the labor sector.

In summary, the authors presented diverse perspectives on the impact of automation on human resource management, highlighting efficiency benefits while also recognizing the ethical, social, and competency-related challenges that this transformation entails. While some, such as Olóriz et al. (2022) and Socarrás et al. (2023), emphasized operational benefits, others, such as Torres (2023) and García and Vera (2023), stressed the importance of carefully addressing ethical and regulatory issues. The divergent positions suggest that although the Fourth Industrial Revolution offers valuable opportunities for human resource management, it is essential to adopt a balanced approach that considers both the benefits and the potential risks, especially regarding privacy, security, and skills development. This analysis underscores the complexity of the impact of automation and AI, where advancements must be accompanied by an ethical framework and responsible management to promote an effective and fair transition in the workplace.

CONCLUSIONS

The studies analyzed revealed that automation not only accelerated processes but also optimized the use of resources, allowing staff to focus on high-value strategic tasks. However, the success of its implementation depended on a comprehensive strategy that encompassed both operational benefits and the ethical, legal, and social challenges posed by this technology, ensuring an approach that placed employee well-being at the core of organizational change.

Despite the benefits, SMEs faced significant challenges, among which resistance to change and the need for continuous training stood out, enabling employees to develop new skills and adapt to technological transformations. In addition, the need arose for a regulatory framework that would protect data privacy and ensure fairness in automated decision-making, especially in human resource processes.

Finally, this review underscored the importance of balancing operational efficiency with social responsibility, ensuring that automation was implemented ethically and in line with labor rights. Rather than replacing human work, the goal was for automation to complement and enhance employee performance in an inclusive and fair digital environment.

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