Nanotechnology Perceptions
ISSN 1660-6795
www.nano-ntp.com

The Future of Work: Impact of Artificial Intelligence on Skills and Employment in the Future

David Naranjo Douglas[1], Ninoshka Fasce Cayo[2], Valeria Carrasco Valencia[1]

[1]Universidad Católica Silva Henríquez (UCSH), Escuela de psicología, Chile
[2]Universidad Santo Tomás, Santiago. Escuela de Ingeniería Comercial, Facultad de Economía y Negocios. Chile
Email: dnaranjod@gmail.com

Artificial Intelligence (AI) is the technology that has most revolutionized and transformed our time, offering benefits and opportunities in various activities. It also poses significant challenges and risks for employment such as changing, replacing, or creating new occupations, tasks, and skills. Objective to analyze the impact of AI on the work environment, after identifying opportunities and challenges in the age of automation. Qualitative descriptive study using semi-structured interviews and observation as data collection techniques. The analysis of the results led to the identification of (3) categories and (5) subcategories from which the study was derived. In conclusion, the future of work will demand a symbiosis between humans and AI, which will require constant learning and adaptation to change by rethinking AI-assisted automation as a way to promote human welfare and progress.

Keywords: Artificial Intelligence (AI), Automation, Future of Work, Digital Skills, Technological Innovation, Labor Transformation, Business Adaptation, Labor Inequality, Fourth Industrial Revolution, AI Ethics.

1. Introduction

Artificial intelligence (AI) is a technology that has seen significant development in recent years, driven by advances in computational power, the massive collection of data, and the progress of machine learning techniques (Serret, 2023). AI has the ability to learn, reason, and solve complex problems, often surpassing human capabilities. Its applications have spread across multiple sectors, including healthcare, education, industry, and entertainment, and it holds the potential to transform the economy and society in much the same way as past revolutionary technologies like steam power or electricity (Trajtenberg & Bresnahan, 1992; Benhamou, 2022). However, AI also presents significant challenges and risks, particularly in

the realm of employment.

AI can automate many tasks that previously required human intervention, potentially affecting employment, job quality, income distribution, and working conditions (Benhamou, 2022). On the other hand, AI can also create new job opportunities, demand new skills and competencies, enhance productivity and innovation, and generate new sectors and services.

AI presents critical challenges for society and the economy, especially concerning the labor market. The automation of processes and the replacement of certain human skills by machines may have a negative impact on employment, income distribution, job quality, and working conditions.

This article aims to analyze the impact of AI on the labor market, drawing from the perspectives of experts in the field. To this end, a literature review was conducted, along with a survey of professionals in the AI and automation sectors. The objective is to understand their views on the use of AI in the age of automation and how it has affected employment.

The article is structured into three parts: the first provides a review of the state of the art in AI and automation; the second describes the methodology employed to gather and analyze expert opinions; and the third presents the study's results and conclusions.

2. Theoretical Framework

We are living in an unprecedented era in human history, where we can understand other languages almost instantly through the use of Google Translate, which is based on an AI system in continuous development. Additionally, AI has become a valuable resource for enhancing academic, administrative, and research-related tasks.

However, this technology also presents challenges and risks for the social future, as noted by various authors (Corvalán, 2018; Dabbous & Boustan, 2023; Marcillo-Pin et al., 2023; Pedró, 2020; Sadin, 2020). On one hand, algorithmic regulation requires a rethinking of the meaning and functioning of political institutions, as machines can automatically process enormous amounts of data and make decisions based on this processing that were not previously anticipated. On the other hand, the digital explosion and entrepreneurial education have influenced the development of entrepreneurial intentions in students, enhancing AI as a form of entrepreneurship.

These aspects raise complex issues concerning the impact of technology on democratic societies, focusing on the criteria that determine automated decisions and the political, social, and institutional risks associated with the presence of biases in such decisions.

AI is an innovation that is transforming the world in all aspects, offering great opportunities but also entailing significant risks. It is essential that society, governments, and businesses remain aware of the benefits and challenges that AI presents, and that ethical standards and principles are established to ensure its responsible and sustainable use. Only by doing so can the full potential of AI be harnessed to improve the quality of life for people and advance human development.

Artificial Intelligence

The term "artificial intelligence" (AI) refers to the simulation of human intelligence in a machine, aimed at efficiently identifying and using the correct fragments of knowledge to solve a problem (Monteiro-Pessoa, 2019). AI is a branch of computer science that deals with the development of algorithms and mechanisms capable of exhibiting behaviors considered intelligent—meaning they can reason and learn in ways similar to humans. The concept of AI was first proposed in 1956 at a conference at Dartmouth College by John McCarthy, one of the pioneers of this discipline, alongside Marvin Minsky, Allen Newell, and Herbert A. Simon (Garrido, 2020).

Since then, AI has evolved and benefited from advances in cloud computing, big data analytics, and machine learning, enabling the creation of more accessible, user-friendly, and cost-effective applications for various business departments (Sanabria-Navarro et al., 2023).

AI is a branch of computer science dedicated to creating systems that can imitate human reasoning and learning, according to Ardila-Osma et al. (2020). This technology has become indispensable for many industries and organizations, which use it to improve their processes and outcomes. The authors argue that abandoning AI would mean losing competitiveness and opportunities in both current and future markets.

AI is present in many aspects of our daily lives, from vehicles and drones to virtual assistants and translation programs, and it has changed the way we interact with the world. Moreover, AI has evolved thanks to the increase in processing power and the availability of vast amounts of data. Some AI systems are capable of learning from the data we generate in the digital environment, allowing them to self-program and find optimal solutions based on simple rules (Schwab, 2016). According to Melnichenko et al. (2021), AI has driven digital changes and technological advances that have enabled companies such as Uber, Amazon, KFC, Android, Twitter, Airbnb, and Walmart to develop new functionalities.

These advances include the automation of HR processes through integrated mobile applications that facilitate time management, meeting organization, tracking movements, delay notifications, multimedia messaging, and work management.

AI is a broad field that encompasses machine learning and deep learning, as well as other approaches that do not involve learning. Machine learning, a branch of AI, has made great strides in recent years, particularly deep learning, which utilizes artificial neural networks.

Deep learning has achieved significant advances in the last decade in various areas. However, AI is not solely based on learning. For instance, early chess programs relied on rules manually written by programmers and were not machine learning-based. For a long time, it was believed that human-level AI could be achieved through explicit rules for manipulating knowledge (Chollet, 2021).

Nonetheless, AI has experienced substantial advancements in recent years, thanks to cloud computing, big data analytics, and machine learning. These technologies have made AI applications more accessible and cost-effective for various business departments.

Artificial Intelligence: Challenges and Opportunities in the Age of Automation

A frequently applied concept in the industry is automation, which refers to the ability of a machine to perform certain processes or tasks without human intervention. This concept is often associated with a capitalist view, as it implies saving time and money (Agudelo et al., 2020). However, automation is not limited to the industrial realm; it extends to many other fields such as digitalization, robotics, and AI, all of which have transformed the world of work, creating new opportunities and challenges for workers (Deloitte, 2018). These technological changes require workers to adapt to the new demands of the market and acquire new skills to remain competitive.

Technology has changed the way we work in many aspects, especially during the COVID-19 pandemic. One example of this change is remote work, which has expanded thanks to the internet, cloud services, and videoconferencing (Ripani & Soler, 2021). However, technology can also have negative effects, such as worker displacement if the new technologies demand skill sets different from those of the current workforce (Bessen et al., 2019). Additionally, the pandemic revealed the gap between those who have access to digital technologies and those who do not.

Thus, public policies are needed to promote access to digital technologies, education, and lifelong learning, as well as to protect workers' rights in the age of automation. Otherwise, what is a positive technology could become a source of deepening labor and wage inequality.

3. Methodology

A qualitative methodology was employed, based on the collection and analysis of different types of information: semi-structured interviews, non-participant observation, and document review. The semi-structured interviews were designed following a guide (attached) that was validated by three experts in organizations, computer science, and mechatronics.

The study sample consisted of six professionals working in leading AI technology companies: two general managers, a project manager, an automation services chief, and two systems analysts. An intentional process was used to select participants, based on criteria established by experts (Hernández-González, 2021). The primary criterion was that the interviewees had theoretical and practical knowledge of AI and had held their positions for at least three years. The interviews aimed to understand the professionals' views on AI and its impact on work.

Once first-hand information was obtained through interviews with AI professionals, it was collected and organized into a content matrix to make sense of the non-numerical data provided by the interviewees. Subsequently, the information was triangulated and interpreted using the researcher's subjectivity and autonomy as an informative tool, along with the perspectives of certain authors. To ensure the validity and reliability of the AI-generated knowledge, analysis categories and subcategories were identified based on the processed information (Román, 2023).

Regarding non-participant observation, the challenges and opportunities of AI in the workplace were assessed from an external position without intentional influence, based on the opinions of various authors. All the information obtained was recorded, organized, analyzed,

and grouped into categories and subcategories.

Finally, to analyze the interview data, a detailed and systematic reading was conducted. The information was classified according to units of meaning (US) that expressed the participants' opinions. The US were grouped into subcategories (SCT) that reflected common or differentiated aspects of their discourses, and categories (CT) were established that synthesized the emerging meanings from the narratives of the research subjects.

4. Results

Given the purpose of the research and based on the first-hand information collected, this study allows us to analyze the opinion (US) of six professionals on the impact of AI in the workplace, identifying opportunities and significant challenges in the era of automation. It is noteworthy that the interviewees converge on five dimensions:

1-Evolution of AI in the Workplace

How has AI evolved in the workplace in recent years?

... it has had a significant impact on the workplace in recent years. Some of those changes involve the automation of routine tasks, theoretically allowing workers to dedicate themselves to other activities, becoming more creative, which generates greater efficiency and quality in processes, thanks to the continuous analysis of data, resource optimization, and error detection (Inf.4).

... AI was first integrated into software platforms, advertising platforms, and generally through the internet… the novelty has been based on intelligence linked to language, which is general intelligence—Generative Artificial Intelligence—that means it can talk to you as if it were a person, and natural language allows it to create a new kind of interaction with great potential. Therefore, it is no longer just about algorithms reading patterns but interacting with people through conversational processes (Inf.1).

In the workplace, it has been providing solutions, especially in maintenance management systems. These systems are increasingly automated, yielding much more efficient results, reducing maintenance costs, unplanned downtime, and machine failures, among other things (Inf.5).
... AI has significantly improved the way data is processed. This has greatly facilitated decision-making in various competitive and operational aspects (Inf.2).

This technology has gained great momentum in recent years, evolving from being used in the military, aerospace, and industrial fields to becoming a personal tool for daily use by a large number of people (Inf.3).

AI has, in recent months, taken on a relevant role... generating content for the Marketing area, identifying previously unconsidered factors for the Commercial area, analyzing open survey responses for the Consulting area, and translating and summarizing training materials (Inf.6).

Artificial intelligence (AI) is a technology that has transformed how we interact with the world, work, and learn. With AI, we can develop intelligent systems that adapt to different contexts and solve complex problems (Coloma-Garofalo et al., 2020). We can also enhance

our abilities and knowledge with personalized resources and online learning platforms. AI allows us to access information quickly and easily, assess our learning, receive feedback, and collaborate with others. AI helps us learn continuously, improve our professional development, foster creativity, and drive business innovation.

AI has also changed how we manage data, make decisions, and perform tasks in various work sectors. From defense to marketing, from consulting to education, AI provides innovative and personalized solutions that optimize our performance and quality of life. This chatbot is an example of how AI can generate relevant content from varied and complex sources. It is a powerful tool that we must use to learn, work, and grow in a dynamic and competitive world. However, AI also raises ethical, social, and legal challenges that we must address responsibly and cautiously (Porcelli, 2020).

AI affects various aspects of our lives, such as our privacy, security, autonomy, and dignity. However, it can also pose risks of bias, discrimination, inequality, and exclusion. Additionally, it may alter our identity, culture, and values, influencing how we think, feel, and act. For these reasons, it is essential that the development and use of AI be carried out in a transparent, fair, inclusive, and sustainable manner, respecting human rights, democratic norms, and ethical principles. Thus, AI must remain under responsible and participatory human control.

Artificial intelligence has significantly transformed the workplace in recent years, mainly through the automation of routine tasks, allowing workers to focus on more creative activities and improving process efficiency. This evolution has been accompanied by advances in generative artificial intelligence, enabling advanced interactions through natural language, which has had a considerable impact on sectors such as marketing and consulting.

2- Employees' Perceptions of AI in the Workplace

What is the general opinion of employees about the use of AI in the workplace?

There are mixed opinions; some people still don't view artificial intelligence favorably. However, it's only a minority who say that AI will gradually displace human labor and generate significant unemployment, whereas another group, if not the majority, welcomes this tool because it makes their work easier, allowing them to be more efficient as professionals, provided they are trained to use it correctly (Inf.5).

This has been very varied because it depends on the adaptability of the employee. In some cases, the implementation has been instantaneous, while in other cases, it has taken a more extended period (Inf.3).

The opinions and/or reactions of employees toward the use of AI can be quite diverse. Nevertheless, it could be positive as long as they perceive a benefit; otherwise, they will always see AI as a threat (Inf.2).

Some workers believe that AI positively impacts their work, allowing them to perform more creative, efficient, and satisfying activities. However, there are also certain fears related to the implementation of AI, such as the possibility of job losses and the replacement of labor by machinery or automated processes (Inf.4).

... we love it, and for that reason, we explore its latest developments... it will be appreciated as an assistant... in the work done (Inf.6).

... those resistant to AI are usually the ones who explore it but do not apply it in the generation of deliverables or documents they need to produce, so they are not making intensive use of it. On the other hand, those who are passionate and committed to change are the ones who find that AI makes their lives easier (Inf.1).

AI can be a great ally for employees, provided they adapt to its use and leverage it to facilitate their tasks and projects. To achieve this, it is essential to foster a culture of learning and innovation that motivates them to explore and apply AI effectively and responsibly. As Martínez-Marín & Muñoz-Moreno (2018) point out, learning happens in everyday life, including technological environments such as cloud-based document creation or Zoom meetings.

Employees' opinions on the use of artificial intelligence at work are diverse. While some fear that AI will replace human labor and cause unemployment, the majority see it as a valuable tool that eases their workload and enhances their professional efficiency, as long as they receive adequate training. The adaptability of workers plays a key role in this acceptance; those more willing to explore and implement AI tend to benefit more from its advantages, while those resistant to change perceive it as a threat.

3- Opportunities and Challenges of AI in the Workplace

What are the main opportunities and challenges associated with the application of AI in the workplace?

The opportunities are endless, limited only by the imagination and the needs of each sector. For example, with AI, we can predictively anticipate future issues and resolve them before they arise. As for the challenges, it involves developing the necessary cybersecurity to set boundaries, as we know that this great technology, in the wrong hands, could cause significant harm to humanity (Inf.2).

The opportunities are linked to generating greater productivity in less time for all activities related to deliverables, such as documentation, reports, and analyses that can be developed. There's also participation in synthesis or conclusion processes that help AI diversify references or concepts to become more disruptive—so to speak. ... the challenge is to understand that AI allows for curating information, selecting information, and even articulating solutions based on what the person defines as the problem… the strongest challenges lie in making good use of these opportunities, as there are three characteristics that workers often lack: first, the linguistic competence to interact with the software; second, the ability to properly define problems, which AI won't do; and third, the ability to define constraints for generating solutions, which are the specialized guidelines that humans must set for AI to solve (Inf.1).

... regarding opportunities… repetitive and routine tasks can be automated, freeing up time to focus on higher-impact and more complex tasks, thus boosting productivity… processing large amounts of data can be done faster and more precisely, reducing error risks… AI can improve access to information and training, allowing us to innovate in the continuous improvement of operational, administrative, and industrial processes. AI tools can displace or replace some workers with low qualifications or those performing repetitive tasks… regarding challenges, there's the social impact associated with changes in workflow modes, new training and

adaptation requirements, the costs of technological updates, and the implementation of new AI tools, which require investment in technology and adaptation of workplaces with new hardware, connectivity speeds, etc. This presents a significant challenge for organizations with liquidity constraints for this type of investment (Inf.3).

The main challenge is for everyone to understand and accept AI as a valuable tool that facilitates our work, rather than displacing jobs. Besides this, it's important that people see the need to train themselves to know how to use and manage these tools. Regarding opportunities… AI allows for delivering precise solutions to client demands, understanding the customer's needs accurately, and thus offering and selling an optimal and effective solution (Inf.5).

... the challenge is to know, manage, and master AI. On the one hand, it will develop a series of new jobs and an industry full of opportunities. On the other hand, it could deepen social inequality, as digital illiterates or those with little exposure to digital tools could easily lose jobs, whereas high-tech companies can boost their productivity (Inf.6). ... with the creation of new jobs related to the development, implementation, and maintenance of AI systems, there has been a considerable transformation in the skills required of workers, who must adapt to the new demands of the labor market and working alongside intelligent machines… it also poses ethical, social, and legal challenges that must be addressed responsibly with everyone's participation… it may also affect the labor market, causing displacements, inequalities, and skill gaps (Inf.4).

Based on the narratives provided by key informants, AI must be understood and accepted by everyone as a valuable tool, but also as a shared responsibility that involves challenges and opportunities for human development. Technological turbulence requires strategic decision-making and the acceptance of new risks (Slavec-Gomezel & Aleksić, 2020), as it frequently involves disruptive changes for industries and people (Martin et al., 2020). These changes may lead to increased demand for both high- and low-skill jobs while reducing demand for middle-skill jobs, leading to labor market polarization, a phenomenon that resembles an hourglass shape (Argüello-Verbanaz, 2019). However, AI does not replace humans; rather, it complements and helps them solve complex problems (Tundidor et al., 2018). To fully leverage AI's potential, it is essential to develop linguistic skills, task definition abilities, and the identification of constraints. Thus, AI can be used effectively and responsibly across various fields of activity.

The implementation of artificial intelligence in the workplace presents a wide range of opportunities, from optimizing routine tasks to the ability to predictively anticipate and resolve problems. However, the challenges are equally significant, particularly the need to develop robust cybersecurity measures to prevent potential harm. AI has the power to transform productivity, but its effective utilization depends on the worker's ability to interact with these tools, define problems, and delineate solutions with precision.

4- Business Adaptation to AI Use in the Age of Automation

How have companies adapted to the use of AI in the era of automation?

Within the organization's strategic plan, technological updates and the use of AI technology are included. We are working hard to adapt every functionality and job role within the

organization, as it is associated with a total change in activities and the development of automations to optimize and streamline operational and administrative processes (Inf.3). This depends somewhat on the sector. I understand that for companies dedicated to advertising, AI has facilitated many previously unimaginable tasks. On the other hand, in the field of IT and data processing, it has been a resounding success in reducing time, space, and even human resources (Inf.2).

... companies have had to adapt to the use of AI to improve their processes, products, and services… Ultimately, this has allowed companies to optimize their resources, reduce costs, and increase their efficiency and productivity (Inf.4).

... it offers the possibility of becoming much more productive in less time… when AI is not merely used as an exploration of how it works, but its use is directly linked to work activities and in a recurring way, it can even store part of how we are generating deliverable documents, etc. (Inf.1).

Some companies fear not getting to know it… others are moving towards familiarizing themselves with it and view it as a tool to facilitate their own work. In general, companies have been fairly cautious in its use, even considering it a threat (Inf.6).

Depending on the industry, but from my perspective, the companies that have adapted the fastest and sought out AI are the ones in the mass consumer goods sales sector, as it provides them with information about the masses—what people demand, what they want, or what they are curious about—classifying them by groups and accurately addressing their needs (Inf.5).

According to the key informants, AI is a reality affecting various sectors and economic activities, from consumer goods sales to data processing. AI improves efficiency, creativity, and competitiveness across different sectors, from advertising to IT. However, it also presents challenges and risks that must be evaluated and mitigated, such as the social, ethical, and labor impacts of automation (Ardila-Osma et al., 2020). AI offers numerous benefits for organizations that adopt it, provided that proper planning and staff training are implemented. Therefore, companies that adapt to this reality can gain competitive advantages and optimize their processes but must also face the challenges of digital transformation. AI is not a threat but an opportunity for innovation and value creation, as long as ethical and social principles governing human coexistence are respected.

Businesses have incorporated artificial intelligence into their strategic plans, driving technological updates and the automation of operational and administrative processes, thereby optimizing productivity and reducing costs. While the implementation varies across sectors—from advertising to IT—the success of AI is evident in improving efficiency and responsiveness to market needs. Despite the benefits, some companies remain cautious about AI, seeing it as a threat, while others view it as an opportunity for innovation and competitiveness.

5- Perspectives on the Future of the Labor Market in the Age of Automation

How do you perceive the future of the labor market with the use of AI in the Age of Automation?

... I believe we must be optimistic and adapt to these changes, which are an unavoidable

reality… That's why it's necessary for businesses and workers to prepare for the future by acquiring new skills, updating their knowledge, and seeking out learning opportunities. We must be clear that AI should not replace humans but complement them, creating new possibilities for joint Human-Machine work (Inf.4).

From the beginning of AI, it has been focused on process automation. When we talk about process control, there is a decision-making aspect that, until now, was purely a human activity. It was once unimaginable that a machine could learn from a production process and have the capacity to make a decision in a specific situation (Inf.2).
... the competition of the future is linked to generating a symbiosis with AI based on problem definition… (Inf.1).

There will be greater opportunities for those who are prepared and trained in AI. Those who prepare to take better advantage of AI in their profession will be one step ahead of those who do not (Inf.5).

The future labor market will require individuals with aspirations to have more training in the use, design, and development of AI automation tools and open-source programming languages… It's important to stay in continuous learning and apply this knowledge to be a highly qualified candidate for the labor market (Inf.3).

... it's important that people are open to change. Those who don't adapt will go extinct… in almost all cases, manual jobs—such as trades, construction, maintenance, or services—are easily automatable (Inf.6).

AI is a tool that is changing the world and the labor market, but it also presents new challenges and opportunities for those who use it. To take advantage of its potential, it's essential to develop the necessary skills to identify problems and create innovative solutions using this technology. One of these skills is AI process automation, which involves applying AI to repetitive or complex tasks, optimizing time and available resources. According to Calvo (2020), in this way, it's possible to improve the quality of life and the level of human development, as long as AI's ethical and social principles are respected.

The future of the labor market with the integration of artificial intelligence is seen as an opportunity for those willing to adapt and acquire new skills. AI will not replace humans but complement them, creating new forms of collaboration between humans and machines. However, both businesses and workers must engage in continuous training to seize the opportunities this technology offers, particularly in the automation of complex and repetitive processes. Those who adapt and update their skills will be better positioned in the future labor market.

The results show that artificial intelligence (AI) is significantly redefining the labor landscape, affecting both the nature of work and the skills in demand. While the automation of repetitive, low-value-added tasks promises increased efficiency and productivity, it also presents the challenge of professional retraining for workers engaged in these tasks. It's clear that to maximize AI's benefits, fostering a culture of continuous learning and adaptation to new technologies will be crucial. However, the study also highlights the gap between sectors that have quickly embraced these technologies and those still resistant to change, which could exacerbate labor inequalities if appropriate public policies are not implemented. Consequently,

collaboration between government, business, and education sectors will be key to ensuring that AI development translates into inclusive and sustainable progress in the labor market.

Thus, the future of work will depend not only on the effective integration of artificial intelligence into work processes but also on our ability to foster a resilient, adaptable, and skilled workforce capable of coexisting with technology and transforming it into a tool for sustainable human progress.

5. Discussion

In light of the results presented, three (3) categories of analysis were established: 1) Application and impact of AI in different fields; 2) Integration of AI into everyday practices across various sectors; and 3) Automation: evolution, application, and adaptation of AI in different areas of the labor market. These categories were further subdivided into five subcategories that guided the research development: a) Application of AI in generating deliverables or documents; b) AI in the workplace: evolution, opinions, and challenges; c) Opportunities and challenges associated with AI in the workplace, including business adaptation and cybersecurity development; d) Use of AI in training and education for the labor market; and e) Business adaptation to AI and the future of the labor market. In this way, the aim was to capture the reality and relevance of the data obtained, which are addressed in the following points:

Application and Impact of AI in Different Fields

AI is a technology that has transformed how we interact with the world, work, and learn. Through AI, we can develop intelligent systems that adapt to different situations and solve complex problems. AI also offers advantages such as access to information, personalized learning, professional development, and innovation. However, AI also presents ethical, social, and legal challenges that must be addressed responsibly and prudently.

AI can have negative effects on our privacy, security, autonomy, and dignity; it can create biases, discrimination, inequality, and exclusion; and it can threaten our identity, culture, and values. Therefore, it is essential that AI development and use be transparent, fair, inclusive, and sustainable. Moreover, AI must respect human rights, democratic norms, and ethical principles. Thus, it is imperative that AI remains under human control, be responsible, and participatory. AI does not pose a threat to jobs in general but rather to specific tasks that can be automated. AI can improve efficiency and productivity in many sectors, which could increase the demand for certain jobs. Rouhiainen (2018) points out that AI can be applied in various fields, such as static image recognition, object classification, and labeling. It is also used in business strategies, customer data processing, predictive maintenance, object detection and classification, content distribution on social networks, and even digital security.

Integration of AI into Everyday Practices in Different Fields

AI is a discipline that seeks to emulate human intelligence through computer systems capable of learning, reasoning, and decision-making. For example, in healthcare, AI can assist in diagnosing diseases through clinical data analysis and computational logic. One example is ELIZA, an application developed by the Massachusetts Institute of Technology (MIT)

between 1964 and 1966, which simulated therapeutic conversations with patients (Medinaceli-Díaz & Silva-Choque, 2021).

In education, AI can facilitate the teaching and learning process through Machine Learning, a system that builds mathematical models from data patterns, allowing for predictions and decision-making without prior programming. Machine Learning can adapt to the needs and preferences of each student, offering personalized content and immediate feedback (Zhang, 2020).

In the field of security, AI can contribute to crime prevention and detection through facial recognition, a mechanism that identifies people based on their unique facial features. Facial recognition can operate remotely, even in large crowds, making it highly useful for public safety (Domingo-Jaramillo, 2021).

In the legal field, AI can streamline and optimize access to and management of legal information through systems for search, advice, and decision-making support. These systems can use standardized and precise legal language, facilitating understanding and communication between legal practitioners. Additionally, they can predict possible outcomes of cases or litigation based on historical and statistical data (Barona-Vilar, 2019).

In journalism, AI can generate automated content through software bots that collect, process, and disseminate information quickly and efficiently. Bots can create news from numerical or structured data, such as sports or financial results. They can also interact with users through chatbots or virtual assistants that respond to their queries or demands (Segarra-Saavedra et al., 2019).

Lastly, the transport and communications sector will undergo significant transformation with the advancement of autonomous vehicles. According to Benhamou (2022), in the near future, we could reach level 4 autonomy, where vehicles drive themselves in highly controlled and simple situations (e.g., parking or driving on a highway). Therefore, the development and dissemination of these technologies will be crucial for the transformation of the transport sector and, consequently, the impact on employment and labor in the industry.

Application of AI in the Generation of Deliverables or Documents

Alcaraz-Calero et al. (2011) present a framework that enables instructors to generate bulletins with tasks and learning materials for each student, as well as interactive learning materials with tasks and their corresponding explanations and solutions. This framework provides a new mechanism for student-teacher interaction and allows for a shift in teaching methodology, both in the classroom and in the design of independent student work, which is emphasized in the European Higher Education Area (EEES). Additionally, Esteves et al. (2020) note that the PROMETEA system, which applies AI to automatically generate phrases, is used in several countries in the region.

AI in the Workplace: Evolution, Opinions, and Challenges

AI is a technology that transforms the workplace, bringing both advantages and disadvantages. On the one hand, AI enhances productivity, efficiency, quality, and innovation, and facilitates employees' work. On the other hand, AI poses risks and challenges for employment, ethics, rights, and responsibilities. These aspects generate diverse opinions among workers,

employers, and society at large (Cisneros-Zúñiga et al., 2023).

Opportunities and Challenges Associated with AI in the Workplace, Including Business Adaptation and Cybersecurity Development

AI is a reality that affects the future of work and presents both challenges and opportunities for individuals and organizations. According to García-Murillo & Gordillo-Ruíz (2021), people who work with AI will have an advantage over those who do not, requiring innovation or reinvention through the development of the necessary skills, competencies, and aptitudes to adapt to change. However, product innovation does not solely depend on AI but also on the company's willingness to embrace new digital technologies (Coronado-Medina et al., 2023). AI also affects employment and labor mobility, particularly through automation. Bessen et al. (2019) indicate that automation increases the likelihood of higher-skilled and better-paid workers leaving their companies, as they seek new opportunities following automation. Ripani & Soler (2021) warn that, in the U.S., 47% of jobs are at risk from automation, while in Latin America and the Caribbean, more than 60% are at risk.

AI also brings risks to information security and fundamental rights. Ardila-Osma et al. (2020) suggest that organizations should implement an information security strategy to mitigate risks in local computer networks and on the internet. Furthermore, a public and interdisciplinary dialogue among all stakeholders is necessary to maximize AI's potential while minimizing its risks. A legal and regulatory framework is also needed to ensure respect for the ethical principles and fundamental rights of workers, employers, and society as a whole. Finally, an education system that prepares individuals for technological changes and equips them with the necessary skills to participate in the labor market is crucial.

Automation: Evolution, Application, and Adaptation of AI in Different Areas of the Labor Market

Automation has been a subject of debate since at least the 18th century, when machines began to be used to help workplace designers calculate productivity and automate tasks (Argüello-Verbanaz, 2019). With the development of robotics and information and communication technologies, this debate has intensified, particularly regarding the impact of automation on employment and workers.

A recent study by Dominia et al. (2022) analyzes how investments in automation-enabling assets affect worker flows within and between companies. The results show that periods of increased automation are associated with net employment growth, driven by a higher number of hires and fewer layoffs. However, differences are observed across professional categories, with the most vulnerable groups suffering the most from the introduction of new technologies (Ripani & Soler, 2021). While it is difficult to predict the long-term effects of automation, Argüello-Verbanaz (2019) suggests that it will likely bring about profound changes that will also affect workers. Therefore, policies need to be designed to facilitate workers' adaptation and transition to new work environments (Moore, 2019).

Use of AI in Training and Education for the Labor Market

AI is transforming the world of work across all sectors and levels. AI can create useful applications for employees, improve work management, and facilitate bias-free recruitment processes. However, AI also presents challenges for employment, education, and ethics.

AI has led to new employment models, such as "uberization," characterized by flexibility, precariousness, and the social responsibility of the worker (Granados-Ferreira, 2022). These forms of work are not sustainable in the long term and require a transition to a more inclusive and equitable productive paradigm. According to the International Labour Organization (ILO), education, development, and digital infrastructure are key factors in leveraging AI opportunities and ensuring a better future for work.

On the other hand, AI can also contribute to improving personnel selection processes by avoiding discrimination often present in conventional methods. However, Aguerrevere et al. (2020) warn that AI may also generate unemployment, particularly among the most vulnerable workers who lack access to training or labor reintegration programs. Therefore, countries must implement strategies that equip their citizens with the necessary skills to adapt to the "new normal" that AI implies. It is imperative to adopt measures that promote the responsible and ethical use of AI while preparing people for the changes it brings.

Business Adaptation to AI and the Future of the Labor Market

The introduction of robotics and AI into the labor market represents a new paradigm concerning the technological divide, employment, and occupational polarization, with effects that will transcend this domain and impact the State in terms of welfare and financial sustainability. Therefore, it is essential to implement actions and measures grounded in the principle of social responsibility and a fair balance of benefits, as workers' technological skills become a key element of social and labor inclusion or exclusion, as well as the sustainability of the social sector (Pérez-Gázquez, 2022).

While there is a wide range of training opportunities in the skills needed to respond to the changes brought about by social exclusion in business operations, in some cases, the training goes beyond the provision of online modules to include AI algorithms that facilitate the evaluation of learning pathways, as is the case with the Italian platform ItalyMobility (Aguerrevere et al., 2020).

It is imperative that organizations adopt effective implementation strategies that place workers' needs at the center and foster a collaborative work environment. Only then can we fully harness the potential of AI to improve work processes and, ultimately, enhance the lives of workers both now and in the future (Bankins et al., 2023). However, the reality of the digital era is that many new companies provide "information goods" whose storage, transportation, and reproduction costs are virtually zero. Some disruptive tech companies seem to require little capital to thrive. Companies like Instagram or WhatsApp, for example, did not need significant funding to enter the market, which alters the role of capital and business scaling in the Fourth Industrial Revolution (Schwab, 2016).

Social exclusion in the labor market is a complex phenomenon that presents both challenges and opportunities for organizations and workers in the context of digitalization. To address these, continuous training in digital skills is required, tailored to the needs and expectations of each sector and professional profile. Additionally, a culture of innovation and scalability must be promoted, leveraging human and technological capital as drivers of business and social development. Finally, the potential negative effects of automation on employment should be anticipated and mitigated through public policies that promote the creation of new jobs, social

protection, and the labor inclusion of the most vulnerable groups.

6. Conclusions

Artificial intelligence (AI) is a reality that impacts the world of work and poses challenges and opportunities for economic and social development. To harness its benefits and mitigate its risks, several actions are required. First, it is essential to train individuals in digital competencies, foster innovation and creativity, and ensure the ethical and participatory use of AI. Second, it is imperative to adopt public policies that protect the rights and well-being of workers and promote social dialogue and the inclusion of all stakeholders in the Fourth Industrial Revolution. Finally, governments, businesses, and workers must create ethical and legal frameworks that respect human rights, equity, and inclusion. Additionally, it is necessary to invest in education and lifelong learning to ensure that all citizens can adapt to the new demands of the labor market and seize the opportunities offered by AI. Only in this way can a better work future be achieved through AI.

Artificial intelligence (AI) continues to profoundly transform the labor market, creating both significant opportunities and challenges for the future of work. AI not only automates repetitive tasks but also opens new areas of employment, particularly in specialized sectors that demand advanced technological skills. However, the transition to an automated labor market requires constant adaptation from both companies and workers. It is essential for workers to develop skills related to AI and automation to remain competitive in this new environment. Furthermore, companies must take an active role in training and retraining their employees to ensure a smooth and equitable transition. Public policies will also play a crucial role in ensuring that this transformation is inclusive and does not deepen inequalities. In the future, collaboration between humans and machines will become a distinctive feature of the work environment, allowing workers to focus on more creative and strategic tasks while machines optimize operational processes. It is vital that this evolution is guided by strong ethical principles that ensure the well-being of all involved in this new labor era.

This collaborative approach between AI and humans will define the future of work, where continuous training and adaptation will be key to successfully facing the challenges posed by the Fourth Industrial Revolution. The future of work does not belong to machines, but to those who know how to integrate them ethically and strategically, turning artificial intelligence into a driver of sustainable human progress.

AI, software, and machines, in general, greatly contribute to performing repetitive and automatable tasks, as well as those requiring high accuracy and speed in the process. Therefore, the upward curve that graphs the number of new jobs associated with programming and technology will not stop anytime soon; on the contrary, the demand for specialists is increasing and will continue in the same direction as technological advancements facilitate the creation of new technologies.

In conclusion, the future of work in an increasingly AI and automation-dominated environment presents significant opportunities for those workers who stay updated and willing to adapt. While it is not necessary to fully understand the internal workings of a program or system, the ability to effectively interact with these tools becomes an invaluable skill. Workers

who develop digital competencies and familiarize themselves with new technologies not only enhance their employability but also enjoy greater flexibility and creativity in their roles. This adaptation not only allows them to optimize their performance but also provides the opportunity to contribute to innovation and the development of solutions that improve productivity and quality of life at work.

It is and will be a challenge for organizations to support workers in acquiring new digital competencies, ensuring that change is managed in such a way that employees do not perceive it as a traumatic and threatening event, but rather as a development opportunity that allows them to avoid obsolescence. This is particularly important when considering that technological advancements necessitate constant updating.

References

1. Agudelo, N., Tano, G., & Vargas, C.A. (2020). History of automation. Bogotá. 1. https://ingenierovizcaino.com/ecci/aut1/corte1/articulos/Historia%20de%20la%20Automatizacion.pdf
2. Aguerrevere, G., Amaral, N., Bentata, C., & Rucci, G. (2020). Labor Market Skills Development in the context of COVID-19. Inter-American Development Bank. http://dx.doi.org/10.18235/0002323
3. Alcaraz-Calero, J. M., Hernández-Molinero, L. D., & Paredes-Moreno, S. (2011). Sistema de Generación Personalizada de Ejercicios de Lógica Computacional [Customized Generation System for Computational Logic Exercises]. In XVII Jornadas de Enseñanza Universitaria de la Informática: JENUI 2011: Actas: Sevilla, 5 al 8 de julio de 2011 (pp. 413-420). Universidad de Sevilla. https://aenui.org/actas/pdf/JENUI_2011_049.pdf
4. Ardila-Osma, J. A., Salcedo-González, E. F., Pedraza-Aguirre, C. A., & Saavedra-Melo, M. Á. (2020). Revisión sobre hacking ético y su relación con la inteligencia artificial [Review on ethical hacking and its relation to artificial intelligence]. Revista RETO, 8(1), 11-21. https://doi.org/10.23850/reto.v8i1.3064
5. Argüello-Verbanaz, S. (2019). The effects of automation on labor. Technological unemployment, labor market polarization and public policy. BCN, Nº SUP: 118.701. https://obtienearchivo.bcn.cl/obtienearchivo?id=repositorio/10221/26941/1/Los_efectos_de_la_automatizacion_sobre_el_trabajo.pdf
6. Bankins, S., Ocampo, A. C., Marrone, M., Restubog, S. L. D., & Woo, S. E. (2023). A multilevel review of artificial intelligence in organizations: Implications for organizational behavior research and practice. Journal of organizational behavior. https://doi.org/10.1002/job.2735
7. Barona-Vilar, S. (2019). Artificial intelligence or the algorithmization of life and justice: solution or problem?. Bolivian Journal of Law, 28, 18-49, https://ssrn.com/abstract=3510300
8. Benhamou, S. (2022). The transformation of work and employment in the age of artificial intelligence: analysis, examples and questions. Project Documents (LC/TS.2022/85), Santiago, Economic Commission for Latin America and the Caribbean, Santiago, Chile. (CEPAL). https://hdl.handle.net/11362/47985
9. Bessen, J., Goos, M., Salomons, A., & van den Berge, W. (2019). Automated feedback: what happens to workers in companies that automate?. Boston University School of Law research paper on law, economics and law, 19(2). https://scholarship.law.bu.edu/faculty_scholarship/584
10. Calvo, J. (2020). Journey into the future of business: How to compete in the era of moonshot

leadership and exponential organizations]. Libros de Cabecera.
11. Chollet, F. (2021). Deep Learning with Python. Shelter Island, Manning Publications.
12. Cisneros-Zúñiga, C. P., Jiménez-Martínez, R. C., & Andrade-Santamaría D. R. (2023). The impact of new technologies and artificial intelligence on employment in the legal sector. University and Society, 15(S1), 637-646. https://rus.ucf.edu.cu/index.php/rus/article/view/3847
13. Coloma-Garofalo, J. A., Vargas-Salazar, J. A., Sanaguano-Guevara, C. A., & Rochina- Chisag, Á. G. (2020). Artificial intelligence, intelligent systems, intelligent agents. RECIMUNDO: Scientific Journal of Research and Knowledge, 4(2), 16-30. https://dialnet.unirioja.es/servlet/articulo?codigo=7591558
14. Coronado-Medina, A. Arias-Pérez, J., & Perdomo-Charry, G. (2023). Effect of technological turbulence generated by artificial intelligence on product innovation: the role of strategic orientation to digitization. Innovar. 33(89). https://doi.org/10.15446/innovar.v33n89.107036
15. Corvalán, J. G. (2018). Artificial intelligence: challenges and opportunities - Prometea: Latin America's first artificial intelligence at the service of justice. Revista De Investigações Constitucionais, 5(1), 295–316. https://doi.org/10.5380/rinc.v5i1.55334
16. Dabbous, A., & Boustani, N.M. (2023). Digital explosion and entrepreneurship education: Impact on promoting entrepreneurial intention for business students. Journal of Risk and Financial Management, 16(1), 27-48. https://doi.org/10.3390/jrfm16010027
17. Deloitte (2018). The age of automation. Deloitte Con-sulting Group S.C. 2017. https://www2.deloitte.com/content/dam/Deloitte/gt/Documents/technology/180605-Robotics.pdf
18. Dominia, G., Grazzib, M., Moschellac, D., & Treibich, T. (2022). Threats and opportunities in the digital age: automation peaks and employment dynamics. Research policy, 50(7). https://doi.org/10.1016/j.respol.2020.104137
19. Domingo-Jaramillo, C. (2021). Use of the facial recognition system to ensure public security. The Digital Criminalist, 9, 20-37. http://revistaseug.ugr.es/index.php/cridi/article/view/20899
20. Estévez, E. C., Linares, S., & Fillottrani, P. (2020). PROMETEA: Transforming the administration of justice with artificial intelligence tools. Publisher: IDB. https://ri.conicet.gov.ar/handle/11336/183777
21. Garrido, Á. (2020). Advances in artificial intelligence. Dykinson, 61 – 28015. http://digital.casalini.it/9788413246604
22. Granados-Ferreira, J. (2022). Analysis of artificial intelligence in labor relations. CES Law Magazine, 13(1), 111-132. https://doi.org/10.21615/cesder.6395.
23. Hernández-González, O. (2021). Approach to the different types of non-probabilistic sampling that exist. Cuban Journal of General Comprehensive Medicine, 37(3), e1442. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21252021000300002&lng=es&tlng=es
24. Marcillo-Pin, K. R., Cevallos-Ponce, A. A., & Gutiérrez-Cevallos, R. X. (2023). Implications of artificial intelligence in higher education. REFCalE: Revista Electrónica Formación y Calidad Educativa, 11(2), 15-27.
25. http://refcale.uleam.edu.ec/index.php/refcale/article/view/3742
26. Martin, S. L., Javalgi, R. G., & Ciravegna, L. (2020). Marketing capabilities and international new venture performance: The mediation role of marketing communication and the moderation effect of technological turbulence. Journal of Business Research, 107, 25-37. https://doi.org/10.1016/j.jbusres.2019.09.044
27. Martínez-Marín, J. M., & Muñoz-Moreno, J. L. (2018). Learning in organizations of the digital era: alternatives from training and for transformation. Editorial UOC.
28. Medinaceli-Díaz, K. I., & Silva-Choque, M. M. (2021). Impact and regulation of Artificial Intelligence in the healthcare field. IUS Journal, 15(48), 77-113.

https://doi.org/10.35487/rius.v15i48.2021.745
29. Melnychenko, S., Lositska, T., & Bieliaieva, N. (2021). Digitalization of the hr- management system of the enterprise in the context of globalization changes. Problems of theory and practice of financial and credit activity, 6(41), 534 - 543. https://doi.org/10.18371/fcaptp.v6i41.251527
30. Moore, P. V. (2019). Artificial intelligence in the work environment. Challenges for workers. Working in the age of data (93-105). https://www.bbvaopenmind.com/articulos/inteligencia-artificial-en-entorno-laboral-desafios-para-trabajadores/
31. Monteiro-Pessoa, R. (2019). Labor law 4.0: Artificial intelligence and professional issues in the Brazilian legal profession. Chilean Journal of Law and Technology, 8(1), 167- 183. http://dx.doi.org/10.5354/0719-2584.2019.51276
32. Pedró, F. (2020). COVID-19 and higher education in Latin America and the Caribbean: effects, impacts and policy recommendations. Carolina Analysis, 36(1), 1-15. https://dialnet.unirioja.es/servlet/articulo?codigo=7642921
33. Porcelli, A. M. (2020). Artificial intelligence and robotics: their social, ethical and legal dilemmas.]. Global Law. Studies on law and justice, 6(16), 49-105. https://doi.org/10.32870/dgedj.v6i16.286
34. Pérez-Gázquez, I. M. (2022). Technology, Employment, and Social Welfare: technology training as an element of inclusion. Sociology of Work, (101), 361-368. https://dialnet.unirioja.es/servlet/articulo?codigo=8672186
35. Ripani, L., & Soler, N. (2021). The impact of automation, beyond borders. Labor Factor. https://blogs.iadb.org/trabajo/es/el-impacto-de-la- automatizacion-mas-alla-de-las-fronteras/
36. Román, A. M. (2023). Artificial intelligence in qualitative analysis. Well-being in culture. A look from the empirical and the episteme]. https://antonioroman.info/inteligencia-artificial-en-el-analisis-cualitativo/
37. Rouhiainen, L.P. (2018). Artificial Intelligence.101 things you need to know about our future today. Editorial Planeta.
38. Sadin, É. (2020). Artificial intelligence or the challenge of the century: anatomy of a radical antihumanism. Caja negra.
39. Sanabria-Navarro, J., Silveira-Pérez, Y., Pérez-Bravo, D., & de-Jesús-Cortina-Núñez, M. (2023). Incidences of artificial intelligence in contemporary education. Comunicar, 77, 97-107. https://doi.org/10.3916/C77-2023-08
40. Segarra-Saavedra, J., Cristòfol, F. J., & Martínez-Sala, A. M. (2019). Artificial intelligence (AI) applied to news reporting and sports journalistic writing. The case of BeSoccer. Doxa Communication, 29, 275-286. https://doi.org/10.31921/doxacom.n29a14
41. Schwab, K. (2016). The Fourth Industrial Revolution. Penguin Random House Grupo Editorial España.
42. Serret, O. (2023). IA power. https://www.linkedin.com/pulse/la-potencia-de-ai-oscar-serret
43. Slavec-Gomezel, A., & Aleksić, D. (2020). The relationships between technological turbulence, flow experience, innovation performance and small firm growth]. Journal of Business Economics and Management, 21(3), 760-782. https://doi.org/10.3846/jbem.2020.12280
44. Trajtenberg, M. & Bresnahan, TF, (1992). General Purpose Technologies: "Growth Engines" Tel Aviv, 16-92. https://ideas.repec.org/p/fth/teavfo/16- 92.html
45. Zhang, X.D. (2020). Machine learning. In: A matrix algebra approach to artificial intelligence. https://doi.org/10.1007/978-981-15-2770-8_6