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Article

Research trends on the relationship between skills, technologies and employment prospects

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Abstract: The multifaceted nature of the skills required by new-age professions, reflecting the dynamic evolution of the global workforce, is the focal point of this study. The objective was to synthesize the existing academic literature on these skills, employing a scientometric approach . This involved a comprehensive analysis of 367 articles from the merged Scopus and Web of Science databases. Science. We observed a significant increase in annual scientific output, with an increase of 87.01% over the last six years. The United States emerged as the most prolific contributor, responsible for 21.61% of total publications and receiving 34.31% of all citations. Using the Tree algorithm of Science (ToS), we identified fundamental contributions within this domain. The ToS outlined three main research streams: the convergence of gender, technology, and automation; defining elements of future work; and the dualistic impact of AI on work, seen as both a threat and an opportunity. Furthermore, our study explored the effects of automation on quality of life, the evolving meaning of work, and the emergence of new skills. A critical analysis was also conducted on how to balance technology with humanism, addressing challenges and strategies in workforce automation. This study offers a comprehensive scientometric view of new-age professions, highlighting the most important trends, challenges, and opportunities in this rapidly evolving field.

Keywords: scientometric analysis; new era professions; academic collaboration; publication trends; workforce evolution; emerging skills

JEL: O33; J24; J21

1. Introduction

Changes in the global economy, high unemployment levels, wage disparities, and technological advances underscore the need to understand how to regulate or leverage technology for the benefit of people. It is also essential to identify the skills that future workers need to compete in a global economy, improve their wages and quality of life, and simultaneously strengthen organizational competitiveness (Joyce et al., 2023). Disruptive technologies are a response to the fourth industrial revolution, which addresses resource scarcity and the need to integrate the technical with the social. This is based on the integration of communication technologies and computer tools with production, opening up previously unknown spaces. These changes imply labor, social, economic, and cultural adjustments; as well as a fracture in the curricula and the need for change that guides knowledge management, as well as the creation of new programs that relate these disruptive changes, and the fact is that what is disruptive is not small changes, but rather a profound revolution of substitution of some technologies for others (Da Costa et al, 2025) .

The advancement of disruptive technologies has impacted organizations of all sizes, requiring an understanding of the importance of acquiring specific skills in disruptive technologies to access new job opportunities and close gaps (Lloyd & Payne, 2023). In the 4.0 society, economic wealth is constituted through the proper use of information and the management of emerging technologies (González et al., 2020). Likewise, new professionals directly and indirectly influence economic diversity and the reduction of recession. Therefore, it is crucial to understand, through studies and research, how to guide students completing their secondary education towards the selection of programs with promising futures (Lott & Abendroth, 2022). Furthermore, Reyes et al. (2023) present strategies for labor integration, emphasizing the need to overcome barriers that impede the adoption of technology, promote innovation, and find strategic allies to face the challenges of the fourth industrial revolution (Cunliffe, 2021).

In the 4.0 revolution, artificial intelligence has impacted the future of work and each of its areas, both knowledge and operational, with opportunities as well as challenges. The speed in performing actions and tasks, instant queries, and the automation of many processes have led to increased productivity and efficiency, better salaries for positions with specific profiles and labor demands. However, a change in the demand for people is also taking place. Some jobs require more workers, while others are at risk, especially those in office administration, maintenance, financial operations, architecture, sales, and legal professions. According to the above, reallocation to other areas will occur, and new curricula will be created for differential professions with new skills demanded by the workforce. (Zazueta-López, 2024).

Likewise, it is undeniable that the use of artificial intelligence demands governance frameworks or processes that guarantee ethics and security for both the data and information handled, as well as responsible decision-making over time. Effective governance requires reliability, explainability and transparency, privacy, and data protection (Viguri, 2024).

The questions that guided the research were the following: (a) What are the main research trends or lines of inquiry into the relationship between skills, technologies, and employment prospects? (b) How has scientific production on these topics evolved between 2015 and 2022? (c) What types of skills stand out as most relevant in recent scientific literature?

Research on new professions is recent and has a significant social impact. However, there is little scientific literature on the subject. The identified reviews focus on specific areas such as education and administration, and curriculum changes to address the future, but not on the core skills that professionals, regardless of their field of practice, must possess to enable them to perform better. Therefore, the purpose of this article is to identify the main theoretical trends regarding the skills required by future professionals to perform effectively. To address the study, three specific trends that emerged from 2015 to 2022 were identified in the bibliometric review: the convergence of gender, technology, and automation; the impact of artificial intelligence on work; and the balance between technology and humanism. Based on these trends, it was possible to explore the knowledge gaps currently required, such as digital transformation, Industry 4.0, data analytics, robotics, machine learning, automation, and digital marketing. All of these have been implemented in all economic

sectors, requiring core skills (not just engineering skills), such as the use and technological adaptability of 4.0 tools and artificial intelligence, digital skills, cooperative and networked work, the development of innovative, creative, and complex thinking, ethical and social responsibility principles, data management and interpretation, and the integration of results into decision-making.

2. Methodology

This research uses scientometric methods to analyze publications from the period between 2000 and 2022, focusing on the evolving field of new-age professions. The documents analyzed were meticulously obtained from the Web of Science databases. Science (WoS) and Scopus. These databases are widely recognized for their comprehensive coverage across diverse knowledge domains, making them well-suited for scientometric analysis (Mohd et al., 2023; Gómez and Vivares, 2024). The methodology adopted in this study reflects approaches described in several seminal works (Hincapié-Naranjo et al., 2024). Table 1 of the manuscript lists key terms frequently associated with new-age professions, providing a basis for our analysis. A total of 367 unique documents were identified in both WoS and Scopus, underscoring the depth and breadth of research in this area.

This study aligns with contemporary scientometric techniques that promote the fusion of multiple database sources (Grisales & Zuluaga, 2023., Botero & Robledo, 2023., Robledo-Giraldo, 2024). This approach not only improves the comprehensiveness of the analysis but also offers a more comprehensive understanding of the trends, challenges, and advancements in the field of new-age professions.

Table 1. Comparative analysis of search parameters and results between Web of Science and Scopus for literature on new-age professions (2015–2022).

Parameter	Science web	Scopus
Range	2015–2022	
Date.	6 November 2023	
Document type	Article, book, chapter, conference proceedings	
Words	Title: “new age professions” OR “professions of the future” OR “emerging professions” OR “new age jobs” OR “future of work” AND Title-summary-keywords “digital transformation” OR “automation” OR “technological impact” OR “skills gap”	
Results	178	328
Total (Wos+Scopus)		367

WoS databases is complex due to their distinct formats. For example, Scopus provides comprehensive reference data, albeit with varying organizational structures depending on the type of reference, such as articles or books. WoS, on the other hand, includes DOIs (Digital Object Identifiers) in its references, making it easier to add supplementary information such as authors, titles, and journal names using web scraping techniques. The culmination of this meticulous data cleaning work is a comprehensive Excel file, composed of 22 sheets. Each sheet contains systematically organized data, essential for performing a comprehensive scientometric analysis and applying the Tree of Science (ToS) algorithm (Robledo & Duque-Uribe, 2022). This structured data format allows for more efficient and effective analysis, laying a solid

foundation for exploring the nuances of new-age professions through scientometrics (Urina-Triana, 2024, Hernández Ramírez et al., 2024, and Quintero-Arango, 2024), as shown in **Figure 1**.

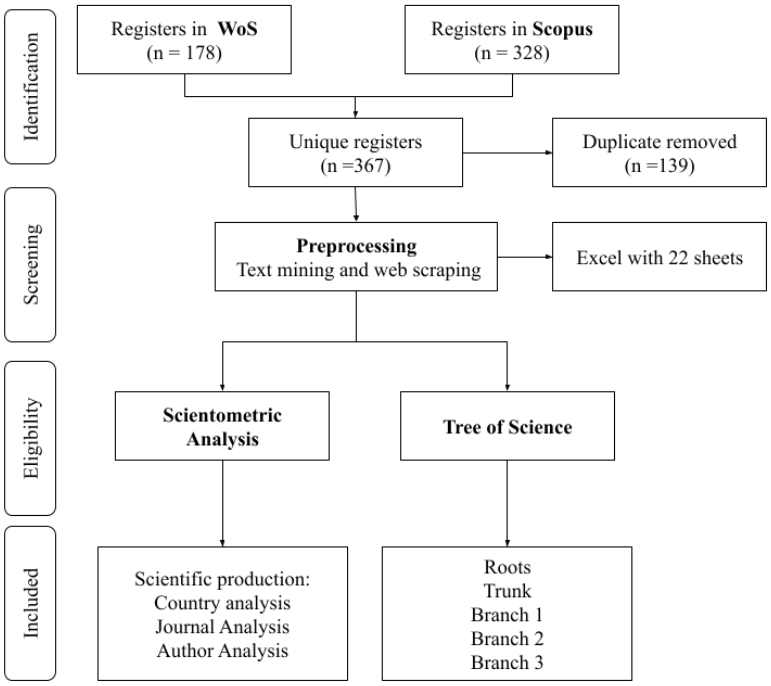

Figure 1. Flowchart of the methodology for scientometric analysis and structuring of the science tree in research on new-age professions.

3. Results

The results found in the scientometric study with the inclusion of a tool for the construction of a science tree (Tree of Science or ToS) allowed Demonstrate research trends in the subject of study over the years, emerging trends, a mapping of collaborative networks on research, knowledge gaps, and decision-making that can be considered in the area of study. Authors and countries that have articulated knowledge management, their citation networks, and theoretical connections are also presented, as well as an understanding of emerging proposals regarding skills and competencies for new jobs. These results are presented below:

A review of trends in the skills and competencies required for entry into future high-demand jobs in business reveals a substantial increase in productivity between 2015 and 2022, with an annual increase of over 80% in recent years, significantly impacting citations and the h-index. Most of this productivity is found in the Scopus database. The United States and the United Kingdom lead in productivity, followed by Germany and Australia, forming a well-connected collaborative network with four clusters that demonstrate strength and proximity. Journals with the highest quartile impact include Human- Computer. Interaction, New Technology, Work and Employment, and Technology in Society. The most productive author is Rauscher N of the University of Heidelberg, Germany, although the most cited author is Bültmann U of the University of Heidelberg, Germany. Medisch Centrum Groningen, Netherlands.

Regarding the tree of science, the power of technology in organizations is so profound that many positions have been replaced by tools such as artificial intelligence, increasing the vulnerability of workers with lower educational levels. To mitigate the risks posed by emerging technologies, ethical oversight of their application is considered essential, with a shift in organizational focus from objectives to employees, allowing room for creativity and leisure. Constant updating in the use of new technologies is also considered necessary.

3.1. Scientometric analysis

3.1.1. Scientific production

Figure 2 compares scientific output related to the topics of technological advances, skills, and the future of work between 2015 and 2022, along with the total number of times these publications have been cited. The figure presents three types of data. The red line represents the total number of publications, revealing a progressive increase in scientific output, with significant growth from 1 to 109 publications over the study period. The bar graph represents the total number of publications in the Scopus (green) and WoS (yellow) databases annually, demonstrating that the former consistently outperforms the latter by 80.27% throughout the study period. Scopus has 265 scientific outputs, while WoS only has 147. The purple line records the total number of citations, indicating a significant increase between 2017 and 2019, peaking in 2019 with 2070 citations. However, from 2019 to 2022, the total number of citations gradually decreased, which may be due to the fact that publication interest during the pandemic may have focused on topics such as teleworking, casework, and the impact of the coronavirus. It is worth noting that, compared between the two databases, the total citations between 2020 and 2022 have remained relatively stable.

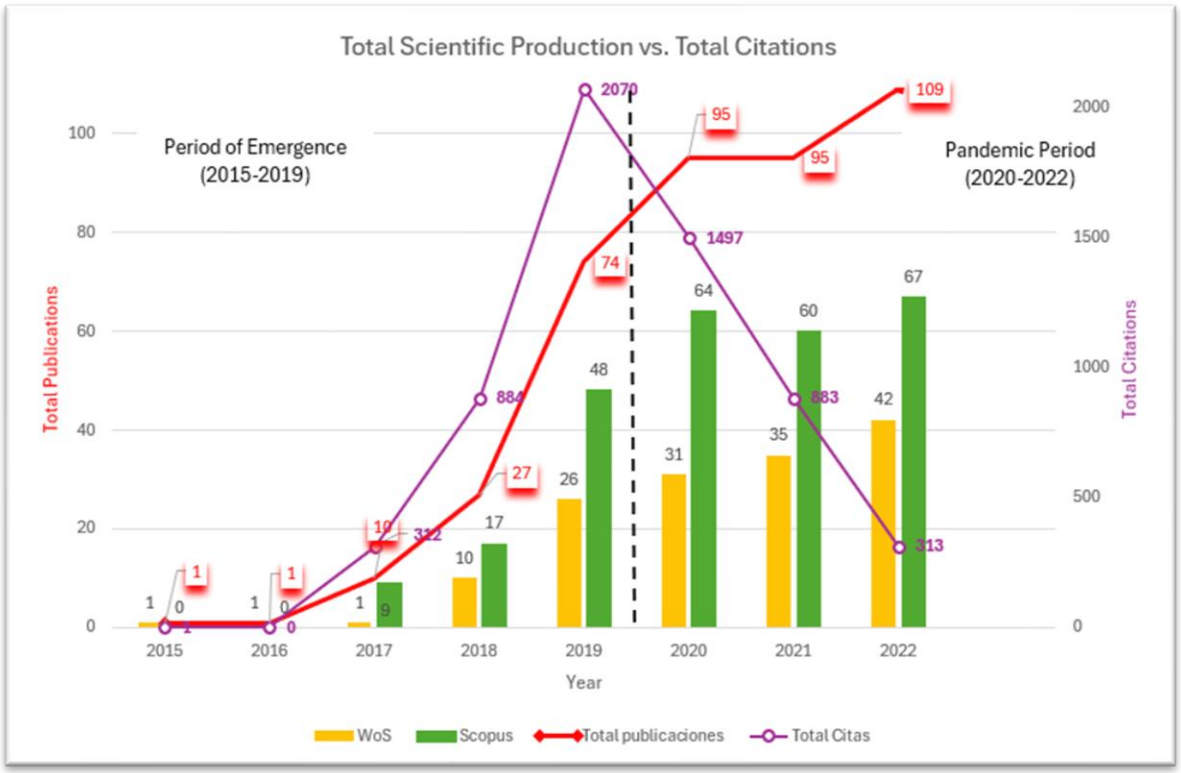

Figure 2. Trends in Scientific Production and Citations for New Era Professions: A Comparative Analysis of Scopus and Web of Science (2015–2022).

- **Period of appearance of AI in scientific productions (2015–2019)**

A detailed review of publications related to new skills, AI, and the future of employment reveals that among the most cited publications is the article "AI: Towards Understanding the Impact of Artificial Intelligence on Work" (Frank et al., 2019), with a total of 193 citations. This article addresses the challenges of predicting and measuring how AI and automation will impact the future of work in terms of productivity, employment, and new occupations. Given the uncertainty posed by these technological changes, it proposes building a resilience-based decision-making framework. The second article with 146 citations is "Human-AI Collaboration in Data Science: Exploring Data Scientists' Perceptions of Automation" (Wang et al., 2019), which explores data scientists' perceptions, attitudes, and expectations regarding the impact of AutoAI and AutoML technologies, the automation of some of their tasks, and their future in the labor market. In short, the future of work will involve human-AI collaboration.

- **Pandemic period: a leap toward intelligent work automation (2020–2022)**

During the pandemic period, the citation rate was 6.90%, with the academic publication "The influence of the COVID-19 pandemic on the digital transformation of work" (Nagel, 2020) standing out with a total of 109 citations. This publication demonstrates how the COVID-19 pandemic accelerated the digital transformation in the workplace, reflected in the increase in teleworking, concerns about task automation, and optimism about future job security. From the above, it can be concluded that digital transformation has a positive impact on society if governments and companies prepare and adapt to these changes. "Will COVID-19 be the tipping point for intelligent work automation? A review of the debate and its implications for research" (Coombs, 2020) is the second most cited scientific publication (90) during this period. The article presents arguments for and against whether the COVID-19 pandemic will be a catalyst for greater adoption of intelligent work automation. The debate highlights that COVID-19 can offer opportunities to advance AI, promoting efficiency, innovation, competitiveness, and quality. However, challenges remain, such as equity, ethics, security, and privacy.

It is worth noting that the increasing impact of research in artificial intelligence and the future of work coincides with evolutionary aspects of the same, such as the launch of OpenAI's GPT-3, which demonstrates unprecedented capabilities in text generation and natural language understanding, the viralization of the GPT chat, and the generation of images from textual descriptions. The replacement of repetitive tasks is also being strengthened, creating new knowledge gaps for researchers to explore (Zuñiga, 2024).

The incorporation of generative AI has sparked various debates, including whether AI will replace workers or complement them; whether a reconfiguration of human capital is required; whether those who do not use it will feel displaced; and the relationship between its application in well-being and equity. In this regard, Brynjolfsson et al., 2025 They argue that generative AI should be understood as a complement rather than a threat, especially for less experienced employees. However,

it's important for employees to stay up-to-date so as not to be displaced. Regarding knowledge management, however, there may be a reconfiguration when talking about tacit knowledge. This doesn't only reside in people, the author asserts, but can also be located in AI, and it can be obtained through good prompt management and digital skills. The author emphasizes the importance of maintaining employee creativity and autonomy, critical thinking, and empathy.

3.1.2. Country analysis

Considering **Table 2**, the analysis reveals that the leading countries in the field of study show considerable interest, particularly in the United States and the United Kingdom, whose production frequency is notably represented in the upper quartiles of publications. In the case of Germany, with its Dual Learning model, the main emphasis is on second-quarter journals, while Australia also shows a trend toward a higher number of first-quarter publications. Emerging economies such as India have begun to gain prominence with publications in all four quartiles, indicating that a significant portion of their research could have domestic impact in the coming years. Notably, while the Netherlands still has a lower production on the topic compared to others, it has begun to gain prominence in its first-quarter publications.

Table 2. Distribution by country of scientific production and citations in New Era Professions research with quartile classifications.

Country	Production		Citation		Q1	Q2	T3	T4
USA	75	21.61%	1290	34.31%	23	10	4	3
United Kingdom	47	13.54%	677	18.01%	15	3	1	1
Germany	37	10.66%	463	12.31%	4	7	4	4
Australia	23	6.63%	208	5.53%	7	3	0	1
India	15	4.32%	132	3.51%	2	4	4	1
Canada	13	3.75%	118	3.14%	4	1	0	0
Finland	10	2.88%	80	2.13%	0	2	0	0
Netherlands	10	2.88%	51	1.36%	3	1	0	1
Spain	9	2.59%	78	2.07%	1	3	1	0
Belgium	8	2.31%	49	1.3%	1	2	0	2

In parallel to the aforementioned trends, recent research in the United States by authors such as Sader (2023) highlights the importance of higher education in addressing the challenges posed by the labor market in the face of emerging technologies. In the case of the United Kingdom, as Liu (2023) highlights, the use of digital technologies can contribute to the dehumanization of work, which underlines the importance of implementing policies to mitigate the effects of digital Taylorism. The German perspective, articulated by Knappertsbusch and Gondalach (2023), gives importance to data protection, labor legislation, and electronic personality as key variables when integrating AI into the world of work. In Australia, according to Pang et al. (2023), the focus is on the integration of educational approaches in the healthcare sector to empower people in the use of enabling technologies 5.0 (Internet of Things, artificial intelligence, machine learning, blockchain, cloud computing, digital twins, collaborative robots, nanotechnology, and 6G technology).

In the Indian context, the approach, according to Kumar (2023), involves identifying the relationship between management, innovation, organizational performance, and sustainability. From the Canadian perspective, according to Wanasinghe et al. (2023), a study on the oil and gas industry suggests the possibility of merging jobs based on people's digital readiness and their ability to adopt and apply new technologies. From the Finnish perspective, according to Tokkonen et al. (2023), applied research on truck drivers and their integration with smart technologies emphasizes the development of job design models focused on user engagement. This perspective is shared by researchers in the Netherlands, where, according to Umbrello (2023), the concept of care ethics should also be included in the future of work.

The network of scientific collaboration between countries reveals the groups that they have formed over time. **Figure 3** illustrates three main groups, led by the US, the UK, and Italy, respectively. Noteworthy are the collaborative scientific efforts between countries such as the US, Switzerland, Colombia, and Uruguay (Jones & Rodriguez, 2021; Gereffi & Rossi, 2021). In the second group, the collaborative work between the UK and Mexico stands out, proposing guidelines for the creation of human-centered work based on technological developments (Moencks et al., 2022). The nodes and links in the graph represent the proportions of new countries and collaborations over time. The graph indicates that the line of new links is growing significantly, surpassing that of nodes, showing the consolidation of an academic community focused on new professions.

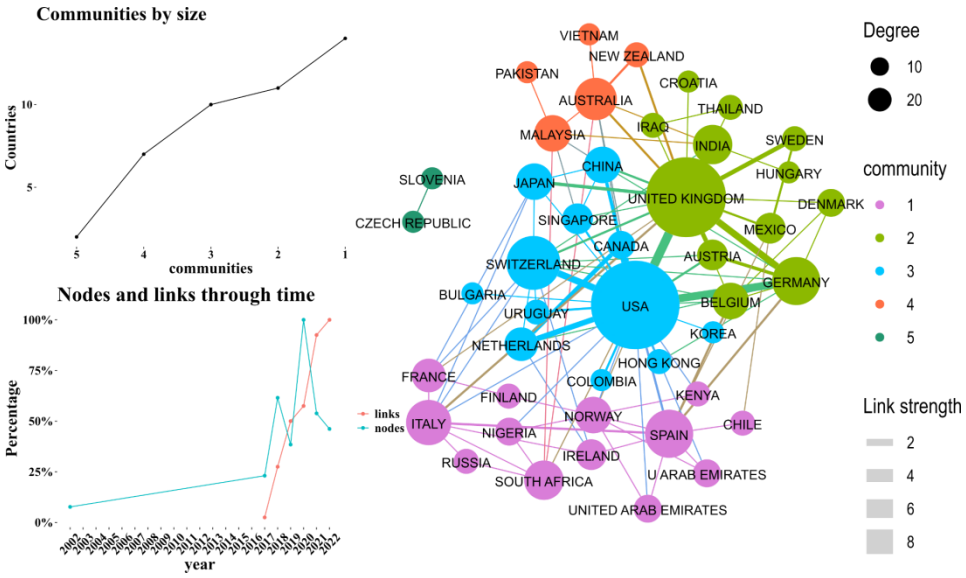

Figure 3. Visualization of global research communities, network dynamics, and collaborative linkages in new-age professions over time.

3.1.3. Journal analysis

WoS and Scopus databases, related to the topic of the study, along with its location in the quartile and its h index. The journals with the highest impact in the quartiles are Human- Computer Interaction, New Technology, Work And Employment, and Technology In Society, all located in the 1st quartile. In terms of impact factor, New Technology, Work And Employment outperforms the others, while Technology In Society stands out in terms of h-index. It is worth noting that

most of the journals publish more frequently in the Scopus database than in WoS, with the exception of International Labour Review, as shown in **Table 3**.

Table 3. Key journals in new-age professions research: Web of Content distribution Science and Scopus, with impact factors and H-index metrics.

Diary	Wos	Scopus	Impact factor	H-index	Quantile
International Labour Review	10	7	0.6	50	Q2
Proceedings of the ACM on Human-Computer Interaction	0	8	0.72	50	Q1
New technologies, work and employment	0	6	1.67	56	Q1
Technology in society	6	6	1.49	69	Q1
Computer Science Notes (including the subseries "Artificial Intelligence Notes" and "Bioinformatics Notes")	0	5	0.32	446	T3
Lecture notes on networks and systems	0	5	0.15	27	T4
Advances in intelligent systems and computing	0	4	-	58	-
Contributions to the economy	0	4	0.1	24	T4
ACM International Conference Proceedings Series	0	3	0.21	137	-
Proceedings of the Conference on Human Factors in Computing Systems	0	3	0.71	216	-

The characteristics of the main journals allow us to identify a differentiating factor between them. “Human-Computer Interaction” is published by Taylor and Francis. Its objective is to understand the interaction between computers and people, covering areas of study such as psychology, applied psychology, computer science, and human-computer interaction. As for “New Technology, Work And Employment”, its purpose is to publish articles from perspectives related to the changing nature of new technologies, labor dynamics and relations. It is based in the United Kingdom and is published by Wiley-Blackwell Publishing Ltd., with subject areas that include business, management and accounting, and social sciences. On the other hand”, Technology in Society” is an international journal dedicated to global discourse at the intersection of technological change and the social, economic, business, and philosophical transformation of the world around us. The journal seeks to understand the role of technology in society through economic, political, and cultural dynamics, as well as the role of society in the use of technology. It is published by Elsevier Ltd., and its subject areas include international business and management, education, human factors, ergonomics, and political science.

Regarding the topics published on the object of study, in the magazine “Human-Computer In “Interaction”, articles address the role of human labor in automation and artificial intelligence (Långstedt & Hellström, 2023). In the journal “New Technology, Work And Employment”, recent work relates technologies to the economy and social relations, gender and the state (Howcroft & Taylor, 2023). In the journal “Technology in Society”, recent work focuses on how technologies and innovation are impacting working life and the future of work, requiring a cultural transformation (Långstedt & Hellström, 2023).

Figure 4 was constructed based on citations across journals and shows the three most significant (largest) clusters. The first cluster addresses articles related to the public policies needed for new professions (Stephany & Teutloff, 2024; Belloc, 2022; Hunt & Warhurst, 2022; Jeffrey, 2021). The second cluster of journals addresses topics related to the specific implications of automation and technologies in the work

environment (Howcroft & Taylor, 2023; Howcroft & Rubery, 2021). The third cluster focuses on a technological topic at work, for example, debates about how artificial intelligence and digital transformation will change the definition of work (Laato, 2021; Singh & Tarkar, 2022).

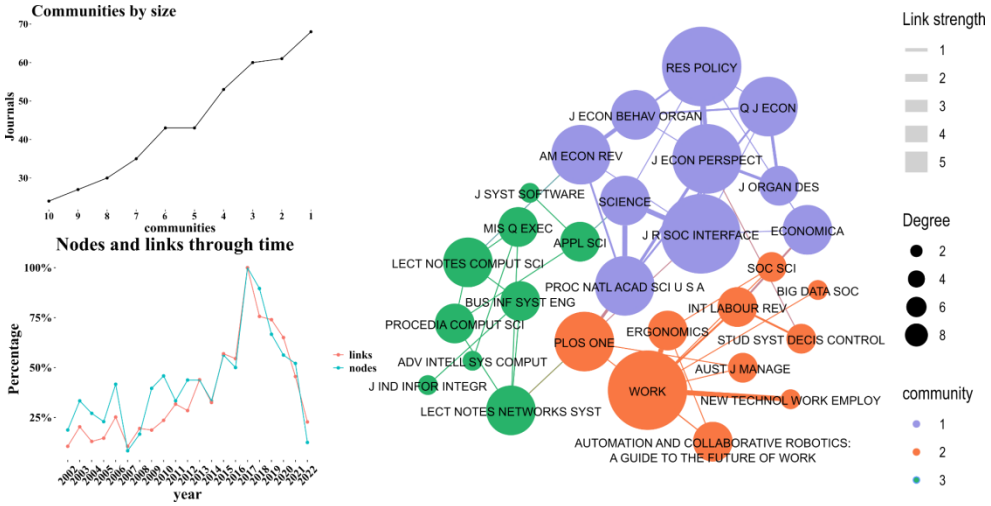

Figure 4. Analysis of the size of research communities, the temporal dynamics of network nodes and links, and the interconnectivity of journals in the study of new-age professions.

3.1.4. Collaboration network between authors

Table 4 shows the article production per author, considering skills, technological competence, and employment prospects. Authors are ordered from highest to lowest according to the total number of articles published in Scopus and WoS. The table also includes each author's h-index, taking into account their institutional affiliation. The results highlight that Dr. Rauscher is the author with the highest number of published articles, with a total of 5 publications. Dr. Bültmann has the highest h-index, with 56. Most authors are affiliated with institutions in Germany, Spain, the United States, and Canada.

Table 4. Academic production of the main authors in the research on new-age professions with Scopus h-index and institutional affiliations.

No	Researcher	Total items*	Scopus h-index	Affiliation
1	Rauscher N	5	1	University of Heidelberg, Heidelberg, Germany
2	Aloisi A	4	3	That is, University, Segovia, Spain
3	Banks C	4	3	Haas School of Business, Berkeley, United States
4	Benanav A	4	-	-
5	Bonaccio S	4	17	Telfer School of Management, Ottawa, Canada
6	Bültmann U	4	56	University Medisch Centrum Groningen, Groningen, Netherlands
7	Gignac M	4	42	Toronto Institute for Work and Health, Toronto, Canada
8	Howcroft D	4	29	Alliance Manchester Business School, Manchester, United Kingdom
9	Jetha A	4	16	Toronto Institute for Work and Health, Toronto, Canada
10	Norman C.	4	23	Cense Ltd., Toronto, Canada

Dr. Rauscher is an important contributor to the generation of new knowledge. In his article, he delves into technological advances in various professions in the United States, highlighting the exponential growth of process automation and the rise of the

platform economy (Rauscher, 2021). On the other hand, Dr. Bültmann, with the highest h-index, has made notable progress in teamwork. His research focuses on the workforce inclusion of young people with disabilities, considering their perceptions of the future of work, participation, and employment opportunities, particularly in the context of technology management (Jetha, A., et al., 2023). These studies offer valuable insights into how technology and workforce inclusion might interact and evolve in the future.

Figure 5 was constructed from the personal networks (ego networks) of each researcher in **Table 4**. The collaboration network has three components, the first being the most prominent. This group predominantly includes researchers from Canada, the Netherlands, and the United States, such as Arif Jetha, Silvia Bonaccio, Ute Bültmann, Monique A.M. Gignac, Cameron Norman, and Cristina G. Banks. These researchers have published the analysis of inequalities in the employment of people with disabilities (Jetha, A., et al., 2023) and the inclusion of older adults with disabilities (Jetha, A., et al., 2023). The figure of nodes (authors) and links (collaborations) over time reveals that the proportion of links to nodes has increased significantly after 2016. This means that the community has been strengthened through repeated collaborations between the same authors (Robledo, Eider, & Duque-Uribe, 2022).

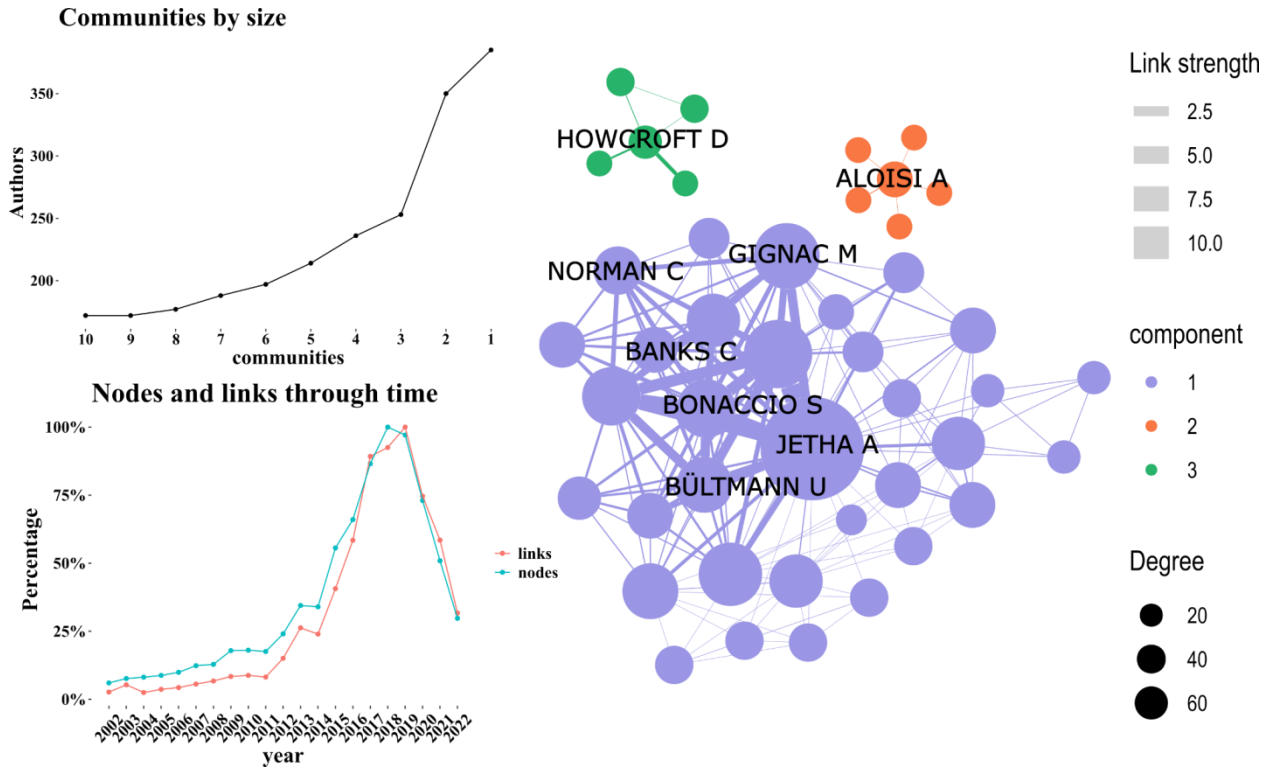

Figure 5. Analysis of collaborative networks between authors and community development in research on new-age professions.

4. Tree of knowledge

Figure 6 illustrates the overall thematic structure of the research field on new-age professions, based on a co-occurrence and citation analysis of the selected documents. This visualization highlights the main emerging subthemes that make up the Tree of Science applied in this study, providing an overview of the conceptual

roots, theoretical trunk, and thematic branches analyzed in the following sections. This thematic network was developed through citation and co-occurrence analysis, revealing the conceptual structure of the research field. The figure provides an overview of the main research groups that underpin the Tree of Science, serving as a starting point for subsequent analysis of its thematic roots, trunks, and branches.

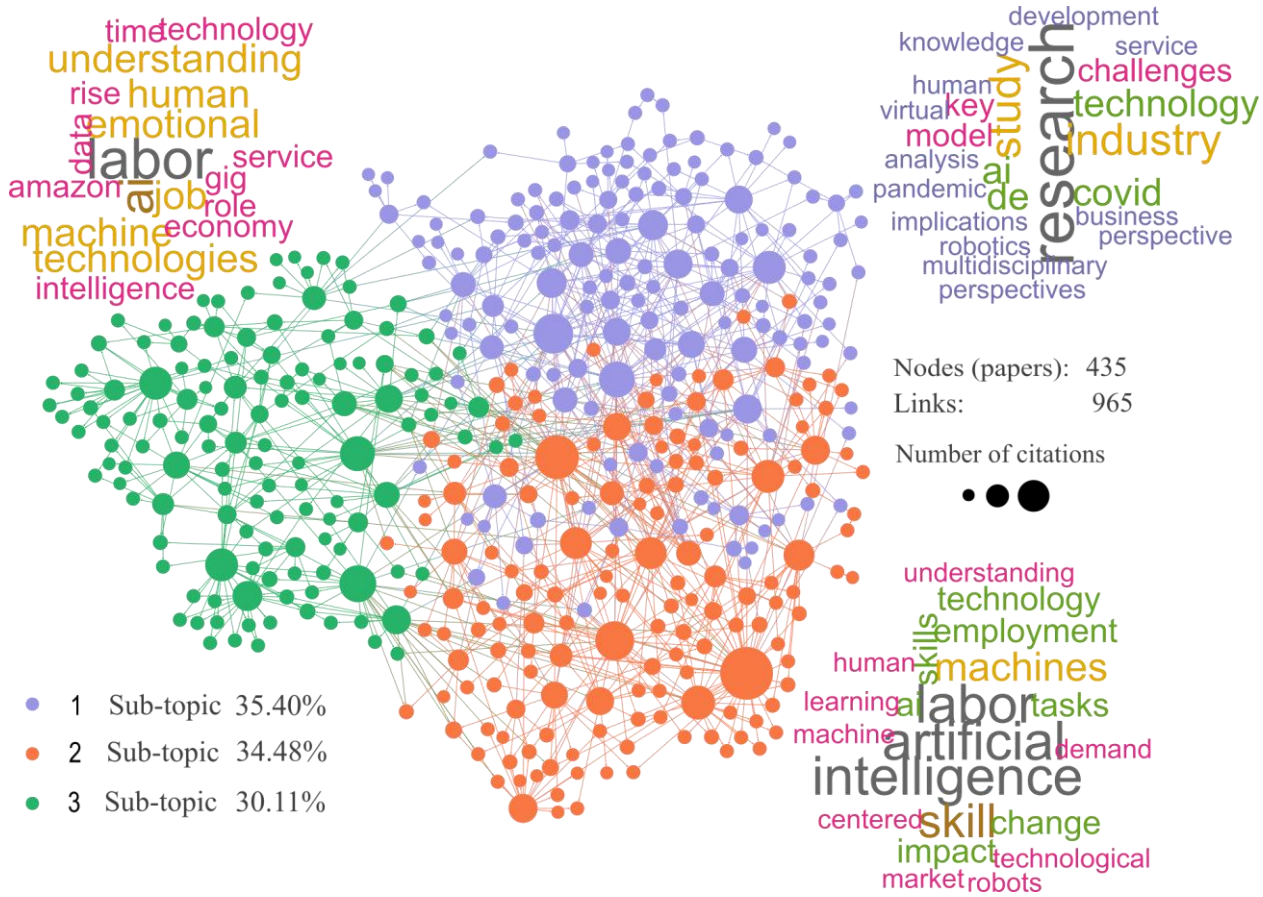

Figure 6. Visualization of thematic networks of subtopics in new age professions research based on citation and co-occurrence analysis.

4.1. Root

The main articles address the impact of technology on occupations and the new skills that must be acquired. Autor et al. (2003) examine the effects of technology on occupations, delineating tasks into routine, non-routine, routine cognitive, non-routine analytical, and non-routine interactive categories. The findings confirmed the hypothesis that technology acts more as a complement to, rather than a substitute for, routine activities. However, Frey and Osborne (2017) found that technology has the potential to replace jobs. For example, their research indicated that 47% of employees are at risk of having their tasks automated, directly impacting middle-income individuals. Therefore, the concept of work is entering a new technological era where automation overtakes human cognitive processes, rendering human labor redundant (Brynjolfsson & McAfee, 2014). In light of this, it is necessary to identify strategies for absorbing the resulting surplus labor force and educational strategies to help young people integrate into this new labor market.

A particularly compelling thesis is proposed by Dr. Martin Ford, who suggests that unlike previous industrial transformations, the advent of AI will lead to a unique industrial metamorphosis. Ford posits that both blue-collar and white-collar jobs will disappear, with the working middle class suffering the most due to rising healthcare and education costs (Ford, 2015). This thesis is championed by Professor Autor, who argues that automation also creates new demands on workers (Autor, 2015) but increases labor market polarization, inflating the number of routine jobs. This means that while automation may not threaten overall employment, it could exacerbate inequality, underscoring the need for more training for less-skilled workers (Arntz & Zierahn, 2016). It is recognized that a new industrial revolution is underway, but its impacts are still unclear and comparing it with past industrial revolutions is challenging (Schwab, 2023). However, another scenario can be envisioned where the automation of highly skilled tasks increases employment for more skilled workers, thus exerting a positive impact on wages for jobs involving low-skilled tasks (Acemoglu & Restrepo, 2018).

Given the above, it is important to clearly differentiate between automation and augmentation. While the former tends to replace work, the latter complements it. If companies prioritize automation, this will almost certainly lead to economic inequality, social gaps, demotivation, and psychosocial problems due to greater investment in technology and a prioritization of specialists in digital skills. However, prioritizing augmentation can lead to backwardness, marginalization, and low productivity. A balanced approach should integrate automation where necessary and add sustainable human value through augmentation (Lei & Kim, 2024).

On the other hand, Raisch and Krakowski (2021) propose that the dilemma is not resolved by choosing one over the other, but by learning to manage the tension between the two. To do so, they suggest that organizations develop dynamic capabilities that allow them to strategically move between automation and augmentation depending on the context, type of task, and competitive environment.

4.2. Trunk

Technology plays a fundamental role in the productive transformation of companies, with people as the foundation, developing and complementing their skills through the use of digital tools to improve the visibility of the products and services they offer (Shestakofsky, 2017). However, the exponential growth of informal platforms contributes to the erosion of formal employment, which leads to an increase in temporary jobs (Eichhorst et al., 2017). This phenomenon coincides with the perspectives of Marx and Keynes, who underline the importance of automation in optimizing production processes, thus facilitating the acquisition of products and services and generating better employment prospects (Spencer, 2018).

At the same time, barriers to artificial intelligence are emerging due to the lack of measurement models that provide real-world data on the replacement of human skills by machines. This lack makes it difficult to assess the adaptability of individual workers (Frank et al., 2019). This has led to scrutiny on the management of artificial intelligence in the workplace, particularly with regard to job losses, as it is often perceived more as a marketing model than a science-based approach (Willcocks,

2020). While artificial intelligence offers benefits, it disproportionately harms certain groups of workers, with young people, women, and people with disabilities being particularly vulnerable (Jetha et al., 2021).

Now, the big difference between humans and machines, according to Felin and Holweg (2024), is that humans not only recognize patterns but also seek explanations for phenomena through their reasoning and cognition, which allows them to generate hypotheses, while AI is correlational, they do not identify causes, only patterns, they do not apply theories or generate hypotheses. Additionally, AI does not act with purpose or values while humans imagine possibilities through abstraction (Wang et al., 2023).

- **Branch 1-Convergence between gender, technology, and automation. Elements for defining the work of the future.**

According to Souto-Otero et al. (2023), there is a relationship between technological change and labor substitution as central elements for economic development. Likewise, according to Bukartaite & Hooper (2023), in a study with Irish entrepreneurs, a relationship can be established between the development of hard and soft skills, supported in turn by the development of a philosophy of lifelong learning that should facilitate collaboration between humans and machines. On the other hand, according to Park & Kim (2022), based on the evaluation of 650 occupations and their analysis, it can be established that 15 types of endogenous tasks facilitate the development of automation processes. Categorized into 5 different criteria that will drive automation and the future of work in an era of rapid technological change, supported by the development of a dynamic management vision that addresses the development of automation risk processes and labor governance. Belloc et al. (Belloc, 2022), allows to articulate the postulates of the radical school and the contributions of institutional theory so that work design and labor governance can advance together in the development of effective automation processes using the experience of industrialized countries as a reference. This process, according to Savona et al. (2022), requires considering the impact of digital automation technologies typical of the fourth industrial revolution on task design, labor compensation, and the development of organizational development policies. Likewise, according to Allspaw (2022), regarding the use of AI in the future of professions and in the wake of COVID, it is necessary to consider how ethics influences the development and use of new technologies where human presence is not required. The situation is that, according to Kwan (2021), it should also be associated with gender management in the conception of demographic changes, social movements, scenario construction, and the political factors themselves that will have implications for the future of work. Finally, according to Nazareno & Schiff (2021), it is possible that the process of automation and artificial intelligence on workers' well-being may also be conditioned by job satisfaction, stress and job insecurity, as well as by the drivers of creative freedom and cognitive overload. A vision complemented by Piercy and Gist -Mackey (2021), when establishing that low-skilled positions will be the most likely to be affected by automation. An aspect that Jain and Ranjan (2020) support by stating that technology complements non-routine work that requires cognitive, creative and social skills, increasing efficiency, productivity and innovation. Without leaving aside

inequality and ethical responsibility in its use and incorporation into the jobs of the future.

- **Branch 2-The Impact of AI on Work: Between Threat and Opportunity. The Effects of Automation on Quality of Life, Meaning at Work, and New Skills.**

The impact of AI on the future of work is a multidimensional phenomenon with profound effects on the definition of human existence. For example, Kelan (2022) explores the relationship between increased automation of certain tasks and the generation of anxiety about potential job loss. Meanwhile, Spencer's (2023) study analyzes this impact as an opportunity to enhance other skills that open doors to tasks that offer greater autonomy, creativity, and recognition, leading to improved well-being at work and overall quality of life in society. Similarly, Siapka (2023) argues that AI can free people from routine tasks and encourage more creative and meaningful activities, becoming a prerequisite for human well-being. On the other hand, a study conducted at Amazon identified that AI algorithms deployed to improve productivity, monitor downtime, and adopt robots have resulted in a higher incidence of musculoskeletal injuries and disorders among employees (Furendal & Jebari, 2023). Therefore, Parmer (2023) suggests that jobs should be analyzed based on two theories: achievement and practice. The author proposes defining jobs from the practical theory, where the main objective is the process and not the achievement. In this way, AI would not threaten meaningful work itself. Furthermore, Barricelli et al. (2023) propose the EUDability model to combine software development and computational thinking as new skills for professionals. However, it is necessary to involve the academic world in these transformations, since a disconnect with the new skills necessary for current challenges in highly qualified professions has been identified (Alibasic, 2022). Along the same lines, Stephany and Teutloff (2024) examine the changes and impacts on the work environment as an opportunity for universities to promote continuous training and updating in digital skills, since these complement existing capabilities and facilitate adaptation to new occupations.

Given the growing relevance of the changes anticipated for new forms of organization and work in the future, it is recommended to include theoretical and practical courses to strengthen technological and industrial management. The findings suggest transforming current curricula and highlighting new programs that will be required over time. To close the gap between training and employment, university-business alliances are needed now more than ever to jointly build refresher programs, as well as new programs that incorporate technological advances to benefit the sectors and improve employability.

- **Branch 3 - Balancing Technology and Humanism: Challenges and Strategies in the Age of Workforce Automation**

The third branch delves into the advantages and disadvantages of technological implementation and the use of algorithms, covering management, human resources, and the daily work performed by collaborators. Certain tasks, particularly those with higher educational and salary levels, exhibit less potential for automation De Oliveira Teixeira et al. (2022). However, it is imperative to respond to the implementation of technology and exercise control over it Manche and Carbonell (2022). There are two ways of reacting: improving digital skills or distancing oneself from them. The latter does not seem to be the most appropriate in a constantly changing world Sako et al.

(2022). The reality is that work, as we know it today, will undergo significant changes, some positive and others not so much; for some, there will be greater freedom, while for others, unemployment will increase Granter and Aroles (2023). Therefore, there is a need to guide future professionals on prospective career paths and those that can be easily replaced by technologies Hoff et al. (2022).

On the other hand, according to Gonzàlez et al.(2018), for technological changes to manifest at all levels, professionals must skillfully manage large amounts of data and information so that they are effectively used to serve organizations (Gonzàlez et al. (2018), Another disadvantage of technology implementation, according to Weibel et al. (2023), lies in the use of untested algorithms or algorithms with margins of error, which causes a loss of confidence in the processes and creates gaps between organizational interests and those of employees. In this sense, it is essential to implement well-being, leisure, rest and family time activities. If an organization fails to take advantage of these changes for the benefit of its workers, it falls into an organizational problem known as dehumanization Liu (2023). Furthermore, human leadership cannot be replaced by technological leadership, and its application can have adverse effects on motivation and performance processes Van Quaquebeke & Gerpott (2023). Appropriate use of algorithms is required to avoid affecting autonomy, motivation and work productivity Parent-Rocheleau and Parker (2022). Similarly, decisions should be made with a focus on employees, continuous training, empowerment in autonomous decision-making, and ongoing support in their implementation (Hoff et al., 2022).

5. Conclusions

Currently, technology has significantly impacted professions, transforming some and creating others. Therefore, it is essential to identify the arguments and theoretical proposals for these new challenges. The purpose of this article is to identify these proposals through a scientometric analysis divided into sections. The first section identified the dynamics of scientific production, analyzing countries, journals, and research networks. The second section applies the ToS algorithm to identify articles on the root, core, and emerging trends. An overview of the impact of technology on work suggests that the new industrial revolution presents contrasts unlike those of the previous ones, affecting both skilled and unskilled jobs. The contribution of industrial and technological advances to strengthening innovation, economic growth, and the emergence of new jobs is undeniable; however, risks to employment are also looming in all economic sectors due to the complexity and technological dependence that it can generate. In this sense, it is necessary to qualify skills and adopt comprehensive employment and training policies that guide the emergence of new products and services and the adoption of new ways of working (L. Guerscjberg. 2025)

WoS databases, revealing that the largest number of published articles is by Dr. Rauscher, and with the largest number of citations, Dr. Bültmann U, totaling 56 citations.

The integration of technology into employment can have two impacts: first, automation can eliminate several jobs, and second, new opportunities may arise thanks to the transformation of existing tasks. Despite this, the risks of using artificial

intelligence, robotics, and the Internet of Things will depend on employment policies, decisions, information privacy, security, ethics, and the well-being of companies' workers and users. Through industrial and technological applications such as AI, employment will be reconfigured, making it necessary to strengthen learning. Trained individuals will have greater opportunities, therefore, it is necessary to strengthen the curriculum rather than with programs with refresher courses that guide them toward changes in the workplace (Villalobos, 2025).

AI impacts the future of work with both challenges and opportunities. On the one hand, it generates uncertainty and anxiety about potential job loss, which negatively affects the meaning and dignity of work. On the other hand, AI can be an opportunity to foster the development of more autonomous, creative, and meaningful skills, freeing workers from routine tasks and improving their job satisfaction and quality of life. The key lies in understanding and addressing the changes and challenges of this society from a multidimensional perspective, considering technological, economic, social, ethical, and human factors. Furthermore, it is crucial to invest in ongoing training and qualifications to complement existing skills. Thus, the evolution of professions and trades in the new era benefits society as a whole and human development. In this regard, Villagómez (2025) identifies the benefits and risks of AI in social aspects, as it strengthens medicine and education, but can exacerbate inequalities when only a few can take advantage of it. Economically, it is an engine of growth and productive efficiency, it generates new business opportunities, but it can undermine information security, which is why it requires investments to protect data, and technologically, it takes advantage of the use of algorithms, allows the resolution of complex problems but can undermine governance (Villagómez, 2025).

There are several advantages and disadvantages to implementing technological systematization and the use of algorithms, whether for hiring processes, management, or daily work in different positions. The advantages are summarized in the speed and precision with which results can be achieved. The disadvantages lie in the lack of knowledge about how to leverage these situations for the benefit of workers, gradual implementation, or the lack of effectiveness and reliability of the tools used. Future workers will require ongoing guidance to find careers with sustainable future prospects.

The scope of the study focused on understanding the existing research trends in the selected databases on the relationship between skills, technologies, and employment prospects, with the aim of identifying the main lines of research on the object of study, the new skills required in a changing world, with a strong impact of emerging technologies, and the need to strengthen humanism in this relationship between employment and technology. In this sense, the results are limited to the Web of Science and Scopus between 2020 and 2022. However, there are other relevant databases that may have valuable results depending on the topic. The search was not limited to any specific search, which limits its application. Furthermore, the purpose of this article is to identify the main theoretical trends in new professions; it does not include identifying new professions, but rather understanding the skills required to face the jobs of the future.

New research on the topic will be able to delve deeper into the years after 2022 and conduct queries in differential databases, as well as integrate specific contributions from different economic sectors.

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