




Impacts of generative artificial intelligence on the future of labor market: A systematic review

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ABSTRACT

Background: Generative AI (GenAI) has the ability to autonomously collect and process data to generate contents, inform decisions, solve problems, and perform tasks that typically require human reasoning. This Systematic Review is conducted to examine the impacts of GenAI on the future of employment, focusing on concerns about rising unemployment, and the positive and negative perspectives outlined within exiting studies. The findings from this review can help identify research gaps, guide organizational planning, and improve AI governance frameworks and policies.

Methods: To identify relevant studies, the PubMed, Scopus, Web of Science, Embase, ScienceDirect and Google Scholar databases and repositories were systematically searched using the keywords: 'Future of work', 'Job market', 'Generative AI', 'Generative AI', and 'ChatGPT'. Additionally, the reference lists of the identified related articles were reviewed for grey literature.

Results: Following the PRISMA guidelines, a total of 14 articles were selected for analysis. Selected studies have examined the positive and negative viewpoints on GenAI, together with pertinent challenges and opportunities. Accordingly, GenAI, when compliant with security and ethical issues, has the potential to increase efficiency whilst reducing costs and time.

Conclusion: Considering the rapid growth and adoption of AI technologies, examining the impacts of GenAI on the future of labor market is crucial. GenAI is likely to create new roles in some sectors yet reduce opportunities in others. A nuanced assessment of the impacts, and ongoing monitoring are vital for effective preparation and adaptation to the evolving work landscape in the presence of advanced AI technologies.

1. Background, research gap, and rationale

Generative Artificial Intelligence (GenAI or GAI), as a strand of the Artificial Intelligence (AI) suite of technologies, is the result of the evolution of AI over the past few decades. In this section, a succinct historical and chronical overview of the evolution of the AI and GenAI technologies is provide to present the relevant contextual background to the readers.

The period immediately following the Second World War and the advent of the Turing Test is often marked as the early days of AI (Fox

et al., 2014). John McCarthy coined the term AI for the first time in 1956 (McCarthy, 1987), followed by a period of AI winter in the 1980s when there was little interest or investment due to a lack of vision regarding its future prospects (Hendler, 2008). That said, the introduction of Expert Systems in the 1980s (Myers, 1986) was deemed revolutionary, even though these systems were mostly limited to supporting very specific tasks (Buchanan & Smith, 1988).

With the rise of Machine Learning technologies in the 1980s and 1990s (Carbonell et al., 1983; Sinha & Sinha, 2025) and advancements in Deep Learning in the 2010s (Schmidhuber, 2022, pp. 2021–2022), AI

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models significantly improved in their ability to process computationally complex tasks. This progress was supported by a rapid increase in the availability of large datasets, which were deemed necessary for training these models (Zha et al., 2025). The advent of GenAI technology is closely related to the development of Generative Adversarial Networks (GANs), introduced in 2014. GANs consist of two neural networks that compete to generate instances resembling real artifacts (Goodfellow et al., 2014). Subsequently, transformer-based models led to a fundamental transformation in the language capabilities of AI (Fahim & Maji, 2025).

In recent years, AI technologies have grown rapidly and have been widely adopted across various industries and sectors, creating enormous value for businesses (Li et al., 2019). The principal purpose of AI technologies is to replicate human capabilities, including learning, interaction, problem solving, decision making, persuasion, and implementation of actions (Huang et al., 2019; Rai et al., 2019; Schultz, 1992). In other words, AI is considered a technological advancement that increases productivity, drives technological developments, and predicts significant changes in societies and labor markets (Brynjolfsson & McAfee, 2014).

GenAI refers to a set of algorithms that utilize extensive datasets and information to create and generate new content, spanning various types such as text, images, videos, sounds, and code (Sveding, 2021). With the queries issued by the human, GenAI systems are capable of producing contents. Accordingly, GenAI interprets human intent and makes suggestions for further requests. In other words, the generated outputs of such systems create more diversity than a standard pattern (Ramaswamy & Ozcan, 2018). ChatGPT and DALL-E developed by OpenAI, and Gemini developed by Google are instances of GenAI technologies that have the ability to imitate human intelligence to some extent, by discovering relevant trends and patterns in different fields and domains (Liu et al., 2023; Singhal et al., 2023). GenAI models utilize deep learning and neural networks to generate content and analyze data, providing human-like responses (Biswas, 2023). GenAI as the umbrella term includes several tools and these tools have facilitated the integration of GenAI across different sectors such as healthcare, medicine, education, media, and tourism (Chan & Hu, 2023; Dehouche & Dehouche, 2023). GenAI differs from traditional AI as it is designed to create new content, by learning from large datasets, whereas AI itself focuses more on tasks like classification, prediction, and decision-making based on pre-existing rules or pertinent data analytics methods. The capability of GenAI algorithms to generate data and adapt to new tasks allows them to seamlessly transition and perform diverse tasks without the need for retraining (Morley et al., 2023). One of the main approaches to constructing GenAI is the use of Variational Autoencoder (VAE), a type of neural network that learns to encode and decode data in such a way that preserves its essential properties (Kingma & Welling, 2013). Another popular pertinent technology is GANs as referred to earlier.

Natural Language Processing (NLP) is an important area in the fields of computer science and AI that focuses on enabling communication and interaction between human language and computer systems (Nath et al., 2022). NLP utilizes computational techniques and algorithms to perform various tasks such as syntactic processing (including parsing and recognition), information extraction, text generation, analysis, interpretation, and simulating human speech-like interactions. NLP aims to enable computer systems to understand, process, and generate human language in a comprehensible and meaningful way (Fleuren & Alkema, 2015; Wang et al., 2018; Yim et al., 2016). NLP is used in the development and management of chatbot systems to facilitate communication with humans in text and speech conversations, as seen in Generative Pre-trained Transformer 3 (GPT-3) (Nath et al., 2022). Large Language Models (LLMs), that are deep learning algorithms, have demonstrated remarkable performance in undertaking NLP tasks (Chowdhery et al., 2022; Chung et al., 2022; Brown et al., 2020). The rise in performance can also be attributed to the increased use of transformer-based training models (Vaswani et al., 2017). Accordingly, LLMs are AI neural network

models that can perform various NLP tasks (Li, 2022). Together with LLMs, these models can produce texts resembling human-written content, though they may also generate other accurate and/or fake contents (Biswas, 2023; Gupta et al., 2022; McGuffie & Newhouse, 2020).

ChatGPT, a variant of GPT-3 developed by OpenAI, was launched in November 2022 and has since gained widespread popularity across industries (Biswas, 2023). It is based on a versatile LLM trained with approximately 45 terabytes of human interaction data, and it can generate novel, meaningful sequences of text that did not previously exist (Kung et al., 2023). ChatGPT has approximately 175 billion parameters and uses natural language recognition through deep learning techniques (Giansanti, 2022). This chatbot can perform tasks such as language recognition, answering questions, and expanding paragraphs (Giansanti, 2022). Chatbots, including ChatGPT, receive user requests (also referred to as prompts) as input and respond through either voice or text (Nithuna & Laseena, 2020; Thorat & Jadhav, 2020). The potential applications of ChatGPT and its predecessors, such as GPT-3, are numerous. They include writing meeting minutes, web pages, catalogs, newspaper articles, poems, songs, reports, forms, scripts, guides, creating codeless automated programs for businesses, and enhancing relationships between stakeholders and businesses through dialogue and service (Basic et al., 2023; Floridi & Chiriatti, 2020; Singh & Singh, 2023; Wang & Demszky, 2023; Zhang & Li, 2021). ChatGPT, similar to many of recently introduced GenAI platforms, can even suggest treatments for patients or answer analytical questions, making it a valuable tool across a broad range of use cases.

The capabilities of GenAI models to perform tasks such as analysis, content production, text generation, translation, summarization, text expansion, and rewriting have garnered significant attention from users across various fields (Boulus-Rodje et al., 2024; Jiao et al., 2023; Stokel-Walker, 2022; Tate et al., 2023). The performance of these models depends on the accuracy of the questions, the quality of the data, and the relevance of the context (Adewale et al., 2024). Accordingly, OpenAI's ChatGPT and Google's Gemini (previously known as Bard) are used in chatbots, language translators, and other programs, generating text that is often indistinguishable from human-written content (Lee et al., 2019).

AI in the workplace has the potential to enhance well-being, motivation, job identity which, in turn, can lead to improved organizational performance and achievements (Huchler, 2022; Parker & Grote, 2022). Moreover, the advancement of AI has provided a strong incentive for economic growth, increased the efficiency of economic development, and significantly impacted the labor market (Wang & Wang, 2022). Researchers predict that in the coming decades, AI could replace 47 % of jobs in the United States (Frey & Osborne, 2017). GenAI, as a strand of AI, is recognized as a powerful technology with a positive effect on software product management, including generating ideas, reducing development costs and time, improving product quality, and enhancing user experience (Parikh, 2023). In addition to these, AI can provide more accurate predictions, improve decision-making processes, and automate tedious tasks (Hamet & Tremblay, 2017; McCarthy, 2007; Verghese et al., 2018).

AI is capable of performing tasks that are challenging for humans. Accordingly, as a notable advantage of AI is that it creates new job opportunities in the digital economy, including roles such as AI programmers, e-commerce specialists, software developers, crowd workers, influencers, and social media workers (Merola, 2022). Job displacement is mainly observed among workers with limited digital capabilities, while positive productivity effects are more apparent among those with more advanced digital skills. Nevertheless, the extent to which the job market is impacted by AI generally depends on how businesses adapt to digital transformation (Arntz et al., 2017).

In order to achieve the goal of changing human work relation, it is imperative to consider the following three aspects: Improving the accuracy and transparency of technology, increasing the flexibility of employees in making decisions related to their data, and developing local and global regulatory frameworks in order to protect the interests

of workers and safeguard organizational values (Mantello & Ho, 2024). Since some positions are replaced by AI technologies, it is likely that these technologies will significantly impact employees' career development, which can be seen as a source of stress in modern work environments (Brougham & Haar, 2020). In an empirical study conducted by Noy and Zhang, it was demonstrated that GenAI improves productivity whilst reducing inequalities between workers with different levels in digital skills (Noy & Zhang, 2023). However, technologies that improve work efficiency are not necessarily intrinsically superior; Experimental technologies in the workplace may sometimes have a negative impact on the work environment. As an instance, technology can make tasks more complex and stressful due to information overload, constant connectivity, and the need for monitoring (Veliz, 2020). The term monitoring refers to continuous and iterative activities related to observing, tracking, and assessing the effects of GenAI on the labor market over time. This entails regular data collection and analysis to understand how GenAI influences job creation, job displacement, skill requirements, productivity, and overall employment trends.

Many economists believe that if new technologies are implemented gradually, they can help increase labor productivity (Herzenberg & Alic, 2019). On the one hand, AI including GenAI technologies helps to improve management processes with a focus on employee well-being; on the other hand, it may lead to issues such as privacy violations, insufficient transparency, and intensification of tensions related to cultural differences (Mantello et al., 2023). Research shows that the perception of job insecurity caused by emerging technologies reduces organizational commitment and job satisfaction. Accordingly, this perception is associated with increased pessimism, depression, and the desire to leave the job (Brougham & Haar, 2018; Li et al., 2019; Vieitez et al., 2010).

Previous studies on automation and robotics (Acemoglu and Restrepo, 2022) and computerization (Frey & Osborne, 2017) that examined their impacts on employment can provide useful insights into the potential effects of GenAI technologies on the future of the labor market, as well as the possible quantification of these impacts. The advent of GenAI, along with a plethora of other emerging platforms and tools, has already demonstrated a significant impact on the nature of job roles and the evolution of workplace tasks. GenAI provides opportunities to improve productivity and enhance the quality of products and services. Conversely, changes in skill and technical requirements present new challenges and opportunities for individuals and organizations. For this reason, a detailed analysis of these impacts is essential for individuals and societies to effectively respond to future challenges and opportunities in the best way by taking advantage of diversity and adapting appropriately. Although several studies have examined the adoption of GenAI in different sectors and assessed their potential effects on the future of the labor market, existing research remains fragmented, context-specific, and often focused solely on either the positive or negative impacts of GenAI adoption. Moreover, the existing studies are often fragmented in nature, and there is lack of comprehensive reviews in the current body of literature. Moreover, there is an urgency in studies such as this one, considering the swift adoption of AI, and in particular GenAI tools, to understand how this rapid adoption is influencing various industries. Thus, this systematic review aims to address this gap in the literature by providing a more comprehensive and balanced analysis of GenAI's influence on the labor market.

This study provides a number of contributions: a) it attempts to objectively synthesize both positive and negative evidence relating to adoption the technologies, striking a balance between societal concerns and perceived impacts, such as unemployment, job displacement, and changing work patterns, versus the utility that AI and GenAI, in particular, offers to workplace, e.g., by streamlining activities, optimizing resources, and enhancing productivity, b) The review highlights future research and policy-making pathways, particularly regarding labor market regulations, workforce reskilling, and devising suitable AI governance frameworks, c) The study provides a valuable and comprehensive reference for both employees and managers, enabling them to

gain a deeper understanding of the evolving labor market and develop effective action plans for upskilling, ensuring adaptability in this rapidly changing environment.

In this study, particularly within the background and discussion sections, we have at times reviewed the impact of AI on the labor market, given that GenAI is considered a subset of the AI suite of technologies. Nonetheless, we have attempted to maintain a focus on the specific impacts of GenAI, considering the novelty of this strand of AI. This study can serve as a blueprint for future research pathways in the fields of technology policy and labor economics. Furthermore, the insights presented in this work can aid policymakers and labor organizations in designing effective management strategies, frameworks for responsible implementation and governance of AI technologies, and policies aimed at mitigating the negative impacts of AI, particularly its GenAI strand.

The rest of the paper is structured as follows: Next section provides an outline of the materials and methods adopted for undertaking this systematic review. This includes an overview of the adopted protocol and reporting guidelines, study screening, eligibility and quality evaluation steps, as well as the final study selection processes. Section 3 presents the results, and in particular focuses on the challenges and opportunities that AI suite of technologies will bring for the labor market. Section 4 entails a critical discussion, highlighting the implications of the study, future research pathways, and study limitations. The paper is concluded in Section 5.

2. Materials, and methods

This Systematic Review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol and reporting guidelines. The review focused on identifying and selecting studies that reported evidence related to the effect of GenAI on the future of the labor market and employment. The initial search was conducted on June 17, 2023, and the results were last updated on June 22, 2023. The keywords used included Future of Work, Job Market, Generative AI, ChatGPT, and their appropriate combinations using the 'AND' and 'OR' operators. The repositories and databases searched included PubMed, Web of Science, Google Scholar, Scopus, Embase, and ScienceDirect. Additionally, to ensure the comprehensiveness of the search, the reference lists of the selected studies were manually examined. No restrictions were applied regarding the year of publication. The details of the identified studies were then transferred into the Endnote reference management software. In line with the PRISMA guidelines, studies that met the inclusion criteria, and examined the challenges and opportunities of GenAI and its impact on the future of jobs and the labor market. were selected.

Table 1
Search strings for different repositories.

Database	Search Type	Search String	Date of Search
Science Direct	Advanced Search	Impact AND "artificial intelligence" OR "ChatGPT intelligence" AND "future of work" AND "job market"	June 17, 2023
PubMed	Advanced Search	Impact AND "artificial intelligence" OR "ChatGPT intelligence" AND "future of work" AND "job market"	June 17, 2023
Scopus	Advanced Search	Impact AND "artificial intelligence" OR "ChatGPT intelligence" AND "future of work" AND "job market"	June 17, 2023
Embase	Advanced Search	(impact:ab,ti AND 'artificial intelligence':ab,ti OR 'chatgpt intelligence':ab,ti) AND 'future of work':ab,ti OR 'job market':ab,ti	June 17, 2023
Web of Science	Advanced Search	Impact AND "artificial intelligence" OR "ChatGPT intelligence" AND "future of work" AND "job market"	June 17, 2023

The following search strings were therefore used to search Science Direct, PubMed, Scopus, Embase, and Web of Science (Table 1).

It should also be noted that Google Scholar was also searched using the simple search using a combination of the above keywords on June 17, 2023 to find grey literature.

2.1. Inclusion and exclusion criteria

Studies were selected based on the following inclusion criteria.

- Studies that reported the impact of GenAI (e.g., ChatGPT) on the labor market and career prospects: Only studies that explicitly examined the role of GenAI in shaping employment trends, job displacement, job creation, or workforce transformations were included. This criterion was adopted to ensure that the selected studies directly addressed the research objective rather than broadly discussing AI technologies without labor market implications,
- Studies with full-text availability: Only studies that provided complete access to their methodology, findings, and discussions were considered. Abstracts, conference summaries, and studies with restricted access were excluded to prevent data gaps in the analysis,
- Studies that provided sufficient data (information about the impact of AI on jobs): Selected studies needed to present either empirical evidence (quantitative or qualitative data) or strong theoretical insights regarding how GenAI influences employment patterns, workforce skill requirements, automation risks, or labor market dynamics. This criterion was crucial to eliminate sources that merely speculated on AI's role without supporting analysis, and
- Articles published in English: To maintain consistency in interpretation and avoid translation biases, only English-language studies were included. Thus, the evidence extraction was done without the need to rely on translated materials, which might introduce inconsistencies.

The following exclusion criteria were applied.

- Studies without full-text availability: Research papers, reports, or articles that were not fully accessible were excluded to prevent incomplete assessments and ensure a transparent, replicable review process; it should be noted that that access to some journals were limited to the authors of this manuscript due to limits of subscriptions to certain journals. This might not be the case for some other authors in the field,
- Review studies: To remain a focus on primary objectives, literature reviews, meta-analyses, and theoretical discussions without original findings or data were excluded. However, key reviews were reviewed separately for providing the background context, and/or for the discussion section,
- Duplicates: Studies that appeared in multiple databases were identified, and duplicates were removed to avoid redundancy in the dataset. Accordingly, only one copy of each duplicate was retained,
- Studies lacking sufficient data: Articles that mentioned AI or automation in brief, yet did not provide relevant discussions, case studies, or empirical findings on GenAI's effects on the labor market were omitted, and
- Articles not published in English: Studies published in languages other than English were excluded to ensure consistency in language interpretation and comparability of results across all selected literature.

2.2. Study selection and data extraction

Reviews and data extraction from selected studies were completed by two researchers independently. Accordingly, study selection was conducted blindly and in accordance with the PRISMA guidelines. Initially, duplicate studies across various databases were excluded, and

only one copy of each was retained. In case of repeated evidence, we selected the most up to date article that provided maximum information. The initial review of the articles was completed based on their titles and abstracts, and irrelevant articles were omitted according to the inclusion and exclusion criteria. Subsequently, the full text of the remaining articles was evaluated based on the same criteria, and at this stage further irrelevant studies were removed. Authors were also contacted by email whenever necessary to obtain additional information. As highlighted earlier; to avoid bias, all the steps of the review process and data extraction were conducted independently by two researchers. In cases where there was a difference of opinion between two researchers, the review of the article was completed with the support of a third reviewer to reach consensus.

2.3. Quality evaluation

To evaluate the quality of the articles, a checklist suitable for observational studies was adopted. The Strengthening the Reporting of Observational Studies in Epidemiology checklist (STROBE) was used, which comprises of six scales: title, abstract, introduction, methods, results, and discussion. In total, this checklist consists of 32 subscales (items). These 32 items include various methodological aspects of the study, including the title, statement of the problem, study objectives, type of study, statistical population of the study, sampling method, determining the appropriate sample size, definition of variables and procedures, study data collection tools, statistical analysis methods and findings. A point was awarded for each item that a study fulfilled. Accordingly, each study could achieve a score between 0 and 32. Articles with a score of 16 and above were deemed to be average and high-quality articles. Studies with a score of less than 16 were considered to be of low methodological quality and were therefore excluded from the Systematic Review.

3. Results

In this study, positive, and negative attitudes, challenges, and opportunities of using GenAI, along with its effects on the future of jobs and the labor market were evaluated. Following the initial search, a total of 1683 articles were identified through the search of selected databases and repositories. An additional 15 related articles were also identified through a manual search. Details of all identified articles were transferred into the EndNote reference management software. However, 230 articles were omitted due to duplication. In the screening stage, the titles and abstracts of the remaining studies were examined, resulting in the exclusion of 723 articles, based on the inclusion and exclusion criteria. In the eligibility evaluation stage, 731 articles were excluded after full-text examination, primarily due to low quality or irrelevance to the study's focus. Finally, 14 studies were included for the final evaluation. The study selection process is summarized in the PRISMA flow diagram (Fig. 1).

Most of the reviewed studies are analytically descriptive and were published in 2023 (Table 2). Table 1 outlines evidence reported within the selected studies i.e., positive attitudes, negative attitudes, challenges, and opportunities of using Generative AI in the context of job market.

The results presented in this section are organized in the following subsections, particularly highlighting the positive and negative viewpoints, as well as opportunities and challenges reported within the selected studies.

3.1. Positive viewpoint

Salvagno et al. (2023) examined the use of AI Chatbots, particularly ChatGPT, in scientific writing. The authors provide a critical overview of both positives and negatives of the use, and the positive viewpoints are provided in this subsection. They reported that the use of Generative AI,

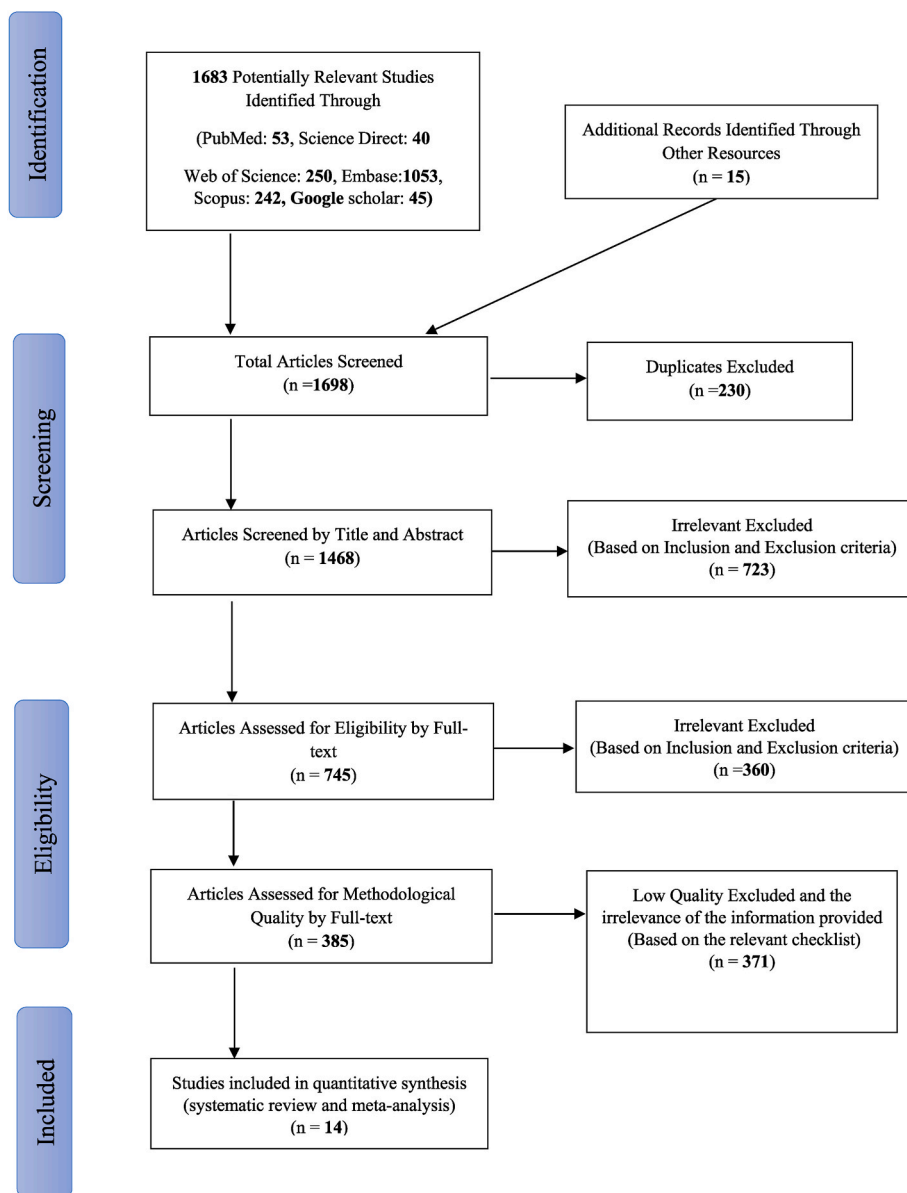


Fig. 1. PRISMA flow diagram for study selection.

such as ChatGPT, can help researchers to be more efficient in writing scientific articles. ChatGPT is capable of producing early drafts and addressing general pertinent considerations. In addition, ChatGPT can assist researchers in conducting literature review and instigating research on various topics. In the study by Ayers et al. (2023) on productivity in healthcare, it is reported that Generative AI (namely ChatGPT as a chat assistant) can improve virtual care by providing empathetic answers to patients' questions. The responses generated by chatbots were often of higher quality and more empathetic than those provided by doctors, which can potentially increase productivity and reduce burnout in the field of healthcare. Moreover, research shows that using a chatbot to draft responses, that are later edited by doctors, can help improve the quality of healthcare.

Al-Medfa et al. (2023) reported that doctors, particularly those with multiple specialties, have a positive attitude towards the use of AI in their daily work. The doctors believe that AI can be used to create personal medication and treatment plans for patients, reducing diagnosis and treatment time. Chen (2023) also highlights the positive opinions of employers and other stakeholders about the use of AI in the recruitment process. The study participants believed that AI could

improve the recruitment process, enabling the creation of optimal recruitment plans.

Khurana and Vaddi (2023) reported that the use of ChatGPT has the potential to enhance the production of scientific content by increasing response speed, thus saving users' time. Fatani (2023) emphasized that the use of ChatGPT in scientific research, especially in the fields of medicine and dentistry, supports text translation, article summarization, and the creation of automatic drafts, reducing time and effort required. Nevertheless, researchers must act responsibly when evaluating the results and conducting final edits. In general, using ChatGPT in scientific research can increase the efficiency and speed of the research process, contributing to the advancement of scientific fields.

In the study by Schulte Steinberg and Hohenberger (2023), it is argued that AI may play a role in reducing gender discrimination in the workplace. The positive perspective presented in the study of Tavakoli et al. (2022) highlights that AI, as an innovative technology, can effectively contribute to improving educational processes and developing skills. Berretta et al. (2023) reported that AI is a key driver of change in the business sector. Moreover, it is emphasized that focusing on people can enable individuals to achieve desired organizational outcomes. Shao

Table 2
Summary of study characteristics including opportunities and challenges of GenAI in various fields and professions.

Author/Year	Country	Type of study	Inspected profession/ field	GenAI Tools	Result
Salvagno et al. (2023)	Belgium	Descriptive analytical method	scientific writing	AI chatbot ChatGPT	Using AI chatbot as a useful tool in clinical practice as well as writing scientific texts and articles can help researchers and scientists in enhancing and refining content, however AI should not replace researchers. Special attention should be paid to the potential risks of using AI in human research; Ethical issues include risks of plagiarism, lack of an expert human judgement, a reduction in the quality of publications, the possibility of unequal access to paid services using AI tools.
Ayers et al. (2023)	USA	Cross-sectional	patient questions/health care	ChatGPT	By providing quality and empathetic answers to patient questions compared to physicians, ChatGPT can facilitate improved patient outcomes while reducing physician and specialist burnout (Chatbot: 78.5 %, 95 % CI, 72.3 %–84.1 %; physicians: 22.1 %, 95 % CI, 16.4 %–28.2 %)
Khurana and Vaddi (2023)	USA	Descriptive analytical method	dental education/ maxillofacial radiology (OMFR)	ChatGPT	The appropriate use of ChatGPT in university and dental education depends on how this technology is embraced by educators, and integrated into teaching and learning process. This technology can enhance the productivity of students and professors Time saving, developing rubrics, producing tests and email drafts, and oral and maxillofacial radiology reports (OMFR) are among some of the reported tasks that could be undertaken by ChatGPT. However, due to the importance of validity and accuracy of content in fields such as oral radiology and the possibility of risks such as plagiarism, copyright problems and reduced creativity, the use of AI should not be considered as a complete replacement for human input.
Fatani (2023)	SAU	Descriptive analytical method	Medical and Dental Research	ChatGPT	Chat GPT AI chatbot has the potential to be used in producing academic articles, academic writing in a shorter time, summarizing articles and translating texts. Although this generative AI tool helps researchers to some extent in writing medical and dental research, it is essential to have appropriate supervision and caution, considering the ethical concerns in content generation, particularly in sensitive fields. .
Schulte Steinberg and Hohenberger (2023)	Germany	Descriptive analytical method	Employment situations	–	After analyzing the preferences of people, especially women, regarding the choice between AI evaluation and human evaluation, this research shows that belief in AI abilities to reduce prejudice and discrimination can play an important role in choosing AI generated evaluations. Women who believe in AI's potential to reduce prejudice are more likely to opt for AI evaluations, especially when faced with discrimination or prejudice. This can contribute to gender balance in workplaces and prevent commonly anticipated discrimination in employment. On the other hand, this research shows that the gender of competitors does not have a direct effect on women's preferences in choosing to AI generated evaluations. These findings provide important results regarding the impact of AI on society and people's career decisions. Overall, this research shows an important role of AI in reducing gender bias and making changes in the labor market
Tavakoli et al. (2022)	Germany	Requirement Analysis	Workplace skills Training	–	This study evaluates how AI improves educational processes through the eDoer system. The system is capable of analyzing online job postings and intelligently derives skill requirements for specific jobs. It then analyses online learning content to break down skills into learning topics and collects relevant learning resources. AI is used to evaluate the quality of educational resources to recommend resources, based on learners' goals. The eDoer system also recommends personalized learning to students, based on individual learning goals. It also monitors learners' progress with assessments. AI plays a key role in facilitating learning by increasing access to educational resources and developing skills related to the labor market. As a result, it supports learners to adapt to changes in the labor market and improves the quality of life and job opportunities.
Berretta et al. (2023)	Germany	Descriptive analytical method	Workplace	–	This research demonstrates that focusing on humans and the assessment of AI in the workplace can improve productivity and lead to desirable individual and organizational outcomes. The Job Perception Inventory (JOPI) is recommended as a practical tool for job analysis and workplace enhancement, assisting companies in aligning AI driven tasks with the needs and job identities of their employees. This study highlights the need for further research across various job types and diverse individuals to better understand and enhance JOPI. Additionally, it is reported that the utilization of supplementary data and

(continued on next page)

Table 2 (continued)

Author/Year	Country	Type of study	Inspected profession/ field	GenAI Tools	Result
Shao et al. (2022)	China	Conceptual Theoretical Analysis	employment in manufacturing industry	–	<p>integration with other job analysis methods can provide more precise insights into the work environment and improve decision-making.</p> <p>This article examines the impact of Artificial Intelligence (AI) technology on employment structures in smart manufacturing companies, demonstrating that the integration of AI with manufacturing activities leads to various changes in the labor market and employment structure. The primary impacts include an increase in demand for high-skilled labor and a relative reduction in demand for low-skilled workers, along with increased investments in research and development and increase in production. Manufacturing companies may experience significant changes in their labor requirements and human resource management practices through the use of AI. Practical recommendations for the development of the organic manufacturing industry include AI integration at a high-level, adoption and application of core technology, talent acquisition, and financial strategy adjustments. Targeted regulatory actions and leadership alliances are suggested for various types of smart manufacturing companies to guide AI-driven transformations in the sector. Furthermore, managers and supervisors should prepare for optimizing workforce structures and utilizing AI technology in production management and necessary adjustments. Future research should focus on industry classifications and discovering cost-saving strategies in operational expenses.</p>
Wach et al. (2023)	Poland	Case study	business	ChatGPT	<p>With an in-depth review of the challenges and opportunities associated with GenAI. This study identifies seven main risks including AI market deregulation, poor information quality, privacy violations, social manipulation, economic inequalities, and other social and geopolitical risks. Finally, recommendations include proper market regulation, development of new skills and training for workers, embracement of ethics principles and upholding individuals' privacy, transparency in the use of data, promotion of fair competition among individuals and companies, and creation of ethical guidelines for managers, policy makers, and GAI developers. The study also emphasizes on the use of GAI, in accordance with proper regulation and compliance with ethical considerations, to improve individuals' capabilities, and various aspects of life.</p>
Kanitz et al. (2023)	Netherlands	Case study	Organizational Change	(i.e., ChatGPT)	<p>Using a practical example of culture change, this article shows how clinicians and health professionals can leverage GenAI tools to improve change processes, such as planning initiatives, mobilizing stakeholders, and monitoring progress. The provided directions for future research include the stakeholder response to GenAI, the impact on organizational change, and the creation of value through GenAI. It is also recommended to nurture active discussions on organizational change, organizational development, and strategy implementation in the new era of GenAI, as both change managers and employees of organizations will increasingly work with GenAI tools in the future. Finally, due to the increasing capability and versatility of GenAI systems, the need for training and skill acquisition for various stakeholders is emphasized in this study</p>
Al-Medfa et al. (2023)	Bahrain	Cross-sectional	medicine	–	<p>Despite of the rising adoption of AI in the field of medicine the attitude of doctors remains largely positive. Doctors believe that AI can reduce diagnosis time, however they also believe that AI cannot replace human skills. This study found that various characteristics such as the age, gender and experience do not have a significant effect on the attitude of doctors' attitude towards AI, nonetheless, concerns regarding job security exist.</p>
Chen (2023)	China	Descriptive analytical method	employment	–	<p>As traditional recruiting methods struggle to keep pace with new talent, employers need efficient recruiting tools. The following pertinent factors are highlighted in the study:</p> <ol style="list-style-type: none"> 1. AI tools in recruitment: AI technology can improve the recruitment process. From job search to skills assessment, AI can help employers and job seekers at every stage. 2. AI-based hiring criteria: These criteria help appropriately shape the hiring process. They can help select applicants faster, whilst reducing workload, and hiring discrimination. 3. Concerns related to AI in recruitment: Despite all the benefits of AI, there are still some concerns. Costs associated with AI adoption, legal and privacy issues, hiring bias, and the possibility of replacing humans are among the reported

(continued on next page)

Table 2 (continued)

Author/Year	Country	Type of study	Inspected profession/field	GenAI Tools	Result
					<p>concerns.</p> <p>4. Transparency and criteria: For the successful use of AI in recruitment, transparency in the process is essential. Applicants should be aware how AI systems make decisions and how that could impact them.</p> <p>5. Human and AI interaction: Effective interaction between human and AI need to be examined. This interaction can promote the improvement of human skills and play an important role in enhancing the recruitment process and adoption of AI.</p> <p>6. Expanding the applications of AI: With the advancement of algorithms and hardware technologies, the applications of AI in recruitment will gradually expand. This includes improving the performance of systems and increasing their ability to make decisions.</p> <p>Finally, AI in recruitment requires a proper balance between the use of technology and the necessary human judgement throughout the recruitment process. This balance helps managers and applicants understand the benefits and challenges of using AI in recruiting.</p>
Warning et al. (2022)	Germany	Descriptive analytical method	Employers' Flexibility	-	AI has a great potential to influence economy, particularly by making changes to the work environment that may have a negative impact on the employees' wellbeing. Administrative and secretarial jobs are likely to experience the most changes. This study shows that AI has different effects on various occupations, requiring policies to mitigate risks and maximizing the opportunities of using these technologies in the workplace.
Fukumura et al. (2021)	USA	Descriptive analytical method (quantitative or survey methods)	Office Workspaces	-	AI can improve workplace environments, by automating personal adjustments and promoting behaviors that support employees' wellbeing and productivity. Interviews with employees show AI is perceived to provide more benefits than possible risks. In other words, the authors believe that AI can bring a significant improvement in the work environment and can play a positive role in increasing the performance and wellbeing of employees.

et al. (2022) stated that AI, as one of the most important technological revolutions, has had a positive effect on the development of enterprises, and has led to changes in the employment structure.

The positive attitude towards GenAI, including ChatGPT, in the study of Wach et al. (2023) shows that this new technology, with its pervasive and effective abilities in improving industries and creating opportunities, can play a major role in improving the quality of human life. From this point of view, the development and application of AI in a responsible and ethical manner can help achieve broader goals, contributing to wider social and economic progress. This positive perspective suggests that while AI presents many opportunities, it also entails responsibilities that must be carefully upheld when leveraging this advanced technology.

Kanitz et al. (2023) highlight the significant potential of GenAI, considering it as a leading technology with exceptional capabilities to improve and transform processes, and techniques, and support organizational change. Their study also shows that GenAI can help practitioners in developing effective change management processes and creating communication content related to various changes. In general, positive perspectives of GenAI presented in their study emphasize that GenAI can play an effective role in undertaking several tasks to achieve organizational changes and increase productivity.

In the study by Warning et al. (2022), it is reported that AI, as an innovative and fast-growing technology, provides many capabilities in various industries. AI can help improve employees' productivity by reducing repetitive tasks and allowing more focus on strategic and creative objectives. In addition, the increased need for skills such as organization and flexibility present an opportunity for professional and personal development. Fukumura et al. (2021) argue that a positive attitude towards AI means embracing it as an opportunity to improve the work environment, employees' performance, and their well-being.

3.2. Negative viewpoint

Salvagno et al. (2023) argue that the use of GenAI, particularly ChatGPT, in scientific writing entails risks such as potential plagiarism, inaccuracies in generated text, the need for human supervision, and unequal access. Their research points out the global digital divide, particularly if the tool is not offered for free. Ayers et al. (2023) in their research on integration of AI in healthcare, emphasize the importance of thorough regulation and human oversight. They also argue that without such considerations, hazards may arise which could impact the quality and standard of healthcare services. Additionally, they raise their concern in employing chatbots in nursing, emphasizing the necessity of doctors' presence.

Khurana and Vaddi (2023) highlight a limitation of GenAI technology in answering image-based questions, which poses challenges in contexts such as oral radiology, where the validity of the content produced by ChatGPT is unreliable. Accordingly, there should be strict regulation and human oversight in the application AI technologies in sensitive fields such as medicine. It should be noted that the use of ChatGPT may present challenges in balancing the need for the presence and expertise of doctors, and sole use of AI generated content in some cases. Fatani (2023) also identified reliability issues in the use of ChatGPT in scientific research, especially in the fields of medicine and dentistry. Moreover, ethical implications and potential negative effects remain underexplored, requiring users to remain cautious in fully trusting ChatGPT in scientific research, instead considering the technology as one of the possible means for translating and summarizing scientific texts.

Schulte Steinberg and Hohenberger (2023) raised concerns regarding impact of AI on gender gap in the labor market. They suggest that AI may not practically reduce the gender gap, and in turn it may exacerbate implicit discrimination in the recruitment process. For AI to

effectively reduce the gender gap, skills management and capacity building, ethical principles, and human rights need to be prioritized. [Tavakoli et al. \(2022\)](#) raise concerns about the eDoer recommender system in the field of education, highlighting the significant financial and technical resources required for the development and implementation of such a system. Evaluating the quality and effectiveness of recommendations demand accurate models and criteria. Moreover, ensuring data privacy necessitates appropriate measures and policies. These challenges show that adoption of AI-based systems in the field of education necessitates accurate and reliable consideration and management of technical, ethical, and legal issues.

[Berretta et al. \(2023\)](#) argue that the impact of AI on workers, particularly regarding the needs, skills and job identity, has not been sufficiently considered in the development and implementation process. [Wach et al. \(2023\)](#) recognize the many potentials that AI presents to the development and progress of societies and industries, however they highlight that its introductions come with its own challenges and risks. They emphasize the need for a responsible and global approach to the development and application of AI in order to prevent its negative and unintended consequences whilst embracing the benefits. [Al-Medfa et al. \(2023\)](#) report that some medical doctors with a negative attitude towards the use of AI, fearing about their job security and that AI technology may undermine their skills. In addition, these doctors point to the weaknesses of the healthcare systems, arguing that they are not fully prepared to integrate AI technologies.

[Chen \(2023\)](#) raises similar concerns related to job security, legal privacy risks, and bias in the hiring process when adopting AI systems. [Warning et al. \(2022\)](#) further argue that AI may cause major changes in job requirements, exposing some workers to serious health risks or potential job loss. Workers in roles heavily reliant on cognitive skills and repetitive tasks are more likely to be replaced by AI. [Fukumura et al. \(2021\)](#) reported that employees are sensitive to the associated concerns that come with AI, highlighting the need to manage skills and mitigate such potential risks. However, they also highlight that AI can bring significant improvements to their work environment and personal lives.

4. Challenges

[Salvagno et al. \(2023\)](#) argue that ChatGPT should be used under human supervision and its outputs should be verified by human experts to reduce ethical risks. [Ayers et al. \(2023\)](#) emphasize the significance of human oversight and verification in delivering healthcare services, when utilizing AI systems. They propose that upholding humanity and empathy in nursing and caregiving is vital as a remedy for current challenges. [Khurana and Vaddi \(2023\)](#) also stated that the limitations of answering image-based queries by AI, the lack of trust in the validity of the content are among the concerns when adopting AI-based systems. [Fatani \(2023\)](#) believes that adoption of ChatGPT in medical and dental research writing should be still considered with caution, despite its capabilities. Since the scientific writings produced by the algorithm have not yet been fully evaluated, more research is needed to carefully examine the ethical concerns and possible negative effects of ChatGPT.

One of the important challenges investigated in the article by [Tavakoli et al. \(2022\)](#) is the dynamic matching of labor market needs with students' individual skills and knowledge. As the labor market changes rapidly, the knowledge and skills required should change dynamically. This makes training and skills development a major challenge, as the needs and expectations of the labor market are constantly evolving. Therefore, the eDoer advisor should be kept current with these changes and provide appropriate personalized solutions to students. This, in turn, supports the job applicants to continuously following the changes and demands in the job market and developing new skills. [Berretta et al. \(2023\)](#) highlight the insufficient attention to the impact of AI on human workers and diversity requirements. [Shao et al. \(2022\)](#) also emphasize pertinent challenges such as the increase in the costs of low-skilled labor and the necessity of optimizing the structure of the

labor force in the transformation process.

[Wach et al. \(2023\)](#) report that one of the main concerns about AI is the lack of market regulation. Lack of regulation can lead to data privacy and security breaches. Moreover, the inaccurate and sometimes low-quality of the data used by AI can lead to flawed decisions with negative outcomes. Automation and rising unemployment are also major concerns. AI may replace certain tasks currently undertaken by human, potentially increasing unemployment in some fields. Violation of privacy and social surveillance are other concerns related to AI. The use of AI in the collection and analysis of personal data may violate individuals' privacy and result in social surveillance. Social manipulation and content fabrication by AI can weaken ethics and goodwill. Widening inequalities and technical stress are also among concerns related to the adoption of AI. These concerns show that although AI has many potentials and benefits, it is necessary to examine related challenges and issues to prevent the unintended negative consequences.

[Al-Medfa et al. \(2023\)](#) outline challenges such as job security concerns and apprehensions related to lack of frameworks and systems to respond to the issues associated with AI adoption. [Chen's research \(2023\)](#) presents challenges such as costs, legal issues, and concerns related to data analysis. [Warning et al. \(2022\)](#) argue that AI can drastically change jobs and skill needs, and there is a need to train individuals to adapt to these changes. On the other hand, employers should also be flexible and support their employees in response to these developments. Moreover, the issue of childcare in the workplace may pose a serious challenge for employees with families who need to balance their personal and professional lives.

[Fukumura et al. \(2021\)](#) also raised concerns about the major changes that AI may introduce to job requirements, which may lead to job losses for some individuals. They also highlighted employees' health-related concerns regarding the use of AI in environmental settings that could affect their well-being. [Fukumura et al. \(2021\)](#) also believe that the changes in skills requirements posed by AI will necessitate training employees to adapt to these changes, potentially leading to other job-related concerns.

5. Opportunities

[Salvagno et al. \(2023\)](#) argue that with proper and balanced use of ChatGPT, productivity and speed can be achieved in scientific writing. This, in turn, plays a useful role in conducting research or instigating a literature review. The effective use of AI technology can lead to the improvement of health and healthcare services, as well as reducing doctor burnout. Furthermore, creating detailed regulations and standards for the use of AI in nursing can support the creation of a safe and ethical environment ([Ayers et al., 2023](#)). Saving time and speeding up decision-making processes are among the opportunities of using Generative AI such as ChatGPT in jobs and the labor market ([Khurana & Vaddi, 2023](#)). [Fatani \(2023\)](#) argues that ChatGPT, as an AI chatbot, can support searching for academic articles and compiling summaries of selected articles. Furthermore, ChatGPT can generate automatic drafts, summarize articles and translate contents from multiple languages. These features allow researchers to make the academic writing process swifter and less challenging.

In some scenarios, users may prefer to adopt AI-based systems rather than relying on human intervention ([Schulte Steinberg & Hohenberger, 2023](#)). As a result, personal and gender discrimination in recruitment processes can be reduced and AI can help promote gender equality. In addition, this study shows that people who have experienced discrimination in the past are more likely to choose AI assessment as a way to reduce perceived discrimination. AI can therefore reduce the expected discrimination in employment and encourage women to apply for more jobs. This possibility allows women to play a greater role in male-dominated fields ([Schulte Steinberg & Hohenberger, 2023](#)).

[Berretta et al. \(2023\)](#) highlight the development of a survey list to support AI implementation projects and create human-centered work

environments with AI. Shao et al. (2022), supports the integration of AI technologies in manufacturing companies and the improvement of workforce structure. Wach et al. (2023), also outline the opportunities that AI can offer, including the integration of AI in organizational structure, improving the workforce by enhancing the digital skills of workers, and improving performance and creativity in content creation using Generative AI tools such as ChatGPT. In addition, AI enhances human capabilities such as recognizing complex patterns in data, making accurate predictions, and generating valuable content. AI helps solve complex problems and improve service quality, giving companies a competitive advantage in global markets. Additionally, by reducing human-related risks such as errors, AI increases trust and efficiency in processes and services.

Al-Medfa et al. (2023) outlined further opportunities that AI can offer. These include reducing the time for diagnosing and treating patients and increasing productivity in medical care. Improving recruitment performance, reducing the time required to recruit and select candidates, and creating more efficient methods for human resource management are also other benefits mentioned (Chen, 2023). Warning et al. (2022) emphasized that AI creates several possibilities in work environments by making major changes to people's jobs and skills requirements. This technology allows employees to remove repetitive tasks and focus on more imperative and complex activities. Furthermore, by addressing the challenges of change that accompany AI, the technology offers opportunities to develop personal and professional capabilities, which can help improve productivity and reduce risks in the workplace. Fukumura et al. (2021) lists several advantages of AI as its ability to improve work interactions, supporting a healthier working habits and employee productivity, as well as increasing personal capabilities.

In light of the collated narrative synthesis, the next section provides a critical discussion of the findings, by relating the extracted evidence with existing literature, their implications, and future prospects.

6. Discussion

To the best of our knowledge, this study is the first systematic review on the potential impact of programs based on GenAI and its impacts on the future of jobs and the labor market. AI, in its broadest term, is used in many fields including robotics, healthcare, finance, and education (Hamet & Tremblay, 2017; McCarthy, 2007; Verghese et al., 2018). AI systems in the recruitment process reduce multiple steps of job advertisements, shortlisting, interviewing, and hiring (Chan, 2022). The rapid development of AI creates many economic benefits (Damioli et al., 2021; Sequeira et al., 2021). From an organizational point of view, the use of AI in a new work structure leads to more intelligent organizational decisions (Sequeira et al., 2021) and promotes innovation (Fuller et al., 2022). From employees' perspective, AI in new organizational structures impacts their employment (Schlogl & Sumner, 2018; Acemoglu & Restrepo, 2020), income (Autor et al., 2020) and well-being (Nazareno & Schiff, 2021). Furthermore, AI contributes to substitution (80), reskilling, and deskilling (Huang & Sharif, 2017; Rafner et al., 2022).

Although AI contributes to productivity and economic growth, it increases inequality, reduces good jobs and negatively impacts wages for workers with low or average skills (Tyson & Zysman, 2022). It was originally believed that tasks typically associated with occupations requiring high skills, such as complex manual tasks, and those using abstract thinking, creativity, and social intelligence, are outside the range of AI's capabilities (Acemoglu & Restrepo, 2020; Autor et al., 2003). However, due to the recent advancements in AI, even unusual cognitive tasks can be automated (Lane & Saint-Martin, 2021). AI can bring job stability and more income, especially for individuals with more education and experience (Fossen & Sorgner, 2022). Exposure to AI increases employment in related jobs and raises demand for technical skills in jobs that use computer systems (Georgieff & Hye, 2022). For instance, the integration of AI in healthcare improves the quality and

efficiency of services, making it a useful and effective assistant in related activities (Hazarika, 2020).

An analysis shows that progress in the field of robotics and AI may lead to the loss of jobs or a radical change in the way tasks are completed, ultimately increasing income and widening the income gap (Korinek & Stiglitz, 2018; MÉDA, 2019). In low- and middle-income countries (LMICs), the risk of job loss due to AI is even higher than in advanced economies, with risks being 69 % in India, 72 % in Thailand, 77 % in China, and 85 % in Ethiopia (Ernst et al., 2019). Considering the anxieties about job security (Frey & Osborne, 2017), the unequal distribution of new jobs (Sorensen et al., 2021; Osoba & Welser, 2017) and the growing income inequalities (Levesque, 2018; McKay et al., 2019) associated with AI, there are troubling facts about the negative health effects (Hollingsworth et al., 2017; McGee & Thompson, 2015) of AI use in the workplace. AI may also disproportionately affect and further undermine social and economic justice for some individuals in the American workforce, including females, Black, Indigenous, and People of Color (BIPOC) workers, employees from rural communities, and individuals with occupational disabilities (Dergaa et al., 2023; Flynn et al., 2021; Mann & Smith, 2017).

With respect to the GenAI specifically, Sundararajan (2017) believes that the possibility of autonomous actions increases because access to knowledge available and stored on the Internet. However, Charwood and Guenole (2022) argue that AI may take over decisions which could reduce the sense of choice and control of users. AI has the ability to take over hazardous and mundane tasks, allowing humans to spend more time on meaningful and innovative activities (Jarrahi, 2018). Nevertheless, by taking over a wide range of tasks, AI could turn humans from active employees to passive controllers (Rieth & Hagemann, 2021). AI, as a useful tool, can help improve employees' performance by providing individual feedback, thereby clearly playing a helpful and positive role in the work environment (Jain et al., 2022). Nonetheless, changes in the work environment resulting from GenAI may lead to a sense of insecurity among employees (Shepherd, 2006). Working with AI in the workplace leads to improved information exchange, increased flexibility in employees' work, and the possibility of remote work (Neeley & Leonardi, 2018). However, the lack of complete trust in AI and its performance may limit the transfer of information between team members and employees (Möhlmann & Zalmanson, 2017). AI takes over monotonous tasks, allowing individuals to have more and more specialized skills in motivational and cognitive activities (Yang & Siau, 2018). However, AI may cause employees to undertake the remaining stressful tasks, since other activities are now being handled by AI (Wisskirchen et al., 2017).

6.1. Future prospects

With the continued advancements in GenAI algorithms and platforms, it is sensibly expected that the impacts will be dissimilar in different ways and within different sectors. In the service industry, for instance, GenAI can support activities related customer service teams, as well as content generation for customers, and reasoning (Pilaniwala, 2024). On the other hand, in industries such as manufacturing and medical sector, the advancements in GenAI may focus on enhancing efficiency and performance (Deng et al., 2024; Khan, Mehmood, & Khan, 2024). In addition to these, in the healthcare sector, GenAI technologies demonstrate the capabilities to diagnose diseases, support analyses of medical images, and production of novel and innovative medical treatments and drugs (Chatterjee et al., 2024). In the organizational context, GenAI has demonstrated abilities for optimizing processes and reducing the human resources costs (Khan, Parahyanti, & Hussain, 2024). Moreover, in the arts and digital industries, GenAI can automatically generate audiovisual contents, writing, and music production (Schatten, 2024). Although there are some concerns associated with intellectual property rights in these sectors (Tyagi, 2024), there are certainly new dimensions that could be explored in various roles

through adoption of GenAI technology.

6.2. Study limitations

This study examined a wide range of challenges and opportunities that Generative AI has created for businesses and the labor market. However, this review has some limitations. The rapid expansion of GenAI platforms, techniques, and also studies related to GenAI would make cross-sectional systematic reviews such as this one challenging. By the time, the study undergoes the review process and gets closer to publication, there may be other studies that have emerged yet not reviewed. Accordingly, there was a limited number of available articles in this field at the time of the final search. In addition, the majority of selected articles have an emphasis on high-income countries. This may limit the generalizability of the current synthesized evidence. In addition, evaluated articles were limited to those published in English, potentially overlooking other pertinent insights in articles published in other languages. Furthermore, a number of studies were excluded from this Systematic Review due to their low quality. There are also the data and measurement gaps in the field of GenAI, making it challenging to predict the overall effect of GenAI on the future of jobs and the labor market. Finally, due to the heterogeneity of the studies, and the lack of relevant quantitative evidence within the identified research, quantitative synthesis through meta-analysis was not conducive.

7. Conclusion

The use of Generative AI has significant effects on businesses and the labor market. One of the key contributions of this technology is the ability to generate content. However, the generation of inaccurate and incomplete content by AI may lead to a decrease in trust in the technology. In some industries and occupations, Generative AI may replace employees in content creation activities and related tasks, reducing job opportunities in these sectors. On the other hand, GenAI may create new specializations in content creation, leading to new job opportunities for people with AI-related knowledge. Legal and ethical concerns including Intellectual Property Rights (IPR) of AI-generated content, should also be addressed. Additionally, due to changes in the labor market and the need for new skills, reskilling and upskilling, training and overall skills development have become more imperative. Employees require to develop new skills to adapt to working with Generative AI. Employees may also need more flexibility to cope with changes in the labor market, and these changes can lead to the creation of new job opportunities for people with appropriate expertise.

7.1. Future research pathways

This study aimed to examine the impacts of generative AI in the labor market, by synthesizing evidence from the available research in the field. In general, Generative AI, as a powerful and multi-functional tool, will bring fundamental changes in the societies and businesses around the world. Therefore, further research is required to examine the unintended consequences of AI adoption in various industries. Accordingly, further research will be required to examine the potential rise in unemployment by sector, region, and job type. Such subgroup analysis will help businesses and industries gain insights for appropriate adaptation strategies and digital transformation needs. Examining digital divide in relation to the impact of GenAI adoption by socio-economic groups, and/or regions would also benefit from further research. Moreover, future review studies could potentially entail meta-analysis if sufficient quantitative evidence are reported in studies with homogeneous methodologies and contexts are identified. In addition to these, further research can focus on the examination of skills requirements, the reskilling and upskilling programs, and the changing nature of the existing low skill jobs. Moreover, collaboration between governments, industries, and higher education institutions is critical to maximize

productivity from Generative AI in businesses. Interactive research in this field can provide the foundation for better strategic decisions.

CRediT authorship contribution statement

Nader Salari: Conceptualization. **Mahan Beirumvand:** Writing – original draft, Investigation. **Amin Hosseinian-Far:** Writing – review & editing, Supervision. **Javad Habibi:** Writing – review & editing, Supervision. **Fateme Babajani:** Writing – original draft, Investigation. **Masoud Mohammadi:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization.

Ethics approval and consent to participate

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Availability of data and materials

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Abbreviation

GAI	Generative AI
NLP	Natural Language Processing
LLMs	Large Language Models
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
STROBE	The Strengthening the Reporting of Observational Studies in Epidemiology checklist

Data availability

Data will be made available on request.

References

- Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188–2244. <https://doi.org/10.1086/705716>
- Adeyemi, M. D., Azeta, A., Abayomi-Alli, A., & Sambo-Magaji, A. (2024). Impact of artificial intelligence adoption on students' academic performance in open and distance learning: a systematic literature review. *Heliyon*, 10(22), Article e40025.
- Al-Medfa, M. K., Al-Ansari, A. M. S., Darwish, A. H., Qreebballa, T. A., & Jahrami, H. (2023). Physicians' attitudes and knowledge toward AI in medicine: Benefits and drawbacks. *Heliyon*, 9(4), Article e14744. [10.1016/j.heliyon.2023.e14744](https://doi.org/10.1016/j.heliyon.2023.e14744).
- Arntz, M., Gregory, T., & Zierahn, U. (2017). Revisiting the risk of automation. *Economics Letters*, 159, 157–160. <https://doi.org/10.1016/j.econlet.2017.07.001>
- Autor, D., Dorn, D., Katz, L. F., Patterson, C., & Van Reenen, J. (2020). The fall of the labor share and the rise of superstar firms. *Quarterly Journal of Economics*, 135(2), 645–709. <https://doi.org/10.1093/qje/qjaa004>

- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics*, 118(4), 1279–1333. <https://academic.oup.com/qje/article-abstract/118/4/1279/1925105>.
- Ayers, J. W., Poliak, A., Dredze, M., Leas, E. C., Zhu, Z., Kelley, J. B., et al. (2023). Comparing physician and AI chatbot responses to patient questions posted to a public social media forum. *JAMA Internal Medicine*, 183(6), 589–596. <https://doi.org/10.1001/jamainternmed.2023.1838>
- Basic, Z., Banovac, A., Krucic, I., & Jerkovic, I. (2023). Better by you, better than me, ChatGPT3 as writing assistance in students essays. *arXiv preprint arXiv:2302.04536*.
- Berretta, S., Tausch, A., Peifer, C., & Kluge, A. (2023). The job perception inventory: Considering human factors and needs in the design of human-AI work. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1128945>
- Biswas, S. S. (2023). Role of Chat GPT in public health. *Annals of Biomedical Engineering*, 51(5), 868–869. <https://doi.org/10.1007/s10439-023-03172-7>
- Boulus-Rodje, N., Cranefield, J., Doyle, C., & Fleron, B. (2024). GenAI and me: The hidden work of building and maintaining an augmentative partnership. *Personal and Ubiquitous Computing*, 1–14. <https://doi.org/10.1007/s00779-024-01810-y>
- Brougham, D., & Haar, J. (2018). Smart technology, AI, robotics, and algorithms (STARA): Employees' perceptions of our future workplace. *Journal of Management and Organization*, 24(2), 239–257. <https://doi.org/10.1017/jmo.2016.55>
- Brougham, D., & Haar, J. (2020). Technological disruption and employment: The influence on job insecurity and turnover intentions: A multi-country study. *Technological Forecasting and Social Change*, 161, Article 120276. <https://doi.org/10.1016/j.techfore.2020.120276>
- Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J. D., Dhariwal, P., et al. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems*, 33, 1877–1901. <https://doi.org/10.48550/arXiv.2005.14165>
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
- Buchanan, B. G., & Smith, R. G. (1988). Fundamentals of expert systems. *Annual Review of Computer Science*, 3(1), 23–58. <https://doi.org/10.1146/annurev.cs.03.060188.000323>
- Carbonell, J. G., Michalski, R. S., & Mitchell, T. M. (1983). An overview of machine learning. *Machine Learning*, 3–23. <https://doi.org/10.1016/B978-0-08-051054-5.50005-4>
- Chan, G. K. Y. (2022). *AI employment decision-making: Integrating the equal opportunity merit principle and explainable AI* (Vol. 39, pp. 1027–1038). AI & Society. <https://doi.org/10.1007/s00146-022-01532-w>
- Chan, C. K. Y., & Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. *arXiv preprint arXiv:2305.00290*.
- Charlwood, A., & Guenole, N. (2022). Can HR adapt to the paradoxes of AI? *Human Resource Management Journal*, 32(4), 729–742. <https://doi.org/10.1111/1748-8583.12433>
- Chatterjee, S., Fruhling, A., Kotiadis, K., & Gartner, D. (2024). Towards new frontiers of healthcare systems research using AI and generative AI. *Health Systems*, 13(4), 263–273. <https://doi.org/10.1080/20476965.2024.2402128>
- Chen, Z. (2023). Collaboration among recruiters and AI: Removing human prejudices in employment. *Cognition, Technology & Work*, 25(1), 135–149. <https://doi.org/10.1007/s10111-022-00716-0>
- Chowdhery, A., Narang, S., Devlin, J., Bosma, M., Mishra, G., Roberts, A., et al. (2022). Palm: Scaling language modeling with pathways. *arXiv preprint arXiv:2204.02311*.
- Chung, H. W., Hou, L., Longpre, S., Zoph, B., Tay, Y., Fedus, W., et al. (2022). Scaling instruction-finetuned language models. *arXiv preprint arXiv:2210.11416*.
- Damioli, G., Van Roy, V., & Vertesy, D. (2021). The impact of AI on labor productivity. *Eurasian Business Review*, 11, 1–25. <https://doi.org/10.1007/s40821-020-00172-8>
- Dehouche, N., & Dehouche, K. (2023). What's in a text-to-image prompt? The potential of stable diffusion in visual arts education. *Heliyon*, Article e16757. <https://doi.org/10.1016/j.heliyon.2023.e16757>
- Deng, K., Liu, X., Xu, D., & Sengupta, A. (2024). Revolutionizing digital health with generative AI: User experiences and healthcare performance. In *2024 IEEE international conference on medical AI (MedAI)* (pp. 366–371). IEEE. <https://doi.org/10.1109/MedAI62885.2024.00055>.
- Dergaa, I., Chamari, K., Zmijewski, P., & Ben Saad, H. (2023). From human writing to AI-generated text: Examining the prospects and potential threats of ChatGPT in academic writing. *Biology of Sport*, 40(2), 615–622. <https://doi.org/10.5114/biolsport.2023.125623>
- Ernst, E., Merola, R., & Samaan, D. (2019). Economics of AI: Implications for the future of work. *IZA Journal of Labor Policy*, 9(1). <https://doi.org/10.2478/izajolp-2019-0004>
- Fahim, Y., & Maji, S. K. (2025). Mathematical frameworks for generative AI applications. In *Generative artificial intelligence (AI) approaches for industrial applications* (pp. 47–67). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-76710-4_3
- Fatani, B. (2023). ChatGPT for future medical and dental research. *Cureus*, 15(4), Article e37285. <https://doi.org/10.7759/cureus.37285>
- Flouren, W. W., & Alkema, W. (2015). Application of text mining in the biomedical domain. *Methods*, 74, 97–106. <https://doi.org/10.1016/j.ymeth.2015.01.015>
- Floridi, L., & Chiriatti, M. (2020). GPT-3: Its nature, scope, limits, and consequences. *Minds and Machines*, 30, 681–694. <https://doi.org/10.1007/s11023-020-09548-1>
- Flynn, M. A., Check, P., Steege, A. L., Sívén, J. M., & Syron, L. N. (2021). Health equity and a paradigm shift in occupational safety and health. *International Journal of Environmental Research and Public Health*, 19(1), 349. <https://doi.org/10.3390/ijerph19010349>
- Fossen, F., & Sorgner, A. (2022). New digital technologies and heterogeneous employment and wage dynamics in the United States: Evidence from individual-level data, 175. <https://doi.org/10.1016/j.techfore.2021.121381>
- Fox, M., De Raedt, L., & Muggleton, S. (2014). Alan turing and the development of AI. *AI communications*, 27(1), 3–10. <https://doi.org/10.3233/AIC-130579>
- Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254–280. <https://doi.org/10.1016/j.techfore.2016.08.019>
- Fukumura, Y. E., Gray, J. M., Lucas, G. M., Becerik-Gerber, B., & Roll, S. C. (2021). Worker perspectives on incorporating AI into office workspaces: Implications for the future of office work. *International Journal of Environmental Research and Public Health*, 18(4). <https://doi.org/10.3390/ijerph18041690>
- Füller, J., Hutter, K., Wahl, J., Bilgram, V., & Tekic, Z. (2022). How AI revolutionizes innovation management: Perceptions and implementation preferences of AI-based innovators. *Technological Forecasting and Social Change*, 178, Article 121598. <https://doi.org/10.1016/j.techfore.2022.121598>
- Georgieff, A., & Hye, R. (2022). AI and employment: New cross-country evidence. *Frontiers in AI*, 5, Article 832736. <https://doi.org/10.3389/frai.2022.832736>
- Giansanti, D. (2022). *AI in public health: Current trends and future possibilities* (Vol. 11907). MDPI. <https://doi.org/10.3390/2Fijerph191911907>
- Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., et al. (2014). Generative adversarial nets. *Advances in Neural Information Processing Systems*, 27. <https://doi.org/10.48550/arXiv.1406.2661>
- Gupta, A., Singhal, A., Mahajan, A., Jolly, A., & Kumar, S. (2022). Empirical framework for automatic detection of neural and human authored fake news. In *2022 6th international conference on intelligent computing and control systems (ICICCS)* (pp. 1654–1659). IEEE. <https://doi.org/10.1109/ICICCS53718.2022.9788271>
- Hamet, P., & Tremblay, J. (2017). AI in medicine. *Metabolism*, 69, S36–S40. <https://doi.org/10.1016/j.metabol.2017.01.011>
- Hazarika, I. (2020). AI: Opportunities and implications for the health workforce. *International Health*, 12(4), 241–245. <https://doi.org/10.1093/inthealth/ihaa007>
- Hendler, J. (2008). Avoiding another AI winter. *IEEE Intelligent Systems*, 23(2), 2–4. <https://doi.org/10.1109/MIS.2008.20>
- Herzenberg, S., & Alic, J. (2019). *Towards an AI economy that works for all. A report of the keystone research center future of work project*. Keystone Research Center.
- Hollingsworth, A., Ruhm, C. J., & Simon, K. (2017). Macroeconomic conditions and opioid abuse. *Journal of Health Economics*, 56, 222–233. <https://doi.org/10.1016/j.jhealeco.2017.07.009>
- Huang, B., Huan, Y., Xu, L. D., Zheng, L., & Zou, Z. (2019). Automated trading systems statistical and machine learning methods and hardware implementation: A survey. *Enterprise Information Systems*, 13(1), 132–144. <https://doi.org/10.1080/17517575.2018.1493145>
- Huang, Y., & Sharif, N. (2017). From 'labour dividend' to 'robot dividend': Technological change and workers' power in South China. *Agrarian South: Journal of Political Economy*, 6(1), 53–78. <https://doi.org/10.1177/2277976017721284>
- Huchler, N. (2022). Komplementäre Arbeitsgestaltung. Grundrisse eines Konzepts zur Humanisierung der Arbeit mit KI. *Zeitschrift für Arbeitswissenschaft*, 76(2), 158–175. <https://doi.org/10.1007/s41449-022-00319-5>
- Jain, R., Garg, N., & Khera, S. N. (2022). Effective human-AI work design for collaborative decision-making. *Kybernetes*, 52(11), 5017–5040. <https://doi.org/10.1108/K-04-2022-0548>
- Jarrah, M. H. (2018). AI and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, 61(4), 577–586. <https://doi.org/10.1016/j.bushor.2018.03.007>
- Jiao, W., Wang, W., Huang, J.-t., Wang, X., & Tu, Z. (2023). Is ChatGPT a good translator? A preliminary study. *arXiv preprint arXiv:2301.08745*.
- Kanitz, R., Gonzalez, K., Briker, R., & Straatmann, T. (2023). Augmenting organizational change and strategy activities: Leveraging generative AI. *The Journal of Applied Behavioral Science*, 59(3), 345–363. <https://doi.org/10.1177/00218863231168974>
- Khan, S., Mehmood, S., & Khan, S. U. (2024). Navigating innovation in the age of AI: How generative AI and innovation influence organizational performance in the manufacturing sector. *Journal of Manufacturing Technology Management*. <https://doi.org/10.1108/JMTM-06-2024-0302>
- Khan, M. I., Parahyanti, E., & Hussain, S. (2024). The role generative AI in human resource management: Enhancing operational efficiency, decision-making, and addressing ethical challenges. *Asian Journal of Logistics Management*, 3(2), 104–125. <https://doi.org/10.14710/ajlm.2024.24671>
- Khurana, S., & Vaddi, A. (2023). ChatGPT from the perspective of an academic oral and maxillofacial radiologist. *Cureus*, 15(6), Article e40053. <https://doi.org/10.7759/2Fcureus.40053>
- Kingma, D. P., & Welling, M. (2013). Auto-encoding variational bayes. *arXiv preprint arXiv:1312.6114*.
- Korinek, A., & Stiglitz, J. E. (2018). AI and its implications for income distribution and unemployment. In *The economics of AI: An agenda* (pp. 349–390). University of Chicago Press. <https://doi.org/10.7208/9780226613475-016>
- Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., et al. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLOS Digital Health*, 2(2), Article e0000198. <https://doi.org/10.1371/journal.pdig.0000198>
- Lane, M., & Saint-Martin, A. (2021). The impact of AI on the labour market: What do we know so far? OECD. <https://doi.org/10.1787/1815199X>
- Lee, J., Yoon, W., Kim, S., Kim, D., Kim, S., So, C. H., et al. (2019). BioBERT: A pre-trained biomedical language representation model for biomedical text mining. *Bioinformatics*, 36(4), 1234–1240. <https://doi.org/10.1093/bioinformatics/btz682>
- Levesque, E. M. (2018). The role of AI in education and the changing US workforce. In *A blueprint for the future of AI*.
- Li, H. (2022). Language models: Past, present, and future. *Communications of the ACM*, 65(7), 56–63. <https://doi.org/10.1145/3490443>
- Li, J. J., Bonn, M. A., & Ye, B. H. (2019). Hotel employees' AI and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. *Tourism Management*, 73, 172–181. <https://psycnet.apa.org/doi/10.1016/j.tourman.2019.02.006>

- Liu, H., Ning, R., Teng, Z., Liu, J., Zhou, Q., & Zhang, Y. (2023). *Evaluating the logical reasoning ability of ChatGPT and GPT-4*. arXiv preprint arXiv:2304.03439.
- Mann, M., & Smith, M. (2017). Automated facial recognition technology: Recent developments and approaches to oversight. *The University of New South Wales Law Journal*, 40(1), 121–145. <https://doi.org/10.53637/KAVV4291>
- Mantello, P., & Ho, M. T. (2024). Emotional AI and the future of wellbeing in the post-pandemic workplace. *AI & Society*, 38(1), 97–119. <https://doi.org/10.1007/s00146-024-01890-7>
- Mantello, P., Ho, M. T., Nguyen, M. H., & Vuong, Q. H. (2023). Bosses without a heart: Socio-demographic and cross-cultural determinants of attitude toward emotional AI in the workplace. *AI & Society*, 38(1), 97–119. <https://doi.org/10.1007/s00146-021-01290-1>
- McCarthy, J. (1987). Generality in AI. *Communications of the ACM*, 30(12), 1030–1035. <https://doi.org/10.1145/33447.33448>
- McCarthy, J. (2007). *From here to human-level AI*. <https://doi.org/10.1016/j.artint.2007.10.009>, 171(18), 1174–1182.
- McGee, R. E., & Thompson, N. J. (2015). Unemployment and depression among emerging adults in 12 states, behavioral risk factor surveillance system, 2010. *Preventing Chronic Disease*, 12. <https://doi.org/10.5888/pcd12.140451>
- McGuffie, K., & Newhouse, A. (2020). The radicalization risks of GPT-3 and advanced neural language models. *arXiv preprint arXiv:2009.06807*.
- McKay, C., Pollack, E., & Fitzpayne, A. (2019). Automation and a changing economy. *Future of work initiative*. The Aspen Institute. Retrieved from <https://www.aspeninstitute.org/wp-content/uploads/2019/04/Automation-and-a-Changing-Economy-The-Case-for-Action-April-2019.pdf>.
- Méda, D. (2019). Three scenarios for the future of work. *International Labour Review*, 158(4), 627–652. <https://doi.org/10.1111/ilr.12157>
- Merola, R. (2022). Inclusive growth in the era of automation and AI: How can taxation help? *Frontiers in AI*, 5, Article 867832. <https://doi.org/10.3389/frai.2022.867832>
- Möhlmann, M., & Zalmanson, L. (2017). Hands on the wheel: Navigating algorithmic management and Uber drivers' autonomy. In Y. Jin Kim, R. Agarwal, & J. K. Lee (Eds.), *Proceedings of the international conference on information systems - transforming society with digital innovation, ICIS 2017, Seoul, South Korea, December 10-13, 2017*. Association for Information Systems, 2017.
- Morley, J., DeVito, N. J., & Zhang, J. (2023). Generative AI for medical research. *BMJ*, 382, 1551. <https://doi.org/10.1136/bmj.p1551>
- Myers, W. (1986). Introduction to expert systems. *IEEE Intelligent Systems*, 1(1), 100–109. <https://doi.org/10.1109/MEX.1986.5006506>
- Nath, S., Marie, A., Ellershaw, S., Korot, E., & Keane, P. A. (2022). New meaning for NLP: The trials and tribulations of natural language processing with GPT-3 in ophthalmology. *British Journal of Ophthalmology*, 106(7), 889–892. <https://doi.org/10.1136/bjophthalmol-2022-321141>
- Nazareno, L., & Schiff, D. S. (2021). The impact of automation and AI on worker wellbeing. *Technology in Society*, 67, Article 101679. <https://doi.org/10.1016/j.techsoc.2021.101679>
- Neeley, T. B., & Leonardi, P. M. (2018). Enacting knowledge strategy through social media: Passable trust and the paradox of nonwork interactions. *Strategic Management Journal*, 39(3), 922–946. <https://doi.org/10.1002/smj.2739>
- Nithuna, S., & Laseena, C. (2020). Review on implementation techniques of chatbot. In *2020 international conference on communication and signal processing (ICCSPP)*. <https://doi.org/10.1109/ICCSPP48568.2020.9182168>. IEEE.
- Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative AI. *Science*, 381(6654), 187–192. <https://doi.org/10.1126/science.adh2586>
- Osoba, O. A., & Welser, W. (2017). *The risks of AI to security and the future of work*. Santa Monica, CA: RAND.
- Parikh, N. A. (2023). Empowering business transformation: The positive impact and ethical considerations of generative AI in software product management—a systematic literature review. *arXiv preprint arXiv:2306.04605*.
- Parker, S. K., & Grote, G. (2022). Automation, algorithms, and beyond: Why work design matters more than ever in a digital world. *Applied Psychology*, 71(4), 1171–1204. <https://doi.org/10.1111/apps.12241>
- Pilaniwala, P. (2024). AI in product management: Enhancing user experience personalization through GenAI. In *2024 3rd international conference on automation, computing and renewable systems (ICACRS)* (pp. 1135–1140). IEEE. <https://doi.org/10.1109/ICACRS62842.2024.10841633>
- Rafner, J., Dellermann, D., Hjorth, A., Veraszto, D., Kampf, C., MacKay, W., et al. (2022). Deskilling, upskilling, and reskilling: A case for hybrid intelligence. *Morals & Machines*, 1(2), 24–39. <https://doi.org/10.5771/2747-5174-2021-2-24>
- Rai, A., Constantinides, P., & Sarker, S. (2019). Next generation digital platforms: Toward human-AI hybrids. *MIS Quarterly*, 43(1), iii–ix. Retrieved from <https://misq.umn.edu/misq/downloads/download/editorial/687/>
- Ramaswamy, V., & Ozcan, K. (2018). What is co-creation? An interactional creation framework and its implications for value creation. *Journal of Business Research*, 84, 196–205. <https://doi.org/10.1016/j.jbusres.2017.11.027>
- Rieth, M., & Hagemann, V. (2021). Veränderte kompetenzanforderungen an mitarbeitende infolge zunehmender automatisierung—eine arbeitsfeldbetrachtung. *Gruppe Interaktion Organisation Zeitschrift Für Angewandte Organisationspsychologie (GIO)*, 52(1), 37–49. <https://doi.org/10.1007/s11612-021-00561-1>
- Salvagno, M., Taccone, F. S., & Gerli, A. G. (2023). Can AI help for scientific writing? *Critical Care*, 27(1), 75. <https://doi.org/10.1186/s13054-023-04380-2>
- Schatten, M. (2024). AI and the future of entertainment technology. <https://hal.science/hal-04637685v1>. (Accessed 4 March 2025).
- Schlogl, L., & Sumner, A. (2018). *The rise of the robot reserve army: Automation and the future of economic development, work, and wages in developing countries* (Vol. 487). Center for Global Development Working Paper. Retrieved from <https://www.cgdev.org/publication/rise-robot-reserve-army-automation-and-future-economic-development-work-and-wages>.
- Schmidhuber, J. (2022). *Scientific integrity and the history of deep learning: The 2021 Turing lecture, and the 2018 Turing award*. Switzerland: IDSIA, Lugano. Technical Report IDSIA-77-21 (Vol. 3).
- Schulte Steinberg, A. L., & Hohenberger, C. (2023). Can AI close the gender gap in the job market? Individuals' preferences for AI evaluations. *Computers in Human Behavior Reports*, 10, Article 100287. <https://doi.org/10.1016/j.chbr.2023.100287>
- Schultz, E. E. (1992). Hawaii international conference on system sciences. *ACM SIGCHI Bulletin*, 24(3), 24–29. <https://doi.org/10.1145/134421.134436>
- Sequeira, T. N., Garrido, S., & Santos, M. (2021). Robots are not always bad for employment and wages. *International Economics*, 167, 108–119. <https://doi.org/10.1016/j.inteco.2021.06.001>
- Shao, S., Shi, Z. Z., & Shi, Y. R. (2022). Impact of AI on employment in the manufacturing industry. *International Journal of Financial Engineering*, 9(3). <https://doi.org/10.1142/S2424786321410139>
- Shepherd, C. (2006). Constructing enterprise resource planning: A thoroughgoing interpretivist perspective on technological change. *Journal of Occupational and Organizational Psychology*, 79(3), 357–376. <https://doi.org/10.1348/096317906X105742>
- Singh, H., & Singh, A. (2023). ChatGPT: Systematic review, applications, and agenda for multidisciplinary research. *Journal of Chinese Economics and Business Studies*, 21(2), 193–212. <https://doi.org/10.1080/14765284.2023.2210482>
- Singhal, K., Azizi, S., Tu, T., Mahdavi, S. S., Wei, J., Chung, H. W., et al. (2023). Large language models encode clinical knowledge. *Nature*, 620(7972), 172–180. <https://doi.org/10.1038/s41586-023-06291-2>
- Sinha, D. K., & Sinha, G. (2025). History of machine learning. In *Machine learning hybridization and optimization for intelligent applications* (pp. 304–309). CRC Press.
- Sorensen, G., Dennerlein, J. T., Peters, S. E., Sabbath, E. L., Kelly, E. L., & Wagner, G. R. (2021). The future of research on work, safety, health and wellbeing: A guiding conceptual framework. *Social Science & Medicine*, 269, Article 113593. <https://doi.org/10.1016/j.socscimed.2020.113593>
- Stokel-Walker, C. (2022). AI bot ChatGPT writes smart essays—should academics worry? *Nature*. Retrieved from <https://www.nature.com/articles/d41586-022-04397-7>.
- Sundararajan, A. (2017). *The sharing economy: The end of employment and the rise of crowd-based capitalism*. MIT Press.
- Sveding, J. J. (2021). Unsupervised image-to-image translation: Taking inspiration from human perception (Dissertation). Retrieved from <https://urn.kb.se/resolve?urn=urn:nbn:se:lnu:diva-105500>.
- Tate, T., Doroudi, S., Ritchie, D., & Xu, Y. (2023). Educational research and AI-generated writing: Confronting the coming tsunami. <https://doi.org/10.35542/osf.io/4mec3>.
- Tavakoli, M., Faraji, A., Vrolijk, J., Molavi, M., Mol, S. T., & Kismihok, G. (2022). An AI-based open recommender system for personalized labor market-driven education. *Advanced Engineering Informatics*, 52. <https://doi.org/10.1016/j.aei.2021.101508>
- Thorat, S. A., & Jadhav, V. (2020). A review on implementation issues of rule-based chatbot systems. In *Proceedings of the international conference on innovative computing & communications (ICICC)*. <https://doi.org/10.2139/ssrn.3567047>
- Tyagi, K. (2024). Copyright, text & data mining and the innovation dimension of generative AI. *Journal of Intellectual Property Law & Practice*, 19(7), 557–570. <https://doi.org/10.1093/jiplp/jpae028>
- Tyson, L. D., & Zysman, J. (2022). Automation, AI & work. *Daedalus*, 151(2), 256–271. <https://doi.org/10.1162/daed.a.01914>
- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., et al. (2017). Attention is all you need. *Advances in Neural Information Processing Systems*, 30. <https://doi.org/10.48550/arXiv.1706.03762>
- Veliz, C. (2020). *Privacy is power: Why and how you should take back control over your data*. London: Penguin.
- Verghese, A., Shah, N. H., & Harrington, R. A. (2018). What this computer needs is a physician: Humanism and AI. *JAMA*, 319(1), 19–20. <https://doi.org/10.1001/jama.2017.19198>
- Vieitez, J. C., Carcía, A. D. L. T., & Rodríguez, M. T. V. (2010). Perception of job security in a process of technological change: Its influence on psychological well-being. *Behaviour & Information Technology*, 20(3), 213–223. <https://doi.org/10.1080/01449290120718>
- Wach, K., Duong, C. D., Ejdy, J., Kazlauskaitė, R., Korzynski, P., Mazurek, G., et al. (2023). The dark side of generative AI: A critical analysis of controversies and risks of ChatGPT. *Entrepreneurial Business and Economics Review*, 11(2), 7–30. <https://doi.org/10.15678/EBER.2023.110201>
- Wang, R. E., & Demsky, D. (2023). Is ChatGPT a good teacher coach? Measuring zero-shot performance for scoring and providing actionable insights on classroom instruction. *arXiv preprint arXiv:2306.03090*.
- Wang, Y.-Y., & Wang, Y.-S. (2022). Development and validation of an AI anxiety scale: An initial application in predicting motivated learning behavior. *Interactive Learning Environments*, 30(4), 619–634. <https://doi.org/10.1080/10494820.2019.1674887>
- Wang, Y., Wang, L., Rastegar-Mojarad, M., Moon, S., Shen, F., Afzal, N., et al. (2018). Clinical information extraction applications: A literature review. *Journal of Biomedical Informatics*, 77, 34–49. <https://doi.org/10.1016/j.jbi.2017.11.011>
- Warning, A., Weber, E., & Püffel, A. (2022). On the impact of digitalization and AI on employers' flexibility requirements in occupations—empirical evidence for Germany. *Frontiers in AI*, 5, Article 868789. <https://doi.org/10.3389/frai.2022.868789>
- Wisskirchen, G., Biacabe, B. T., Bormann, U., Muntz, A., Niehaus, G., Soler, G. J., et al. (2017). AI and robotics and their impact on the workplace. *IBA Global Employment Institute*, 11(5), 49–67.
- Yang, Y., & Siau, K. L. (2018). *A qualitative research on marketing and sales in the AI age*.

- Yim, W.-W., Yetisgen, M., Harris, W. P., & Kwan, S. W. (2016). Natural language processing in oncology: A review. *JAMA Oncology*, 2(6), 797–804. <https://doi.org/10.1001/jamaoncol.2016.0213>
- Zha, D., Bhat, Z. P., Lai, K. H., Yang, F., Jiang, Z., Zhong, S., & Hu, X. (2025). Data-centric AI: A survey. *ACM Computing Surveys*, 57(5), 1–42. <https://doi.org/10.1145/3711118>
- Zhang, M., & Li, J. (2021). A commentary of GPT-3 in MIT technology review. *Fundamental Research*, 1(6), 831–833. <https://doi.org/10.1016/j.fmre.2021.11.011>