Algorithms and Employment: A Review of AI's Impact on the Labour Market

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ABSTRACT

This paper investigates the economic implications of Artificial Intelligence (AI) on the global labour market through a systematic literature review of highly cited literature published within the past decade - a period characterised by significant scholarly attention to AI's development and its economic consequences. By examining labour market dynamics, this study synthesises existing research to address the central question: How does AI impact labour markets on a global scale? The employed methodology enabled the identification of key themes, including the transformation of employment structures, evolving skill requirements, and automation's differential effects across occupational categories and geographic regions. This paper contributes to the scholarly discourse by offering a comprehensive synthesis of empirical findings and theoretical frameworks concerning AI's economic ramifications. The analysis reveals future research trajectories and underscores the imperative for evidence-based policy interventions designed to maximise AI's socioeconomic benefits while mitigating potential labour market disruptions. The findings have significant implications for policymakers, industry stakeholders and educational institutions as they navigate the complexities of this technological progress in the labour markets.

KEYWORDS: *artificial intelligence, economic, economic impact, labour market, productivity.*

JEL CLASSIFICATION: *A12, O10, O32, O39, O40.*

1. INTRODUCTION

Artificial Intelligence (referred to as AI throughout this paper) has emerged as a transformative force in the global economy, reshaping industries, labour markets, and traditional economic paradigms. The rapid advancement of AI technologies, exemplified by the recent surge in large language models (LLMs), has sparked intense interest among economists, policymakers, and worldwide business leaders. This paper aims to provide a more systematic literature analysis of the economic implications of AI, focusing strictly on its impact on labour markets. As this field continues to evolve and integrate into various sectors, it significantly changes employment dynamics, altering job availability, wage structures, and the overall economic landscape. Notably, this transformation raises important concerns regarding job displacement, wage inequality, and the adaptability of the workforce, highlighting a pressing need for effective policy responses. In turn, this will help mitigate the adverse effects on vulnerable workers and communities.

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In global labour markets, AI has the potential to displace certain jobs while simultaneously creating new opportunities, often leading to sector-specific changes that require workers to acquire new skills. This trend has been characterised by wage stagnation and increased income inequality, as the demand shifts toward higher-skilled positions in sectors like technology as well as research and development, leaving low-wage workers at a disadvantage (Dwivedi *et al.*, 2021). More recent research on AI's impact on the labour market reveals a complex landscape of opportunities but also fundamental challenges. While AI and automation may displace certain jobs, particularly those involving routine tasks (Frank *et al.*, 2019; Tailor *et al.*, 2023), they also create new employment opportunities requiring technical skills, creativity, as well as emotional intelligence (Faishal *et al.*, 2023).

Studies highlight the potential for AI to augment worker productivity and to transform job roles across various sectors, including healthcare, finance, and transportation (Sharma & Sehgal, 2023). However, concerns persist regarding work-related inequalities, potential discrimination, and the need for ethical frameworks (Özkiziltan & Hassel, 2021). To address these challenges, researchers emphasise the importance of lifelong learning, reskilling programs, and proactive policies (Lane & Saint-Martin, 2021; Faishal *et al.*, 2023). The future impact of AI on labour markets remains uncertain, necessitating ongoing research and adaptive strategies both from businesses and governments to ensure beneficial outcomes for society (Yeh *et al.*, 2020). At a global level, the economic benefits of AI are likely to be unevenly distributed, with leaders anticipating that North America and China will benefit the most from developing and using the technology (McKinsey & Company, 2018). This uneven distribution highlights the need for careful management of the AI transition, including supporting worker adaptation and addressing potential inequalities (Szczepański, 2019). The integration of this into economics not only opens new avenues for analysis and policy formulation but also prompts critical discussions about the role of technology in economic decision-making and social planning. (Agrawal, Gans & Goldfarb, 2018). The emergence of AI has introduced a new dimension to economic theory, with the potential to redefine traditional economic concepts. (Bickely *et al.*, 2022).

The motivation for this research comes from the pressing need to thoroughly understand and navigate these changes to economic systems worldwide. As AI capabilities continue to expand, questions arise about its potential to disrupt traditional economic models, create new opportunities, and increase existing inequalities in society. By examining research related to these issues, this paper contributes to the growing body of literature on the economics of AI and provides insights that can inform future direction for study and research. This paper differs from existing research, as it provides a more holistic view, tracing the evolution of AI in economic theory, and providing a research context for current economic developments and future projections.

To achieve the aim of this study, the methodology is primarily centered around a basic systematic review, including a comprehensive database search and a literature review of the relevant papers. The findings conclude that AI is likely to influence economic growth and labour market dynamics, at a global scale. The remainder of this paper is structured as follows, Section 2 provides a historical overview of AI in economic theory, Section 3 examines the methodology employed in this paper, and Section 4 provides findings on the impact of AI on labour markets. Section 5 concludes with a summary of key findings and their implications for the future of traditional economic systems in the age of AI and discusses the limitations of this study, proposing future areas of research.

2. A HISTORICAL OF AI IN ECONOMIC THEORY

2.1. Definitions of AI, in time

As we have described the transformative potential of AI across the global economy in the introduction, it is important to contextualise this technological evolution within its historical trajectory. By understanding the origins and evolution of AI, we can better understand its role in shaping current economic dynamics and recognise the foundational developments that paved the way for AI's integration into economic theory. AI has been defined and categorised in various ways across the literature. Some define AI as programs that surpass human intelligence (Dobrev, 2013), while others focus on machines demonstrating intelligent behaviour (Przegalinska, 2018). This is a big domain and includes technologies such as machine learning, deep learning, and natural language processing (Welsh, 2019; Cox & Mazumdar, 2022). Figure 1 represents the relationship between key concepts in artificial intelligence (AI) and is based on seminal work of LeCun, Bengio and Hinton (2015). The diagram illustrates AI as the broadest encompassing field, with increasingly specialised subfields represented by concentric circles. Machine Learning (ML) is positioned as a subset of AI, focusing on algorithms that improve through experience. Deep Learning (DL), a more specialised approach using neural networks with multiple layers, is contained within ML. Generative AI (GenAI), which creates new content based on patterns in training data, is shown as a subset of deep learning. At the core of the diagram are Large Language Models (LLMs), positioned as the most specific technology among these concepts, and the most popular form of AI, in recent years. LLMs represent a particular implementation of generative AI designed to process and generate human language on a scale. Researchers have proposed different categorisations, including applications in library processes, data literacy, and user management (Cox & Mazumdar, 2022), as well as themes in AI art practices such as aesthetics, identity, and interpretation (Gruchy, 2020).

The field's evolution is traced from early pioneers (Feigenbaum & Feldman, 1963) to contemporary applications across various domains (Sharma *et al.*, 2023). Wang (2008) argues that different definitions of AI lead research in divergent directions, highlighting the need for a unified working definition to give AI a proper identity. Looking for a general definition of AI, the Oxford English Dictionary proposes that Artificial Intelligence refers to "the theory and advancement of computer systems capable of executing tasks typically associated with human intelligence"(Oxford English Dictionary, 2022). This definition can be perceived as both broad and vague because the field of Artificial Intelligence covers a wide range of technologies and techniques that enable machines or programming interfaces to perceive their environment, learn from experience, and perform tasks that typically require human intelligence or intervention. Because of this broad spectrum and the absence of a single universally recognised descriptor, categorising AI is a challenging task. Sarker (2022) successfully attempted to divide AI into five distinct types: analytical, functional, interactive, textual, and visual AI. However, the most used terms in AI are techniques used to create intelligent and smart systems for various real-world applications. The recent surge of interest in AI and disruption of the labour market has primarily stemmed from advancements in the field of generative AI and machine learning (Agrawal, Gans & Goldfarb, 2019). Although each type of AI technology has a particular application and scope, it is often the case that existing technologies are combinations and applications of various categories. Thus, categorising AI systems based on specific types or techniques is not always feasible. AI development is a wide and ongoing practice, and new forms of AI technologies are continuously being researched and produced over time.

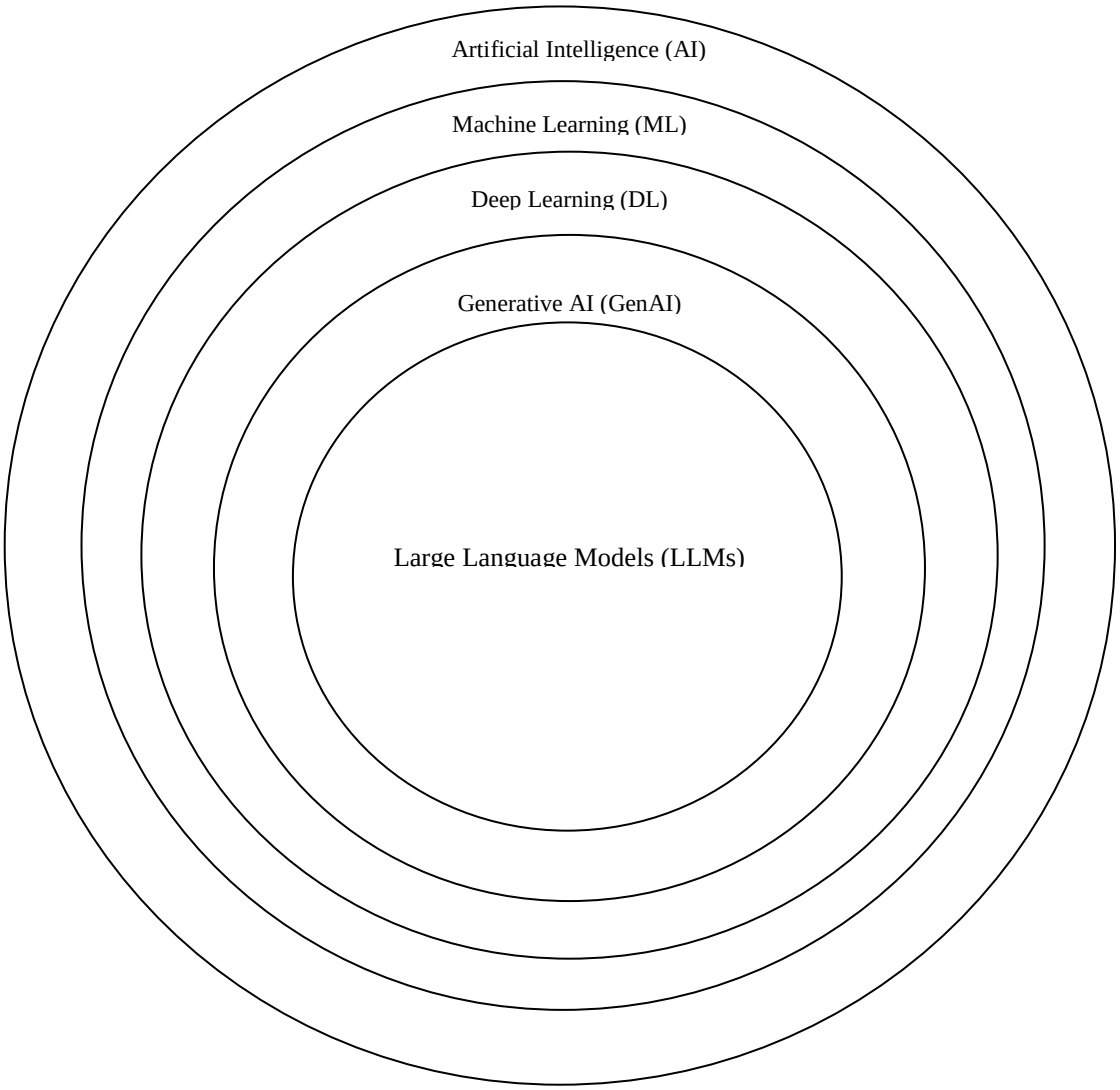

Figure 1. Hierarchical relationship of AI technologies and subfields
Source: authors' contribution

2.2. The historical Evolution of AI

The intersection of science and economic theory has a rich historical background, which has evolved over time. Early economic theories and models laid the foundation for understanding the impact of science on the economy, ranging from the classical theories of Adam Smith and Karl Marx to the neoclassical economics of Alfred Marshall and John Maynard Keynes. The discussion on technological advancement and its economic implications has been a recurring theme. In their paper *"Artificial intelligence in the field of economics,"* Bickley *et al.* (2022) discussed the long and evolving history of Artificial Intelligence in the field of economics, highlighting the varied degrees and focus of economists on AI since its early days. Historic AI's foundations were laid by pioneers such as Charles Babbage and Ada Lovelace in the 19th century (Grzybowski *et al.,* 2024). Alan Turing, also considered a pioneer of the field of computer science, made significant advancements in the mid-20th century (Zerilli *et al.,* 2021). The field gained momentum in late 50s, marking AI's birth as a scientific discipline (Chang, 2020; McCorduck *et al.,* 1977). Its development has since progressed through various stages, including rule-based systems, machine learning, and deep learning(Chang,2020; Luger, 2022). Despite facing challenges, the field has continued to

evolve, with recent advancements in natural language processing, speech recognition, and robotics (Moloi & Marwala, 2021). Today, AI applications are increasingly prevalent in everyday life, from search engines to healthcare (Nilsson, 2009). In 2020 the European Commission published a report titled: *"AI Watch: Historical Evolution of Artificial Intelligence"*, where it aimed to analyse the evolution in time of three paradigm shifts.

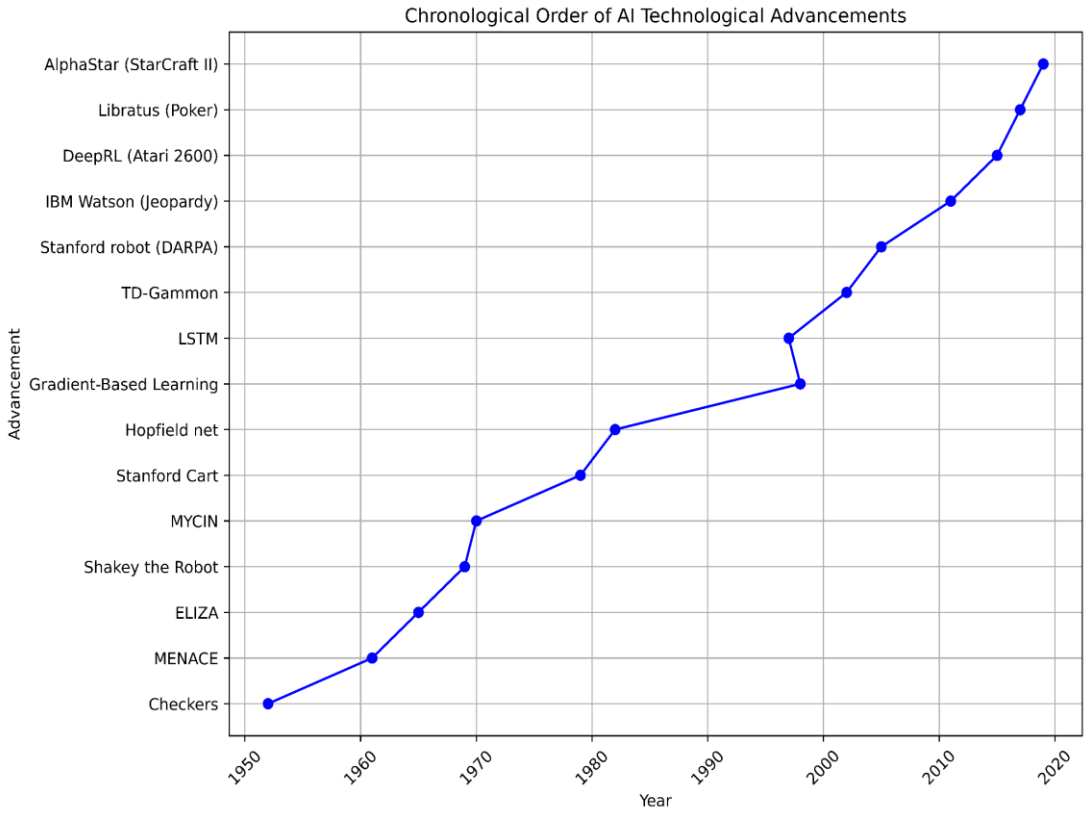

Figure 2. Chronological Order of AI Technological Advancements

Source: authors' own analysis based on data from the European Commission (2020)

Figure 2 represents the well-known research and development advancements that have played an important role in shaping the development of the field, as it is known today. Each milestone enhances AI understanding and application, shaping today's landscape. Early initiatives such as Checkers and MENACE paved the way for machine learning by showcasing computers' ability to learn from experience and gradually enhance their performance. This principle forms the cornerstone of contemporary AI systems and has significantly influenced AI researchers. In addition, ELIZA and Shakey introduced key aspects such as natural language processing and autonomous navigation, which have become integral components of AI applications such as chatbots and self-driving vehicles (Delipetrev et al., 2020)**.** Systems such as MYCIN and Stanford Cart showcased the potential of AI in specialised knowledge domains and physical navigation, leading to the development of more sophisticated expert systems and robotics used in healthcare, logistics, and beyond (Delipetrev et al., 2020). The practical applications of these advancements have been vast and transformative across various industries. Today's AI technologies are built upon these foundational achievements, and they continue to evolve as researchers and practitioners build on this legacy to explore new frontiers in Artificial Intelligence. (European Commission, 2022). As a more recent example, the world was taken by storm with the emergence of ChatGPT, an easily accessible tool that demonstrated a high level of proficiency in human communication, overcoming the boundaries between verbal expression and linguistic

structure – it can grasp intricate contexts and subtle nuances, and even appreciates humour. It quickly became one of the most adopted products (Hu, 2023) and enabled humans to do everything from organising a holiday to outlining a research paper and generating ideas. This technology is based on what researchers call a large language model (LLM), which is capable of fundamentally demonstrating that "computers" can indeed grasp the intricate nuances of human language and social interaction (Nield, 2023). OpenAI, the company behind ChatGPT, introduced a preliminary demo for it to the public on November 30, 2022, which subsequently gained widespread attention from both media and academia. Early adopters posted numerous examples of chatbots' capabilities, such as creating travel itineraries, composing fables, and coding websites from scratch. The chatbot's popularity increased overnight, as it attracted more than one million users within five days of its release. The emergence of this tool has demonstrated that Artificial Intelligence can transform and optimise some human tasks, having an exponential ability to exert a profound influence on various dimensions of society.

3. METHODOLOGY

Having established the historical foundation of AI and its adopted definitions, the next step is to explore how these influences can impact economic theory by systematically studying scholarly research. The historical evolution provides a backdrop against which this study examines the impact of AI in labour markets. The following section on methodology describes the rigorous approach undertaken to compile, analyse, and interpret relevant literature, ensuring that the subsequent findings are comprehensive and grounded in a structured analysis. For the methodology, this paper utilises the basic systematic review guidelines proposed by the Campbell Collaboration (2014), taking five successive steps to identify and analyse relevant studies, choosing the criteria for including studies in the review, literature search, selection of studies, data extraction and data analysis. As a first step, a set of criteria was adopted to investigate the key aim of this paper. The methodological framework employed in this study is the PEO (Population, Exposure, Outcome) model, which is particularly well-suited for qualitative research questions (Bettany-Saltikovand McSherry, R., 2024). The PEO framework was operationalised as follows: the Population comprises studies focusing on AI technologies and their applications; the Exposure refers to the evolution and development of AI over time; and the Outcomes encompass the impact on labour markets, consumer behaviour, and policy frameworks. This structured approach ensures a comprehensive and systematic exploration of the research question. To maintain the currency and relevance of the findings, the review includes studies published within the last decade (2014-present). This timeframe was chosen to capture the most recent developments in AI and its societal implications, given the rapid pace of technological advancement in this field. To maintain the relevance and quality of the review, specific inclusion and exclusion criteria were established. The inclusion criteria included only articles published in English between 2014 and 2024 that were considered to reflect the most recent developments in AI and its economic implications.

The selected studies needed to focus on this paper's major theme: labour market dynamics. The exclusion criteria involved: studies focused on AI concerning policy frameworks, consumer behaviour, and law, as well as non-English studies. These, while relevant, fall outside the economic focus of this review. The exclusion criteria also included non-peer-reviewed articles, conference papers, and grey literature to ensure consistency and quality. To assess and minimise bias, a basic checklist was used. This checklist approach included a few fundamental questions designed to quickly identify potential biases in the selected studies: Did the study clearly define its research question and objectives? Was the sampling method

appropriate and clearly described? Were the data collection methods reliable and thoroughly explained? Did the authors acknowledge limitations that could impact the study's validity?

This basic checklist approach ensures that each study included in the review meets a minimum standard of quality without requiring extensive analysis. By focusing on these five essential questions, the risk of bias was minimised simply and effectively, providing enough rigour to draw meaningful conclusions without unnecessary complexity. This approach was chosen to prioritise simplicity and make the methodology more accessible, particularly given the broad scope of this review. More complex bias assessment tools, such as the Cochrane Risk of Bias Tool, were considered, but ultimately were not used due to the additional time and resource constraints they would impose. By opting for a straightforward checklist, the authors aimed to maintain a balance between rigour and practicality, ensuring enough reliability while facilitating a more streamlined analysis.

3.1. Literature Search

The search strategy was designed to be both comprehensive and precise using two avenues: first, a keyword search in academic databases to identify relevant literature, and second, a Boolean search on relevant review studies. Before this search, a systematic combination of keywords was predetermined. The database chosen for this paper was Web of Science, and search strings were meticulously developed based on the PEO framework, incorporating studies related to artificial intelligence and labour markets. Bakir et al. (2022) argued that the Web of Science is the most used and most suitable database for literature analysis, having a higher coverage, mainly due to indexing many articles from popular journals, published in English. The keywords selected were “Artificial Intelligence”, “economic impact”, and “labour markets”.

3.2. Study Selection

Figure 3 captures the paper selection process which follows a rigorous four-step approach: identification of relevant literature, initial screening of titles and abstracts, full-text review of potentially eligible studies, and final selection for inclusion in the review. Data extraction was conducted using a form to systematically collect relevant information from the included studies. The extracted data encompassed study characteristics; key findings related to AI evolution and impacts on the specified domain. When screening the selected full-text articles, the main reason for exclusion was that studies didn’t relate directly to the areas discussed in this paper and in contrast, most academic papers were more focused on “Artificial Intelligence” and “Sustainability”. As a result, 898 studies were selected due to this procedure, 69 were excluded before assessment. Finally, 47 articles met the criteria to be included in a qualitative literature review. Given the qualitative nature of this review, this approach was adopted for analysing potential impact as well as key themes emerging from the research. This method involved reviewing the selected papers, allowing for a nuanced and comprehensive overview of the current state of knowledge on the topic.

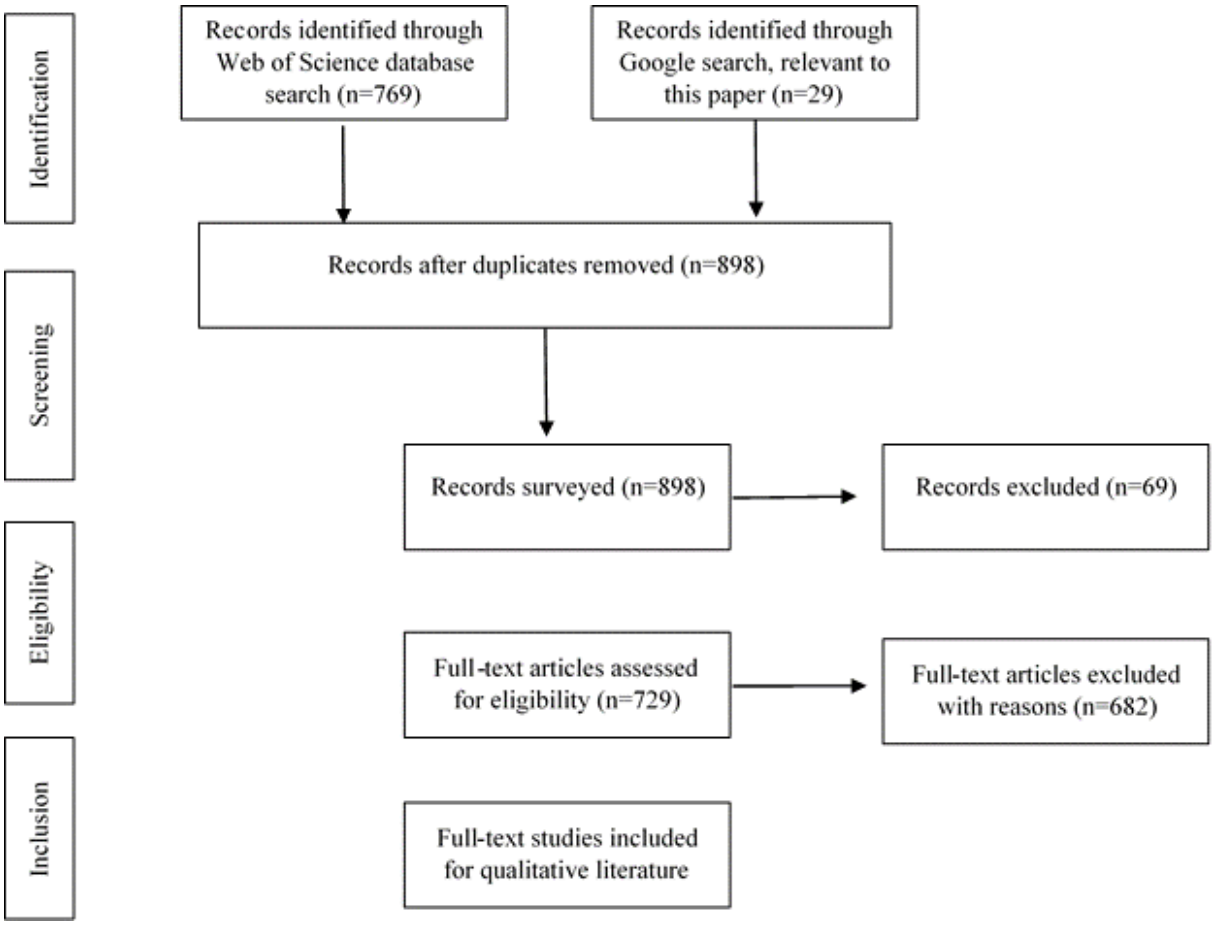

Figure 3. Illustration of Systematic Literature Review
Source: Authors own contribution based on data extracted from Web of Science

4. FINDINGS

With a clear methodology outlined, including a criterion for inclusion and exclusion of the studies employed in this paper, this section presents the findings of this review. By analysing these findings, the paper aims to provide a more nuanced understanding of AI's economic influence supported by empirical research and theoretical insights. Firstly, there has been a clear growth in academic research focused on Artificial Intelligence in the last 3 years. Figure 4 shows the evolution of articles over the last 10 years, with 30+ studies published in total during this period. There has been a notable increase in publications in recent years, since 2022, suggesting growing research interest in the field.

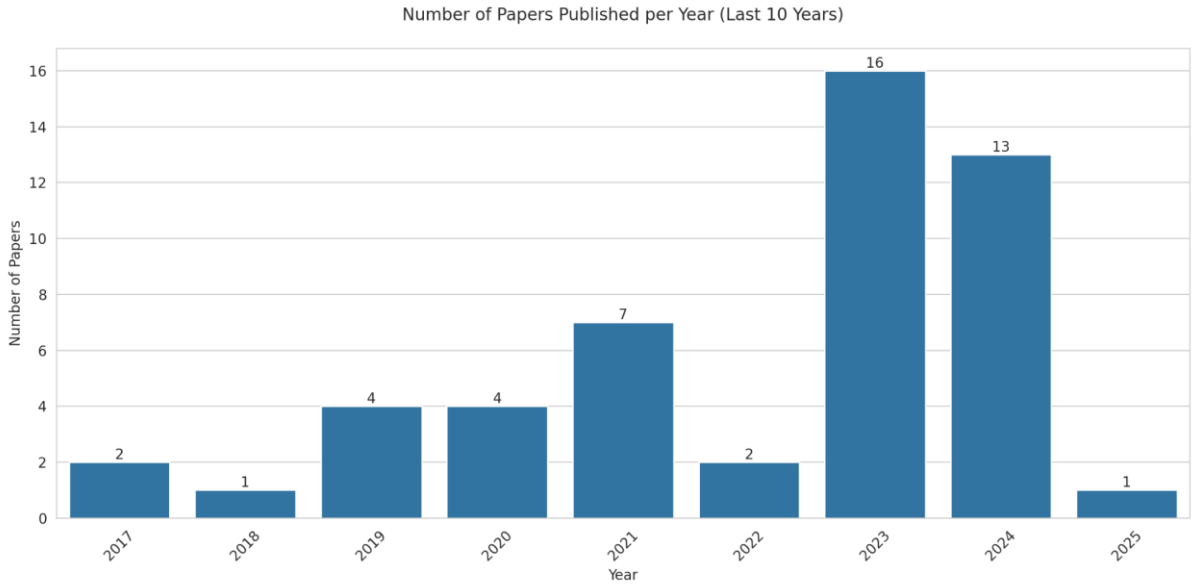

Figure 4. Number of papers published per year (in the last 10 years)
Source: authors' own analysis based on data from Scopus and Web of Science

Outside of academia, as the field of AI evolves, it alters the character of the work, and the skill set required for the workforce. Consequently, there are concerns about job displacement and the necessity of upskilling and reskilling workers to adjust to the evolving economic environment, so no one is left behind (Giuntella, Koenig, & Stella, 2023). On the positive side, AI is also expected to extend its capacity to stimulate productivity growth. It has the potential to generate novel business models, boost innovation, and optimise logistics and distribution. These advancements have the potential to transform industries and generate new economic prospects if built well and with ethics in mind (Gonzales, 2023). As researchers have delved into the historical evolution of AI in economic theory, they have identified key topics that have shaped the discourse. These topics include the emergence of machine learning algorithms, the integration of AI into business processes, and the exploration of AI's role in creating new economic opportunities. (Agrawal, Gans, & Goldfarb, 2019). One key aspect highlighted in the scholarly research is the evolving perception of AI's role in shaping economic theories and models (Bickley et al., 2022). Initial concerns about job displacement have gradually shifted toward understanding the potential of AI to drive productivity growth and innovation (Abrardi et al., 2022). This shift in focus reflects the growing recognition that AI is not only a substitute for human labour but also a catalyst for new economic opportunities (Acemoglu et al., 2020). The studies reviewed in this paper explore the intersection of AI and economics, providing insights into the evolving dynamics of this relationship. For instance, Bickley et al. (2022) examined the use and discussion of AI in economics across time, geography, and subfields. Their findings revealed a positive correlation between the quality of institutional affiliation and engagement with AI in economics, suggesting that leading research institutions are playing a crucial role in advancing the integration of AI into economic theory and practice. Beyond its effect on these economic areas, it has the potential to drive productivity growth, create new business models, and enhance innovation. These developments have the power to reshape industries and create new opportunities, which could have widespread implications for the global economy. A study conducted by

Laura Nurski and Mia Hoffmann (2022) examined the impact of AI on the nature and quality of jobs.

The authors suggest that AI's impact on the workplace is complex, reconfiguring job design and labour division through various automatic tasks in the development and production process, as well as distribution. However, they observe that the implications for job quality are nuanced and contingent on factors such as knowing how to integrate it into daily tasks and their composition. Despite its potential benefits, the implementation often leads to significant shifts in job quality across diverse contexts (Hoffmann and Nurski, 2022). These changes in job design can strain social and physical work environments and alter contractual employment conditions. Furthermore, existing power dynamics within organisations can accelerate job quality disparities among different socioeconomic groups. One way to mitigate this potential negative impact is to actively involve worker participation in the AI adoption process, ensuring transparent systems with human oversight. (Giuntella, Koenig and Stella, 2023). Policymakers also play a crucial role in preserving employees' power and job quality by involving experts and social partners in the AI adoption process. In a more comprehensive analysis of the *Impact of Artificial Intelligence on the labour market*, Agrawal et al. (2019) explored the nuanced effects, emphasising the ambiguity of these outcomes. The authors observed that, while AI substitutes capital for labour in predictive tasks, potentially displacing jobs involving skills such as transcription or navigation, it also opens opportunities for new tasks once rendered economically infeasible by uncertainty. An example of this is AI's role in healthcare, where improved glucose level predictions can lead to new types of jobs in chronic disease management. (Agrawal *et al.,* 2019). The study also highlights the intertwined nature of prediction and decision tasks, with AI's impact on decision tasks remaining uncertain, suggesting that better predictions could equally enhance or diminish the role of labour. The authors caution against applying conventional automation labour market analyses to AI, as its impacts cannot be categorised as favoring labour or capital. Their work ultimately acknowledges the complexity of AI influences, hinting at a landscape in which job augmentation and creation may offset automation-related job losses. (Agrawal *et al.,* 2019).

5. DISCUSSION

The discussion section examines these competing narratives, considering both the challenges of workforce transition and the potential productivity gains that AI implementation might offer. This part aims to provide an integrative perspective that underscores the need for proactive strategies to ensure that AI benefits are widely distributed and its risks minimised. This paper conducted a literature review of relevant research assessing the impact of AI on global labour markets. In contrast to the existing literature, this review only focused on highly cited studies from the past 10 years, particularly from 2022 to 2024, where a growing research interest can be observed. Furthermore, this is not limited to geographies, but provides a global overview of the current state of research. This study found that rapid advancements in AI have served as a scientific breakthrough and can have significant implications for human society, economies, and economic development. The sources, while insightful, present certain limitations that could be addressed in future research to enhance the understanding of AI's economic implications. While the reviewed studies acknowledged the ethical implications of AI, there remains a need for more focused research on addressing issues like bias, fairness, transparency, and data privacy. Future research should prioritise developing ethical frameworks and policy recommendations to guide responsible AI development and deployment, ensuring that its benefits are widely shared and potential risks are mitigated. Research should expand beyond examining AI's impact on aggregate economic indicators to investigate its effects on specific sectors and demographics. This would provide a more nuanced understanding of how AI is shaping different industries and its implications for workers with varying skill levels and socioeconomic backgrounds. Addressing these

limitations in future research would contribute to a more comprehensive and informed understanding of AI's economic implications, enabling policymakers, businesses, and individuals to navigate the challenges and opportunities presented by this transformative technology. It is important to note that comparative industry-specific impacts were not explored in detail due to scope limitations, which was a deliberate decision to maintain the focus and conciseness of the review. A significant concern is the limited diversity of geographic focus in many studies. Much of the current research primarily centers around North America, Europe, and China, leaving the economic impacts of AI on developing regions underexplored. This geographic bias limits the generalisability of findings, particularly when considering the varied socio-economic contexts that influence AI adoption globally. Furthermore, there is a lack of longitudinal studies examining AI's impact over extended periods. For example, future studies could focus on specific sectors such as education, manufacturing, or healthcare over a 10- or 20-year period. This could provide crucial insights into how AI integration affects productivity, employment, and economic stability over time. Another limitation is the absence of consensus regarding how AI is defined and measurement frameworks for assessing AI's economic impact. Studies often use different metrics to evaluate productivity gains and labour displacement, which complicates direct comparisons and synthesis of findings. Additionally, much of the research emphasises the positive economic outcomes of AI, such as increased productivity while underplaying or insufficiently addressing the potential negative externalities, including widening income inequality, job displacement for lower-skilled workers, and ethical concerns related to data privacy and algorithmic bias. The lack of comprehensive consideration of these challenges suggests the need for more balanced research that critically evaluates both the benefits and drawbacks of AI implementation. Despite the compelling findings presented, this review reveals significant gaps in how AI's economic impact is measured and the geographic diversity of existing studies. The lack of a unified measurement framework for evaluating AI's influence across different economic environments complicates the direct comparison of studies and limits the capacity for broad generalisation.

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