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ANALYSIS OF THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE LABOR MARKET IN THE EUROPEAN UNION

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Abstract
The impact of Artificial Intelligence (AI) in the European Union (EU) is profound and is felt in all sectors. AI, a branch of computer science that mimics human intelligence, is transforming the work landscape through automation and innovation. In the EU, governments promote public-private collaboration to integrate AI into different industries, from healthcare to sustainable agriculture. Automation frees up human resources for strategic activities but also reconfigures the requirements of the labor market, generating new jobs such as data analysis. However, evolution also brings challenges related to employment, requiring investment in lifelong learning and reskilling. Economic projections point to a significant impact of AI on EU GDP, with estimates reaching up to 10% by 2030. However, the correct adaptation of the workforce is essential to realize this technology's full potential and ensure a fair and sustainable transition to the future of work in the EU. Our article complements the literature on Artificial Intelligence. We carry out the analysis of the field and the impact generated by technological advancement on the labor market in the European Union. Thus, our paper follows three main points, as follows: in the first part of the study, we will resort to the analysis of the influence of AI on European companies; the second part focuses on the European Union's policies and initiatives regarding the use of Artificial Intelligence in the workplace, and in the third part, we present the advantages, challenges, as well as the future of new technologies.

Keywords: *artificial intelligence; European Union; digitalization; labor market; workforce.*

JEL Classification: *J2, J3, M21*

INTRODUCTION

In the ever-evolving digital age, artificial intelligence has become a key driving force in transforming the European Union's labor market. With rapid technological advancements and the increasing deployment of AI-based solutions in various economic sectors, several significant impacts are emerging on how we work, produce and conduct our financial activities. Digitalization is the primary driver of changes in the labor market, and AI is one of the leading actors of this transformation. While automation has often been associated with job losses, AI also promises to create new opportunities and improve efficiency in various economic areas (Adam Taylor, 2018).

In the European Union, many businesses and organizations rapidly adopt their AI-based technologies to optimize their processes and remain competitive in the global marketplace (Mihai, Aleca & Gheorghe, 2023). Everyone from SMEs to multinational corporations is interested in AI's potential in increasing productivity and innovation. Sectors such as manufacturing, financial services, health, transport and education are deeply influenced by the adoption of AI technologies. From optimizing the supply chain to personalizing healthcare services, AI significantly impacts how these sectors operate and thrive. The use of AI in the workplace is becoming more prevalent, with applications such as virtual assistants, data analysis, and the automation of repetitive processes. These technologies bring benefits in terms of efficiency and innovation, but they also raise questions about data protection and the impact on employees. The impact of AI on the EU is complex and brings both opportunities

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and challenges (Susar and Aquaro, 2019). On the one hand, AI technologies can drive growth and innovation (Aldoseri et al., 2024), and on the other hand, they can create social inequalities and affect traditional jobs (Makridakis, 2017). The European Union aims to address the impact of AI through policies and initiatives that promote a fair and sustainable transition to the digital economy. From data protection regulations to training and reskilling programs, the EU aims to guide the development of AI in the desired direction. While AI brings many benefits, such as increased efficiency and innovation, there are also significant challenges to address, such as social inequalities, job loss, and the impact on the environment and mental health. In this paper, we aim to examine these issues in more detail and assess how AI influences the labor market in the European Union, identifying both the opportunities and the difficulties to be encountered with the transition to a digitalized economy (BinSaeed et al., 2023).

The history of artificial intelligence is marked by remarkable progress and continuous debate. In the 1950s and 1960s, pioneers such as Alan Turing and John McCarthy paved the way for AI research. This period was marked by optimism but also by disappointment, with the underestimation of the difficulties in replicating human intelligence. The 1970s and 1980s brought the development of algorithms such as neural networks and expert systems, which led to the first practical applications in areas such as speech recognition and medical diagnostics. In the 90s and early 2000s, the increase in computing power and data availability led to a resurgence of interest in AI, with the emergence of technologies such as machine learning and deep learning. These advancements have led to remarkable achievements in image recognition, machine translation, and virtual assistants. Today, AI is ubiquitous in everyday life (Elliott, 2019), from search engines and personalized recommendations to autonomous cars and collaborative robots. C. West Churchman, Stafford Beer, and John von Neumann are three leading researchers in the field of artificial intelligence (AI) development, each making significant contributions and distinctly influencing the evolution of this field (Dyson et al., 2021). C. West Churchman was known for his significant contributions to cybernetics, systems theory, and management. It is especially recognized for promoting an integral and multidisciplinary approach in analyzing complex problems within organizations and society in general (Churchman, 2011).

Beer was a pioneer in the field of cybernetics and management theory, bringing concepts such as cybernetics and systems theory to the study of artificial intelligence. He promoted that the human nervous system can be understood and shaped using cybernetic principles, inspiring researchers to approach AI from a holistic and interdisciplinary perspective (Beer, 1960).

On the other hand, Von Neumann and Kurzweil, an outstanding mathematician and physicist, made significant contributions to machine computing and game theory. His work on cellular automata has profoundly impacted the development of AI learning and adaptation algorithms. With their solid theoretical foundation, Von Neumann and Kurzweil has contributed to developing more rigorous and practical approaches to AI (Von Neumann & Kurzweil, 2012). By integrating their ideas and contributions Von Neumann and Kurzweil have significantly influenced the evolution of artificial intelligence. Their interdisciplinary approach and theoretical foundation have stimulated research in new directions and contributed to the development of more advanced methodologies and technologies in the field of AI. Thus, their contributions remain fundamental in the understanding and continuous progress of artificial intelligence.

I. DIGITALIZATION OF THE WORKFORCE

Digitalization has emerged as a pervasive force in the global economy, significantly impacting labor markets and leading to notable changes in job organization and nature. The effects of digitalization on employment and workforce structure are intricate and nuanced, highlighting the importance of inclusive policies in addressing social and economic disparities. As technological advancements accelerate, companies increasingly seek innovations to maintain competitiveness and expand their market presence. Furthermore, research conducted by Alberti and Pizzurno underscores the vital role that family businesses play in driving innovation within the economy. As technology costs fall, automation is becoming an attractive alternative to repetitive tasks. This leads to the replacement of human labor with machines and other capital equipment, such as robots. This change creates demand for workers with non-routine skills while reducing demand for workers who perform routine occupations. This phenomenon contributes to increasing inequality in the labor market, which impacts global employment. Debates on the evolution of the workforce structure and technological impact are central to social research. Although it was initially thought that technology favors high-skilled workers, a more recent approach suggests a polarization of jobs, with an increased demand for low-skilled and high-skilled workers, while medium-skilled occupations are in decline.

The polarization of the labor force is a complex phenomenon, in which the demand for labor does not increase uniformly with the level of qualification (Goos et al., 2014). The increase in the consumption of services at the expense of goods is causing a change in the distribution of jobs, with medium-skilled workers being

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disproportionately affected.

Recent studies focus on the impact of digitalization on employment and labor shortages in Europe (Vasilescu et al., 2020), as well as the transformation of work in the contemporary era (Zhan et al., 2020). Empirical analyses suggest a link between information and communication technology (ICT) skills and employment rates, and more inclusive policies can help address structural labour market problems. Thus, digitalization has become a key factor in the evolution of the global labor market, influencing the distribution of employment and creating new challenges and opportunities for workers and organizations (Figure 1). Adapting to these changes is essential to ensure sustainable economic growth and reduce social and economic inequalities. Half of European companies have some level of artificial intelligence integrated into their businesses.

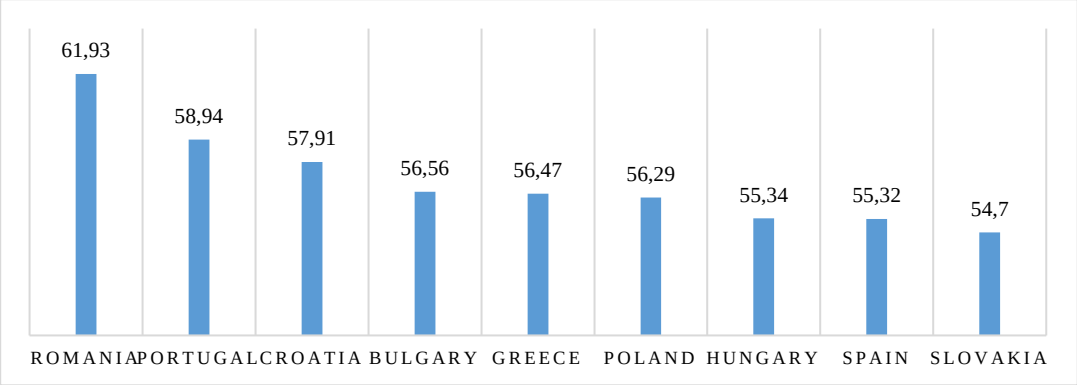

Figure 1. Top 10 EU countries by employment with low risk of digitalization
Source: data retrieved from Eurostat

Aside from potential job losses, artificial intelligence could provide several crucial benefits. 19% of workers agree that artificial intelligence can help alleviate the burden of their work, and nine out of ten tech executives agree that AI-powered machines will handle mundane tasks, freeing up workers to enjoy more creative work. Additionally, AI can help eliminate work-related fatigue and allow people to explore careers that provide a greater sense of meaning and well-being. In many countries, most of those surveyed said robots and computers will "definitely" or "probably" do much of the work currently done by humans (Figure 2).

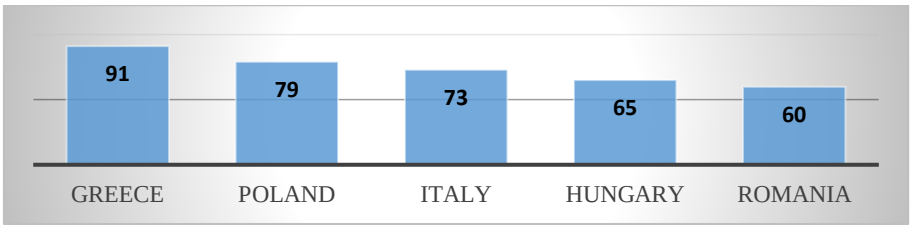

Figure 2. The opinion of the population on the takeover of part of the work done by humans by AI
Source: data retrieved from Eurostat

Overall, more than half of adults say that in the next 50 years, robots and computers will do much of the work currently done by humans. Of those who believe it will, the vast majority said that jobs lost due to automation will not be replaced by "new, better-paying jobs" and that it will be difficult for ordinary people to find jobs (Figure 3).

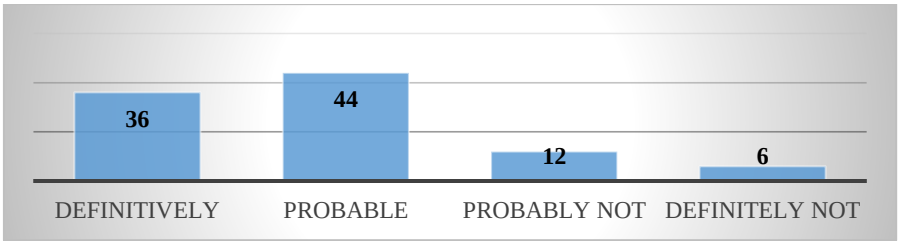

Figure 3. The share of workers who believe that their job will exist in 50 years
Source: data retrieved from Eurostat

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II. EUROPEAN COMPANIES USING AI

In 2020, 7% of EU companies with at least 10 employees used AI applications. While 2% of enterprises used machine learning to analyze big data internally, 1% analyzed big data indoors with the help of natural language processing, natural language generation, or speech recognition (Figure 4). A chat service, in which a chatbot or virtual agent generated natural language responses for customers, was used in 2% of businesses. The same proportion of companies, 2%, used service robots, which are characterized by a certain degree of autonomy, for example, to carry out cleaning, dangerous or repetitive tasks such as cleaning poisonous substances, sorting items in the warehouse, and helping customers with shopping or at payment points, etc (Bonsón et al., 2021).

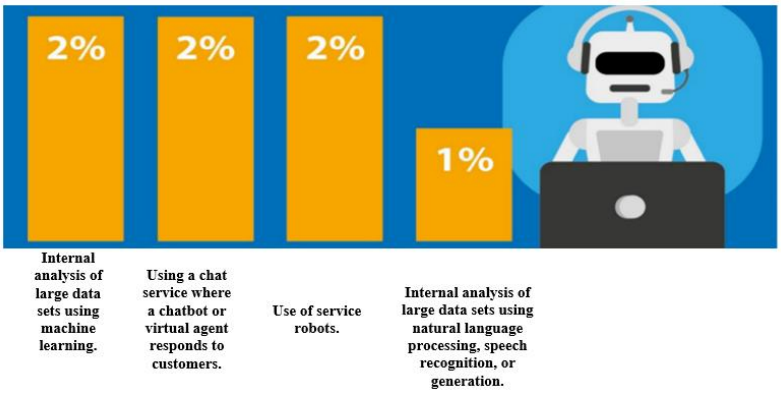

Figure 4. Methods of using AI in EU companies
Source: data retrieved from Eurostat

The table highlights the limited but varied adoption of AI technologies among EU enterprises in 2023. Only a small percentage of companies are using AI-driven solutions, with 2% employing machine learning for analyzing large datasets internally. This application of machine learning assists in identifying patterns and generating insights from vast data sets, which can help businesses make data-driven decisions. Similarly, 2% of companies are utilizing chat services where AI chatbots or virtual agents respond to customers, automating customer support and potentially enhancing customer experience while reducing the need for human intervention. Additionally, 2% of EU enterprises have incorporated service robots into their operations, likely to assist in tasks that may be repetitive or physically demanding. Meanwhile, a smaller proportion—1%—use natural language processing (NLP) and speech recognition or generation for internal data analysis. This suggests that while some companies are exploring advanced AI capabilities, overall adoption remains relatively low, with only a few applications seeing meaningful implementation across EU businesses. The data reflects a cautious yet growing interest in AI-driven tools to improve operational efficiency and customer interaction. Within EU companies, Artificial Intelligence is mostly used in Big Data (2%), ChatBot or virtual agent services (2%), service robots (2%), and NLP (1%).

Figure 5. presents the AI adoption by enterprises in European countries for 2024, highlighting the disparities in AI integration across different regions. Denmark, Sweden, Finland, and Belgium emerge as the top adopters, with Denmark leading at 27.58%, followed closely by Sweden and Finland. These countries, known for their strong digital infrastructure and innovation-driven economies, have consistently invested in AI technology. In contrast, Romania, Türkiye, and Poland remain at the lower end of the spectrum, with AI adoption rates below 7%, reflecting potential challenges such as limited investment, infrastructure gaps, or slower regulatory advancements. Countries like Luxembourg, Netherlands, and Slovenia show significant growth, indicating increasing momentum in AI adoption. The chart underscores the widening gap between highly digitized economies and those still developing AI capabilities, emphasizing the need for targeted policies and investments to ensure broader adoption across Europe (Watch, 2022).

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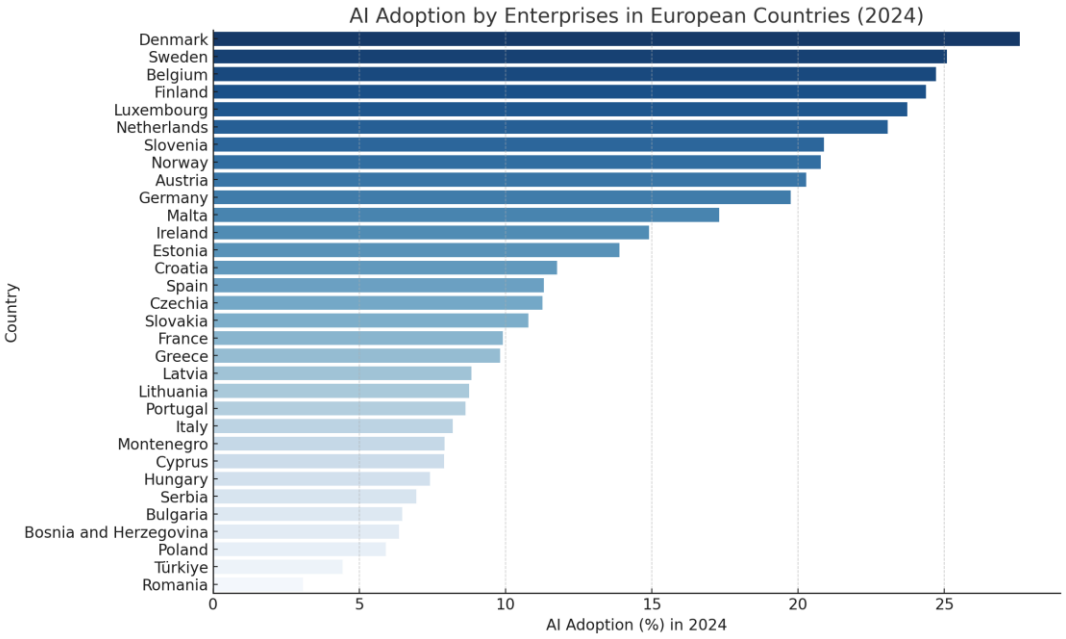

Figure 5. Methods of using AI in EU companies
Source: own contribution with data retrieved from Eurostat

Figure 6. illustrates the AI adoption trends from 2021 to 2024 for selected European countries, showcasing varying growth patterns. Denmark, Sweden, Finland, and Belgium exhibit a sharp increase in AI adoption, particularly between 2023 and 2024, highlighting a strong push for digital transformation. Germany and France show steady but moderate growth, indicating consistent investment in AI. Meanwhile, Romania, Poland, and Türkiye remain at the lower end, with slow adoption rates and minimal growth, suggesting potential barriers such as infrastructure limitations or policy delays. Notably, Denmark saw a dip in 2023 before rebounding significantly in 2024, reflecting possible short-term economic or regulatory fluctuations. The chart emphasizes the divergence between AI leaders and lagging nations, indicating that while AI adoption is increasing overall, the pace varies significantly across Europe.

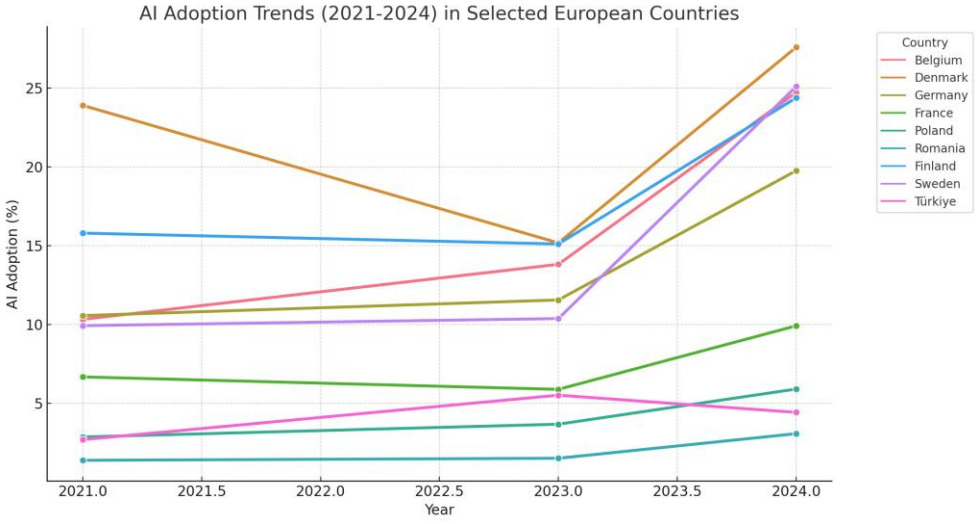

Figure 6. AI Adoption Trends in EU Companies
Source: own contribution with data retrieved from Eurostat

The descriptive statistics for AI adoption in enterprises across 2021, 2023, and 2024 show a clear upward trend in adoption rates (Table 1). The mean AI adoption increased from 7.12% in 2021 to 7.79% in 2023, and significantly to 13.50% in 2024, reflecting a rapid acceleration. The median values follow a similar pattern, indicating that AI adoption has grown broadly across countries, not just among outliers. Standard deviation and variance show fluctuations, with 2024 displaying the highest variability, suggesting that some countries are adopting AI at a much faster rate than others. The range also expands from 13.66 in 2023 to 24.51 in 2024,

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reinforcing the notion of increasing disparity among nations. Kurtosis and skewness values indicate that the distribution was more right skewed in 2021, meaning some countries had exceptionally high AI adoption, while in 2023 and 2024, the distribution became more balanced. However, the highest values (max) grew significantly, from 23.89% in 2021 to 27.58% in 2024, showing that leading countries are rapidly pushing AI adoption forward. Overall, the descriptive statistics confirm a sharp increase in AI adoption but also highlight widening gaps between high-adoption and low-adoption countries.

Table 1. Descriptive statistics for AI adoption in European Countries

2021		2023		2024	
Mean	7,1171875	Mean	7,785	Mean	13,4984375
Standard Error	0,885964964	Standard Error	0,711999683	Standard Error	1,27640349
Median	6,42	Median	6,47	Median	11,02
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Dev.	5,011774674	Standard Dev.	4,027678432	Standard Dev.	7,220428505
Sample Variance	25,11788538	Sample Variance	16,22219355	Sample Variance	52,1345878
Kurtosis	2,545966739	Kurtosis	-0,958209229	Kurtosis	-1,138037273
Skewness	1,316771994	Skewness	0,465895465	Skewness	0,538008981
Range	22,99	Range	13,66	Range	24,51
Minimum	0,9	Minimum	1,51	Minimum	3,07
Maximum	23,89	Maximum	15,17	Maximum	27,58
Sum	227,75	Sum	249,12	Sum	431,95
Count	32	Count	32	Count	32

Source: own contribution

By performing a time-series analysis of AI adoption trends spanning from 2021 to 2024, and forecasting AI adoption rates for 2025 and 2030 using Exponential Smoothing, we can visualize the historical trends in AI adoption across selected countries. The forecast indicates that Belgium, Sweden, Luxembourg, Finland, and the Netherlands are anticipated to have the highest rates of AI adoption in 2025 (Table 2).

Table 2. Descriptive statistics for AI adoption in European Countries

Country	**2025 Forecast**	**2030 Forecast**	**Country**	**2025 Forecast**	**2030 Forecast**
Sweden	30.297	68.222	Serbia	9.273	24.398
Belgium	30.67	66.645	Cyprus	10.364	23.639
Luxembourg	27.79	54.615	Latvia	10.803	23.578
Austria	24.737	53.337	Spain	13.026	22.124
Netherlands	26.47	51.37	Montenegro	10.195	21.62
Finland	27.0	48.45	Lithuania	10.333	21.108
Norway	23.537	48.412	Hungary	9.12	20.195
Slovenia	23.824	46.726	Croatia	12.483	20.033
Estonia	18.403	46.203	Bosnia and Herzegovina	8.88	19.605
Germany	23.143	46.118	France	10.727	18.827
Malta	20.684	38.535	Bulgaria	7.64	15.59
Denmark	25.903	35.128	Poland	7.184	14.784
Ireland	17.283	34.833	Italy	8.503	13.578
Czechia	14.007	31.006	Portugal	9.327	12.902
Greece	12.667	30.667	Türkiye	5.937	10.261

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Slovakia	13.26	27.235	Romania	3.677	7.902

Source: own contribution

The AI adoption forecast for 2025 and 2030 suggests a rapid acceleration in AI integration among European enterprises, with Sweden and Belgium leading the trend, projected to reach over 66-68% adoption by 2030. Other high-growth countries include Luxembourg, Austria, and the Netherlands, all expected to surpass 50% AI adoption within the next decade. This substantial increase highlights the growing role of AI in business operations, likely driven by government policies, technological investments, and workforce digitalization. The sharp rise also suggests a widening gap between high-adoption and low-adoption countries, indicating that while some nations are poised to leverage AI-driven efficiencies, others may struggle to keep pace. These forecasts emphasize the need for strategic investments in AI infrastructure and training programs to ensure a balanced and competitive digital transformation across Europe.

III. SECTORS OF ACTIVITY INFLUENCED BY AI

In the dynamic landscape of modern industries, companies face multifaceted challenges, ranging from operational inefficiencies to complex decision-making processes. Navigating through these pain points is a constant quest for improved performance and sustained growth. Artificial intelligence has evolved beyond a buzzword, becoming an indispensable tool for organizations seeking innovative solutions to their most pressing problems. Businesses often need help with challenges such as data overload, inconsistent decision-making, inefficient resource allocation, and the need for real-time insights. These obstacles can hinder progress, hinder efficiency, and compromise a business's overall success. However, AI integration mitigates these challenges and propels businesses to unprecedented levels of excellence. In this era of digital acceleration, artificial intelligence serves as a strategic ally, providing customized use cases in major industries. From healthcare and finance to manufacturing and retail, the transformative impact of artificial intelligence is reshaping traditional paradigms. Using ML algorithms, predictive analytics, and advanced automation, businesses can harness the power of AI to streamline operations, optimize resource utilization, and gain insights into consumer behavior and market trends. According to a report by Grand View Research, by 2030, the global artificial intelligence market size is expected to reach $1,811.8 billion, up from $136.6 billion in 2022, with a CAGR of 38.1%.

Artificial intelligence (AI) is significantly transforming various sectors by automating tasks, enhancing decision-making, and personalizing user experiences. In Healthcare, AI supports diagnostics, personalized treatments, and administrative efficiency. In Retail & e-commerce, AI improves customer experience through recommendation algorithms, chatbots, and demand forecasting, while Food Technology benefits from AI in optimizing food production, quality control, and reducing waste. Supply Chains & Logistics leverage AI for route optimization, inventory management, and predictive analytics, improving efficiency and reducing costs. The Tourism industry utilizes AI for personalized travel recommendations, virtual tours, and streamlining booking processes, enhancing customer engagement.

In fields like Real Estate, Media & Entertainment, and Automotive, AI enables more accurate property evaluations, content personalization, and the development of autonomous vehicles, respectively. Education uses AI for adaptive learning platforms, virtual tutors, and administrative automation, making learning more accessible. The Fashion industry applies AI in trend forecasting, design automation, and supply chain management. Private Equity & Investment uses AI for risk assessment and portfolio optimization, while Legal Affairs employs it for document analysis and contract review. Information Technology benefits from AI in cybersecurity and software development automation, while Hospitality leverages AI-driven concierge services and customer support to improve guest experiences. Across these sectors, AI fosters innovation and drives efficiency, transforming industry standards and practices.

IV. USE OF AI IN THE WORKPLACE

The impact of technology on skills and occupations has been the subject of intense debate among economists over the past three decades. The Skill-Based Technical Change Hypothesis (SBTC) was the first significant theory, arguing that technology implicitly favors skilled labor over unskilled labor by increasing relative productivity and demand for it. However, critics began to question this hypothesis as early as the 2000s. For example, Card and Di Nardo (2002) noted that wage inequality remained relatively stable in the 1990s, even in the context of continuous technological advances.

The authors demonstrated that computer capital replaces workers in routine cognitive and manual tasks, but complements them in solving non-routine problems and complex communication tasks. This suggests a more nuanced relationship between technology, skills, and occupations that exceeds SBTC predictions.

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The Routinization Hypothesis (RBTC) provides an alternative explanation, arguing that technology leads to job polarization. Thus, routine tasks, whether manual or cognitive, are the most affected by automation, which may explain, at least in part, the increase in wage inequality and polarization in the labor market. This hypothesis suggests that technology affects different categories of workers and that there is a tendency towards the concentration of jobs at the extremes of the skills spectrum, from the highly skilled to the low-skilled (Brekelmans & Petropoulos, 2020).

Some authors note that technological changes have led to a labor market polarization, affecting the demand for various categories of jobs. Thus, there is an increase in the relative demand for high-paying and skilled jobs, which require non-routine cognitive skills, and for low-paying jobs, which require non-routine manual skills. In contrast, demand for medium-skilled jobs that often involve routine manual and cognitive skills has declined. The authors Autor and Dorn (2013) propose a unified theory that explains this polarization, integrating the hypothesis of routinization, the delocalization of tasks, and the reallocation of the workforce to service occupations. However, there are also criticisms of this hypothesis. Fernandez-Macias and Hurley (2017) consider the concept of routine occupations elusive, making it challenging to evaluate jobs in this context. They also believe that routine tasks are not associated with skills in the way envisaged by the routinization hypothesis, nor with the polarisation observed in Europe.

On the other hand, Oesch and Piccitto (2019) found evidence of occupational improvement, rather than polarization, in a more limited sample of EU countries. They used extensive measures to classify occupations, including prestige, education, and job satisfaction. However, critics might argue that these measures are no more suitable than income for measuring occupations' skills.

V. Impact of AI on the EU

A recent report highlights that one in three European entrepreneurs has adopted Artificial Intelligence (AI), with an annual increase of 32%. This trend could contribute an additional €600 billion to the European economy's gross value added (GVA) by 2030. This economic impact is equivalent to the value of the European construction industry. However, to unlock the full potential of AI, Europe needs to address three major challenges: creating an innovation-friendly environment, reducing the digital skills gap, and ensuring access to the latest technologies for all businesses. While the benefits of using AI are obvious, including an increase in revenue and productivity for three-quarters of the companies that use it, this adoption is more prevalent among large companies than small and medium-sized enterprises (SMEs). SMEs face significant barriers to AI adoption, such as finding the right talent, regulatory concerns, and implementation costs.

"Europe is on the cusp of an unprecedented opportunity," said Tanuja Randery, Managing Director of AWS Europe, Middle East and Africa (EMEA). "Companies recognize the benefits of AI for their growth and productivity. SMEs account for more than half of Europe's GDP, and tackling the challenges that hinder their digital journey is vital. To realise the full potential of artificial intelligence, it is imperative that Europe provides digital skills support and regulatory certainty to support the ambitions of businesses of all shapes and sizes."

AWS customer in the Netherlands, Growy, uses AI to grow its business and crops. The agri-tech business uses the Internet of Things (IoT) with AI to operate and monitor its fully automated and robotic farms, providing a glimpse into how AI can create a more sustainable future. "The benefits are too significant to ignore," explained Growy's Jochem Meuwese. "With AI, Growy has built fully automated vertical farms that increase crop yields, protect soil quality, and address food insecurity." Regulatory uncertainty and skills shortages are hampering investment.

The lack of digital skills is the most frequently cited challenge. Sixty-one percent of European businesses said a digital skills shortage affects their business performance, while more than a quarter (26%) said it has prevented them from adopting AI. With the European Commission set to miss its target of having at least 20 million employees as ICT specialists by 2030 with eight million people, addressing the digital skills gap is key to democratizing AI technology in Europe. Regulatory uncertainty, coupled with Europe's persistent digital skills shortage, is preventing businesses from making full use of technology despite its impact on positive social and economic potential. The report highlights that 21% of European companies identify compliance and legal uncertainties as a significant barrier to digital adoption. This rises to 45% among companies that already use more AI technologies. Those who cite such concerns plan to invest 48% less in technology over the next three years, compared to those who do not face such barriers. Addressing the skills and regulatory obstacles businesses face will be key to enabling AI innovation in Europe.

VI. EU Policies and Initiatives

The European Union's digital strategy is focused on creating a regulatory environment that encourages the

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safe and beneficial use of artificial intelligence (AI) while mitigating its potential risks. This strategic approach aims to harness AI's transformative potential across multiple sectors, including healthcare, transportation, manufacturing, and energy. By supporting advancements in these areas, the EU envisions improvements in public health outcomes, enhanced safety in transportation, greater production efficiency, and progress toward energy sustainability. To this end, in April 2021, the European Commission introduced a regulatory framework proposal for AI. This framework classifies AI systems based on the level of risk they pose, ranging from minimal risk to unacceptable risk, with the most stringent regulations applied to high-risk applications that could directly impact fundamental rights or public safety.

The European Parliament's goals for AI regulation are grounded in principles of safety, transparency, fairness, and environmental responsibility. Key to these goals is the requirement for human oversight of AI systems to ensure that they operate ethically and without unintended harmful effects. By mandating transparency, the EU intends for AI operations to be understandable and explainable, particularly in high-stakes applications like healthcare diagnostics, law enforcement, and recruitment. Additionally, the EU seeks to develop a standardized and technologically neutral definition of AI, ensuring that the legislation remains adaptable to future technological advancements. Through this regulatory framework, the EU aims to position itself as a leader in ethical AI development, promoting innovation that aligns with European values and prioritizes human rights and societal well-being. Act IA proposes different rules for different levels of risk. AI systems with unacceptable risk, such as behavioral manipulation, social scores and biometric identification, will be banned. Those with high risk, affecting safety or fundamental rights, will be assessed before being placed on the market and throughout their life cycle. Users will also have the right to lodge complaints with designated national authorities.

Generative artificial intelligence, such as ChatGPT, will not be classified as high-risk, but will have to comply with transparency requirements and EU copyright law. This includes disclosing that the content was generated by AI, designing the model to prevent illegal content from being generated, and publishing summaries of copyrighted data used for training.

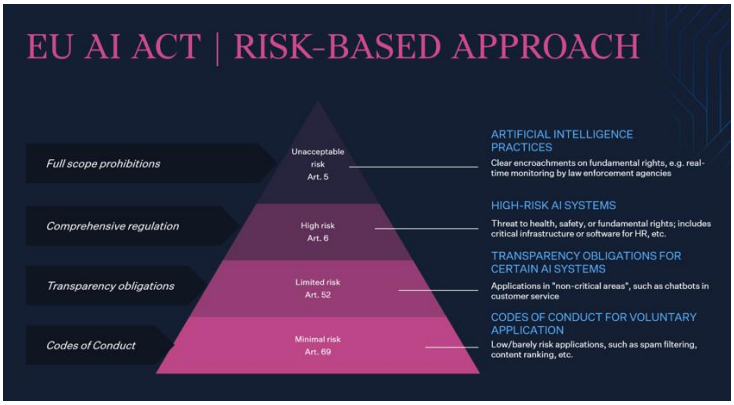

Figure 7. EU Artificial Intelligence Act
Source: https://sk-advisory.com/aktuelles/why-the-eu-needs-a-meaningful-ai-governance-framework.php (2023)

VII. ADVANTAGES AND CHALLENGES

Developed digital infrastructure and regulations on protecting privacy and freedom of expression can make the EU a world leader in the data-driven economy and its applications. Artificial Intelligence (AI) brings numerous benefits to citizens, including improvements in healthcare, safer and cheaper transport, tailored products and easier access to information and education, with a positive impact on job security and the creation of new professions (Pisaniuc, 2022).

For companies, AI opens up new opportunities in developing products and services, even in sectors where European companies are already competitive, such as the green economy, agriculture or healthcare. The increase in labor productivity associated with AI is estimated to be between 11% and 37% by 2035. In public services, AI can reduce costs and contribute to the objectives of the European Green Deal, which is estimated to reduce global greenhouse gas emissions by 1.5% to 4% by 2030. It can also strengthen democracy by monitoring data, preventing disinformation and ensuring access to quality information. In terms of security, AI has considerable potential in preventing crime and ensuring security. Its use in criminal justice can speed up data processing and prevent crime, while online platforms already use AI to detect and combat illegal online behavior. In the military field, AI can be used for defense and attack strategies, reducing the risks of physical harm in armed conflict. However, the

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excessive or inappropriate use of AI can pose risks, and proper regulation and oversight are essential to maximize benefits and minimize threats (European Parliament, 2023).

The dangers of Artificial Intelligence (AI) in the economic field are diverse and must be carefully addressed to minimize the negative impact and maximize the benefits of this technology. The reduced use of AI can have significant consequences, including missed opportunities for the implementation of important programmes, loss of competitiveness and economic stagnation. In contrast, an excessive use of AI can lead to unnecessary investment and application in the wrong contexts. The issue of liability for damage caused by AI-powered operational devices or services is still unclear, and the lack of clear regulations can affect trust in technology (Pisaniuc, 2022).

There are also concerns about threats to fundamental rights and democracy. AI can be used to influence decisions based on discriminatory criteria or to create polarised online environments, thereby affecting democratic processes and the pluralism of public debates. Moreover, there are risks related to the use of AI in the field of security and safety, with applications that can be hacked or misused.

The impact of AI on jobs is also an important issue, with forecasts pointing to both the elimination of some jobs and the creation and improvement of others. However, special attention is needed to prevent long-term unemployment and to ensure a skilled workforce through training. As far as competition is concerned, data aggregation can lead to distortion, and the lack of transparency regarding interaction with AI can raise questions about access to information and user manipulation. According to the information mentioned above, addressing the dangers of AI in the economic field requires a balance between innovation and regulation to ensure that the benefits of this technology are maximized and the risks are properly managed.

In recent years, the goal of demonstrating the feasibility of using artificial intelligence (AI) for common applications has been widely achieved, paving the way for a reality where AI is an integrated part of life. However, doubts about the impact of AI on society and the economy persist. On the one hand, the enthusiasm for technological progress is evident, but on the other hand, the fear that machines will replace human jobs is increasingly present (Von Neumann & Kurzweil, 2012).

The history of technological evolution has transitioned human labor to machines and computers, leaving the future direction of AI uncertain. While there are optimistic forecasts of a new cultural and industrial revolution, concerns persist regarding the extent of AI's control over our world. Nonetheless, robotics conferences have showcased impressive technological advancements that benefit humanity. Today's robots, which operate in environments beyond human reach and execute tasks with remarkable precision, are viewed as extensions of human intelligence. Currently, researchers are working on machine models capable of learning independently, without explicit programming, and it is difficult to predict precisely how AI will evolve in the future. However, it seems that AI will become increasingly integrated into sophisticated and complex applications, and concepts such as a collective consciousness, uniting human identities and machines, are becoming increasingly plausible in this context (Pisaniuc, 2022).

VIII. CONCLUSION

The impact of Artificial Intelligence (AI) on the labor market within the European Union (EU) is a multifaceted and timely subject, given the rapid pace of technological advancement and the ongoing shift towards a digital economy. This paper delves into the complexity of AI’s influence on employment by examining several key aspects, including the digitalization of the workforce, the rate and scope of AI adoption by European companies, sector-specific impacts, and the transformative effects AI has within workplaces across the EU. In addition, it analyzes EU-level policies and initiatives designed to support AI integration while addressing the potential social and economic challenges. By exploring both the benefits—such as productivity improvements and job creation in emerging sectors—and the risks, including potential job displacement and skill mismatches, this research aims to provide a comprehensive understanding of AI’s evolving role in reshaping the European labor market.

The introduction establishes the research's significance by contextualizing the inevitability of digitalization and the rapid technological progression transforming labor and economic systems. It underscores the need for careful management of this transition to ensure that the shift towards AI-enabled workplaces is both beneficial and equitable. To ground the study in historical perspective, the paper also briefly explores foundational research in AI, spotlighting three key pioneers: Von Neumann and Kurzweil, known for his work on self-replicating machines and game theory; C. West Churchman, a systems theorist who emphasized ethical decision-making in AI; and Stafford Beer, a pioneer in cybernetics who advocated for the practical application of AI in organizational management. These foundational thinkers laid the groundwork for modern AI research, offering insights that continue to inform contemporary discussions on the ethical, social, and economic implications of AI in today’s digital economy.

In the section on digitizing the workforce, we explored how digital technologies, particularly artificial

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intelligence (AI), are reshaping business operations and fundamentally altering the nature of work. Automation and advanced data analysis, powered by AI, have enabled companies to streamline processes, reduce costs, and enhance productivity. However, alongside these benefits, we discussed the challenges of upskilling and reskilling the workforce to ensure employees can effectively engage with new technologies. Many workers face the risk of skill obsolescence, necessitating proactive measures by organizations to provide training and development programs that bridge the gap between current skills and the demands of a more digital, AI-driven workplace. These adaptations are crucial for fostering a resilient workforce capable of thriving in an evolving digital landscape. Our analysis of European companies' AI adoption reveals notable trends and disparities across industries. Certain sectors, such as manufacturing and finance, lead in AI implementation due to their capacity to invest in technology and the clear efficiencies AI offers within their operations. Other industries, such as retail and hospitality, show slower adoption rates, often due to limited resources or a lack of technical expertise. We identified several factors influencing successful AI deployment in the European business context, including the availability of skilled professionals, access to financial resources, and organizational readiness to integrate AI. These findings highlight the importance of strategic planning and investment in both technology and human capital to maximize the potential of AI across different sectors.

AI-influenced business sectors were identified and analysed, highlighting the diversity of how AI affects different areas, from manufacturing and financial services to healthcare and transport. We have noticed that in some cases, AI can lead to job losses, but at the same time it can create new opportunities and areas of activity. The use of AI in the workplace was analyzed from the perspective of the impact on employees and work processes. We identified the benefits, such as increased efficiency and innovation, but also data security challenges and concerns about job losses. The impact of AI on the EU has been assessed in the context of policies and initiatives at EU level. We examined the strategies and measures taken to regulate and manage the transition to a digital economy, with a focus on ensuring a fair and sustainable transition for all European citizens.

In conclusion, the influence of Artificial Intelligence on the European Union's labor market is indeed a multifaceted and dynamic phenomenon, presenting both significant opportunities and complex challenges. As AI continues to transform industries, it reshapes job roles, skill requirements, and workplace dynamics, creating both prospects for economic growth and concerns about job displacement and inequality. The careful management of these effects is crucial for ensuring that technological advancements contribute positively to society as a whole. This requires a balanced approach that emphasizes both innovation and the protection of workers' rights, with a focus on upskilling and reskilling to equip the workforce for an AI-driven economy. By fostering collaboration among governments, businesses, educational institutions, and labor organizations, the European Union can play a central role in guiding this transition towards a digital future. Policies that prioritize ethical AI, inclusivity, and environmental sustainability can help shape a labor market that benefits all citizens. With shared responsibility and active engagement from all stakeholders, the EU has the potential to lead by example in building a fair, resilient, and sustainable digital economy, ensuring that the benefits of AI are equitably distributed and that the workforce is prepared for the future.

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