

Chapter 4.

IMPACT OF ARTIFICIAL INTELLIGENCE ON FIRMS, INDUSTRIES AND COUNTRIES

„Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals“.¹⁶⁰ Machines no longer operate solely on human command. Large volumes of data enable machines to process vast amounts of information thanks to their superior analytical capabilities, allowing them to "learn" and become intelligent. Based on this, they make intelligent predictions about the future. Artificial intelligence is a general-purpose technology that can function as part of software in the virtual world or be directly embedded in hardware devices such as advanced robots, autonomous cars, drones, or Internet of Things applications.

The development of AI has gone through various stages, starting from logic-based approaches in the 1950s and 1960s, through knowledge-based expert systems in the 1970s and 1980s, to data-driven approaches since the year 2000. Despite periods of stagnation and reduced investment, the development of AI has accelerated thanks to increased computing capacities and the availability of large volumes of data. Contemporary advances in AI, especially in the field of machine learning (ML), have enabled the development of methods such as deep learning. Specialized graphical processing units (GPUs) have facilitated extensive parallel numerical calculations, which have been crucial for machine learning. Additionally, the digitalization and networking of computer systems have enabled the availability of large datasets, which are essential for training ML models. In the same way that the invention of the steam engine signified a pivotal moment in industrial development, catalyzing the First Industrial Revolution, and the discovery of electricity facilitated the Second Industrial Revolution, artificial intelligence is poised to drive the Fourth Industrial Revolution, establishing a significant milestone and transforming all aspects of our lives. There will not be a single segment that will not be influenced in some way by artificial intelligence. AI has already become a part of our everyday lives. It is used in medicine to aid in treating chronic diseases, diagnosing tumors by instantly comparing X-rays, diagnosing heart attacks, and calling emergency services based on the caller's voice. In the pharmaceutical industry, AI algorithms analyze genetic data and identify potential targets for new drugs, accelerating the development and testing process. Machine learning-based technologies are used for translation, video captioning, or blocking spam emails. The possibilities for using

¹⁶⁰European Commission (2018). COM/2018/237 final, Communication from the Commission to the European parliament, the European council, the Council, the European economic and social committee and the committee of the regions Artificial Intelligence for Europe. Preuzeto: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A237%3AFIN> visited 1.7.2024. godine

artificial intelligence are becoming limitless. The main fields where AI is applied are transport, agriculture, manufacturing, energy, telecommunications, medicine, and public services. Many farms across Europe already use AI to monitor animal movement, temperature, or feeding. To improve performance, AI requires data. AI-based systems enable the reduction of business risks and contribute to the overall increase in productivity and efficiency of operations. These technologies are used to predict trends and consumer behavior. At the macroeconomic level, they are also used to predict trends in inflation, GDP, and unemployment. They can significantly improve industrial production and contribute to changing industrial structures towards new global trends and sustainable industrial development. Many factories in Europe have become more efficient thanks to AI. The potential for its use in economic development is enormous. It is predicted that AI will double annual global economic growth rates over the next 15 years. McKinsey Global Institute estimates that by 2030, about 70% of companies will have implemented at least one type of AI technology, resulting in an increase in global GDP by about 12% annually. AI is expected to enhance labor productivity, create smart systems and programs, and spread innovation across various sectors of the economy.¹⁶¹ Although AI is highly beneficial, there are also significant challenges that need to be addressed. These include data protection, adapting the education system for new technologies, resolving ethical challenges such as preventing discrimination, and ensuring transparency in decision-making.

The aim of this paper is to investigate and analyze the impact of artificial intelligence (AI) on firms, industries, and countries worldwide. Based on this objective, we have defined the primary research hypothesis to be tested in this study: the application of AI in various economic sectors. Through a literature review, a detailed analysis of AI implementation in different countries, and the impact of AI on specific industries and individual companies, the goal is to understand how this technology is transforming business processes, the economy, and global competitiveness. Based on the collected data, the paper will provide insights into adaptation strategies across various economic sectors that are essential for maximizing the benefits of AI while simultaneously highlighting the potential challenges and risks arising from these changes.

1. LITERATURE REVIEW

In the book "The Fourth Industrial Revolution," the author (Schwab, K. 2016) examines the impact of artificial intelligence (AI) and other technologies on the global economy and society.¹⁶² Focusing on China and Silicon Valley, the author (Lee, K.L., 2018) explores the race between nations in the implementation of AI.¹⁶³

¹⁶¹ Vlada Republike Srbije (2020). *Strategija razvoja veštačke inteligencije u Republici Srbiji za period 2020-2025. godine*. Beograd: Vlada Republike Srbije, 5.

¹⁶² Schwab, K. (2016). *The Fourth Industrial Revolution*. Geneva: World Economic Forum.

¹⁶³ Lee, K.L. (2018). *AI Superpowers: China, Silicon Valley, and the New World Order*. Boston: Houghton Mifflin Harcourt.

Research has been conducted on how innovations in AI affect economic growth through a panel data study. This research indicates that AI can significantly enhance productivity and economic performance. The study highlights AI's potential to act as a general-purpose technology, influencing numerous sectors and leading to diverse paths of economic development compared to previous technological advancements.¹⁶⁴

AI is emerging as a new general-purpose technology, exemplified by GPT (Trajtenberg, 2018)¹⁶⁵, with increasing research comparing AI to previous technologies, particularly ICT (Lu and Zhou, 2021)¹⁶⁶. Firms worldwide are adopting AI to improve efficiency, innovation, and competitive advantage. Research shows that AI can significantly enhance operational processes, optimize supply chains, and improve customer experience (Brynjolfsson and McAfee, 2017)¹⁶⁷. Some authors emphasize that the implementation of AI presents challenges for researchers and the educational system, including the need for highly skilled personnel and changes in organizational structure (Jarrahi et al. 2020)¹⁶⁸.

Several researchers examine the fundamental framework of trust in AI, considering the challenges and opportunities associated with explainable AI (XAI). Studies highlight the importance of transparency and user trust in the broader application of AI technologies. They also explore the paradox of AI's success, where high-profile achievements increase trust, but concerns about privacy and job loss generate mistrust.¹⁶⁹ Numerous studies investigate the impact of the COVID-19 pandemic and the Russo-Ukrainian conflict on industry, often with similar research findings (Lutovac et al., 2023)¹⁷⁰. We explore research related to the contemporary economy in the era of the Fourth Industrial Revolution (Savić et al., 2019)¹⁷¹. Authors Ajay

¹⁶⁴ Gonzales, J.T. (2023). *Implications of AI innovation on economic growth: a panel data study*. *Economic Structures* 12, 13 (2023).

¹⁶⁵ Trajtenberg, M. (2018). *AI as the next GPT: a Political-Economy Perspective*. No. w24245. *National Bureau of Economic Research*.

¹⁶⁶ Lu, Y., Zhou, Y. (2021). *A review on the economics of artificial intelligence*. *Journal of Economic Surveys*, 35(4):1045–1072.

¹⁶⁷ Brynjolfsson, E., McAfee, A. (2017). *The Business of Artificial Intelligence*. *Harvard Business Review*.

¹⁶⁸ Jarrahi, M.H., Willis, M., Bojd, K., Wolf, K. (2020). *Artificial intelligence and the World of Work, a Co-Constitutive Relationship*. *Journal of the Association for Information Science and Technology*.

¹⁶⁹ Lukyanenko, R., Maass, W. & Storey, V.C. (2022). *Trust in artificial intelligence: From a Foundational Trust Framework to emerging research opportunities*. *Electron Markets* 32, 1993–2020 (2022).

¹⁷⁰ Лутовац Баковић, М., Лутовац, М., Живковић, А. (2023). *Руско-украјински конфликт: Утицај на индустрију*. XI Научни скуп ЕКОНБИЗ 2023 /економија и бизнис/ Тема научног скупа: Утицај геополитичких промјена на националну економију 22. и 23. јун 2023. године, 17.

¹⁷¹ Savić, Lj., Lutovac, M., Lutovac, M. (2019). „Contemporary economy at the age of the Fourth industrial revolution“. *Contemporary Trends in Insurance at the Beginning of*

Agrawal, Joshua Gans, and Avi Goldfarb explore the economic implications of AI application in various industries.¹⁷² There is research related to AI and manufacturing development. One such study was conducted by Eder et al. (2023)¹⁷³, who used data samples from manufacturing SMEs from 2008 to 2015 to study the relationship between industrial robotics and labor productivity. AI can generate complementary innovations as technologies continue to proliferate, leading to a multiplier effect (Brynjolfsson et al., 2017)¹⁷⁴. Liu et al. (2020)¹⁷⁵ empirically investigated the impact of AI on technological innovation using panel data from 14 manufacturing industries in China from 2008 to 2017 and found that AI enables technological innovation and has a greater impact on technological innovation in low-tech sectors.

2. THE CONCEPT, SIGNIFICANCE, AND ROLE OF AI

There are numerous definitions of AI. Russell, S. J., and Norvig, P. (2009) provided a definition for the original approach to artificial intelligence: "Artificial Intelligence (AI) is a branch of computer science that deals with the development of computer systems capable of performing tasks that typically require human-like abilities such as image recognition, natural language understanding, learning, planning, and problem-solving."¹⁷⁶ Nilsson, N. J. (2014) offered a capability-oriented definition: "Artificial Intelligence refers to the development of computer systems that can perform tasks that usually require human intelligence. This includes capabilities such as image recognition, speech recognition, decision-making, learning, and problem-solving."¹⁷⁷ Poole, D., Mackworth, A., and Goebel, R. (1998) defined artificial intelligence as a field of computing focused on developing systems that can automate tasks requiring human intelligence. Their definition states: "Artificial Intelligence refers to the development of computer systems that can perform tasks that require human intelligence, such as pattern

the Fourth Industrial Revolution, Kočović, J., Tomašević, M., Jovanović Gavrilović, B., Boričić, B., Petrović, E., Koprivica, M. (eds.), Belgrade: Faculty of Economics, University of Belgrade, ISBN: 978-86-403-1589-0, Ch. 2, 21-34.

¹⁷² Agrawal, A., Gans, J., Goldfarb, A. (2018). *Prediction Machines: The Simple Economics of Artificial Intelligence*. Harvard Business Review Press.

¹⁷³ Eder, A., Koller, W., Mahlberg, B. (2023). *The contribution of industrial robots to labor productivity growth and economic convergence: A production frontier approach*. *Journal of Productivity Analysis*. 2023, 1–25.

¹⁷⁴ Brynjolfsson, E.; Reck, D.; Syverson, C. *Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics*. NBER Working Paper. In *The Economics of Artificial Intelligence: An Agenda*; University of Chicago Press: Chicago, IL, USA, 2017.

¹⁷⁵ Liu, J., Chang, H., Forrest, J.Y.L., Yang, B.(2020). *Influence of artificial intelligence on technological innovation: Evidence from the panel data of china's manufacturing sectors*. *Technol. Forecast. Soc. Chang*. 2020, 158, 120142.

¹⁷⁶ Russell, S. J., & Norvig, P. (2009). *Artificial Intelligence: A Modern Approach*. Pearson Education.

¹⁷⁷ Nilsson, N. J. (2014). *Artificial Intelligence: A New Synthesis*. Morgan Kaufmann.

recognition, decision-making, learning, and adaptation to new situations." What sets these systems apart from ordinary computer systems is their ability to adapt and learn from experience.¹⁷⁸ There are also definitions of AI based on the emulation of human behavior. One such definition is: "Artificial Intelligence is the field of computer science concerned with creating computer systems that can perform tasks that require human intelligence, such as pattern recognition, natural language understanding, decision-making, and learning."¹⁷⁹ "In the context of Industry 4.0, AI plays a pivotal role in enhancing operational efficiency, optimizing supply chains, and fostering innovation across various industrial sectors."¹⁸⁰ In this paper we use the widely accepted definition of artificial intelligence offered by the European Commission's Independent Expert Group¹⁸¹: "Artificial Intelligence (AI) refers to systems that display reasonable, intelligent behavior by analyzing their environment and taking actions — with some degree of autonomy — to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications)."¹⁸²

3. THE IMPACT OF ARTIFICIAL INTELLIGENCE ON NATIONS

After the world economic crisis of 2008, the global economy experienced significant changes. Increasing trade conflicts and protectionism have emerged as a result of the changing global economic balance. The confluence of the COVID-19 pandemic and the conflict in Ukraine are key events that have exposed economic vulnerability while greatly exacerbating existing geopolitical tensions. Extraordinary global disruptions in the last few years have led to a new economic reality that shapes today's national economies and business results.¹⁸³ At the same time, we are witnessing the Fourth industrial revolution, also known as Industry 4.0, which brings radical changes to the way we live and work. We still don't know at this point how everything is going to take place, but it is clear that our response will have to be an integrated and comprehensive one, including all the interested parties

¹⁷⁸ Poole, D., Mackworth, A., & Goebel, R. (1998). *Computational Intelligence: A Logical Approach*. Oxford University Press.

¹⁷⁹ Luger, G. F., & Stubblefield, W. A. (2004). *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*. Pearson Education.

¹⁸⁰ García-Madurga, M.A., Grilló-Méndez, A.J. (2023). *Artificial Intelligence in the Tourism Industry: An Overview of Reviews*. *Administrative Sciences* 13, no. 8, 172.

¹⁸¹ European Commission (2018). *A definition of AI: Main capabilities and scientific disciplines*, Independent High-Level Expert Group on Artificial Intelligence set up by the European Commission. Brussels: European Commission.

¹⁸² The Government of the Republic of Serbia (2020). *The Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025*, Belgrade: The Government of the Republic of Serbia, 5.

¹⁸³ Lutovac Đaković, M., Lutovac, M., Živković, A. (2024). *Industrial policy for the new global economy*, XII Conference EKONBIZ 2024 30th and 31st May, *New Economic Reality: The Economic Consequences of Social and Demographic Transition*, 222-228.

in global politics, starting from the public and private sectors to the academic community and civil society. The scope and depth of these changes will affect the transformation of the entire economic systems. Industry 4.0 is characterized by a high degree of complexity and the use of network integration of products and production process. Artificial intelligence is all around us, starting from driverless driving and drones, to virtual assistants and software.¹⁸⁴ Countries that recognize and seize the opportunities presented by AI can achieve significant advantages, as it has the potential to transform societies and economies in unprecedented ways. Investing in AI is not merely a matter of technological development but a strategic necessity that will determine the future prosperity and security of a nation. Countries that strategically invest in AI can reap substantial benefits across various spheres. Countries that recognize and seize the opportunities presented by AI can achieve significant advantages, as it has the potential to transform societies and economies in unprecedented ways. Investing in AI is not merely a matter of technological development but a strategic necessity that will determine the future prosperity and security of a nation. Countries that strategically invest in AI can reap substantial benefits across various spheres. Artificial intelligence (AI) technologies are seeing rapid uptake, including transport, agriculture, finance, marketing and advertising, science, healthcare, criminal justice, security the public sector, as well as in augmented and virtual reality applications¹⁸⁵. AI can significantly enhance productivity and efficiency across industries. Automating repetitive tasks, analyzing large datasets, and predicting trends enable companies to optimize their operations, for example, by predicting loan defaults or insurance risks. From an economic perspective, recent advances in artificial intelligence (AI) either decrease the cost of prediction or improve the quality of predictions available at the same cost. At the national level, this leads to greater economic growth and competitiveness in the global market. As with the onset of every industrial revolution, there is a fear that AI will lead to the disappearance of certain jobs and occupations. The reality is that new types of jobs and employment opportunities will simultaneously emerge. It is difficult to predict which human occupations will be most affected by AI. Various factors determine this, such as the economic sector, economic trends, and government policies. The greatest burden will fall on occupations that involve repetitive tasks, such as lower-level service sector jobs. It is also essential to monitor the impact of AI on the labor market and continuously adapt the workforce's qualifications. The development and implementation of AI technologies require highly skilled workers such as engineers, data analysts, cybersecurity experts, and others. Countries can use AI to enhance their cybersecurity systems. AI can detect and respond to threats more quickly and efficiently than traditional

¹⁸⁴ Savić, Lj., Lutovac, M., Lutovac, M. (2019). „Contemporary economy at the age of the Fourth industrial revolution“. *Contemporary Trends in Insurance at the Beginning of the Fourth Industrial Revolution*, Kočović, J., Tomašević, M., Jovanović Gavrilović, B., Boričić, B., Petrović, E., Koprivica, M. (eds.), Belgrade: Faculty of Economics, University of Belgrade, ISBN: 978-86-403-1589-0, Ch. 2, 21-34.

¹⁸⁵ OECD (2019). *Artificial Intelligence in Society*. Paris: OECD Publishing, Paris, <https://doi.org/10.1787/eedfee77-en>.

systems, thus protecting critical infrastructure and national security. AI is already broadly used in digital security applications such as network security, anomaly detection, security operations automation and threat detection.¹⁸⁶ AI technologies are increasingly used in military and intelligence operations. From analyzing satellite imagery to autonomous drones, AI enables more precise and faster decision-making in critical situations. With the development of digital infrastructure, countries can use AI for surveillance and enhancing public safety. Smart cameras and gunshot locators are already in use in some cities. Face-recognition technologies are increasingly being used to provide effective surveillance by private or public actors. AI improves traditional face-recognition systems by allowing for faster and more accurate identification in cases where traditional systems would fail.¹⁸⁷

The use of AI technologies in healthcare and pharmaceuticals will impact the entire healthcare system through faster and more accurate disease diagnosis, personalized treatments, epidemic prediction, preventive care, and the discovery of new drugs and treatments. This will significantly improve public health and reduce healthcare system costs. Reducing inequalities and ensuring equal access to the healthcare system is made possible through the use of AI in telemedicine, which is particularly beneficial in remote and rural areas. By applying AI technologies in education, educational programs are created to meet the individual needs of students. This can enhance the quality of education and allow each student to reach their full potential. Additionally, AI is used for performance analysis, such as student and teacher performance, providing insights that can help improve teaching methods and strategies.

There are numerous reasons why countries should invest in AI. First, global competitiveness. Investing in AI allows countries to remain competitive in the global market.

Countries that lead in AI technologies will have an advantage in economic growth, innovation, and attracting foreign investments. According to Lerner, modernization is understood as a process of social change in which development constitutes the economic component.¹⁸⁸ Second, sustainable development. AI can contribute to sustainable development by optimizing resources, reducing pollution, and improving agriculture. This is particularly important in the context of global challenges such as climate change and population growth. Third, improving the quality of life for their citizens. Better healthcare systems, more efficient administration, enhanced security, and higher quality education are just some of the benefits. However, alongside the good, there are also downsides to AI. It is

¹⁸⁶ OECD (2019). *Artificial Intelligence in Society*. Paris: OECD Publishing, p.67, <https://doi.org/10.1787/eedfee77-en>.

¹⁸⁷ OECD (2019). *Artificial Intelligence in Society*. Paris: OECD Publishing, p.69, <https://doi.org/10.1787/eedfee77-en>.

¹⁸⁸ Lutovac, M. (2023). *Regionalni razvoj*. Beograd: BAPUSS, 39.

expected that malicious use of artificial intelligence will increase. Such malicious activities include identifying software vulnerabilities to exploit them for privacy violations.

Several factors contribute to the growth of the AI industry. Firstly, the increasing availability of big data provides more opportunities for AI applications, as AI algorithms require substantial data to learn and improve. Secondly, advancements in computing power and cloud computing infrastructure enable more efficient processing of AI applications.

Thirdly, the rising demand for automation and optimization across industries like manufacturing, finance, and transportation is promoting the adoption of AI technologies. Fourthly, the expanding use of AI in consumer-oriented applications such as virtual assistants and chatbots is broadening the AI market. Lastly, increasing investments and collaborations among technology firms, research institutions, and governments are fostering innovation and stimulating growth in the AI industry.¹⁸⁹

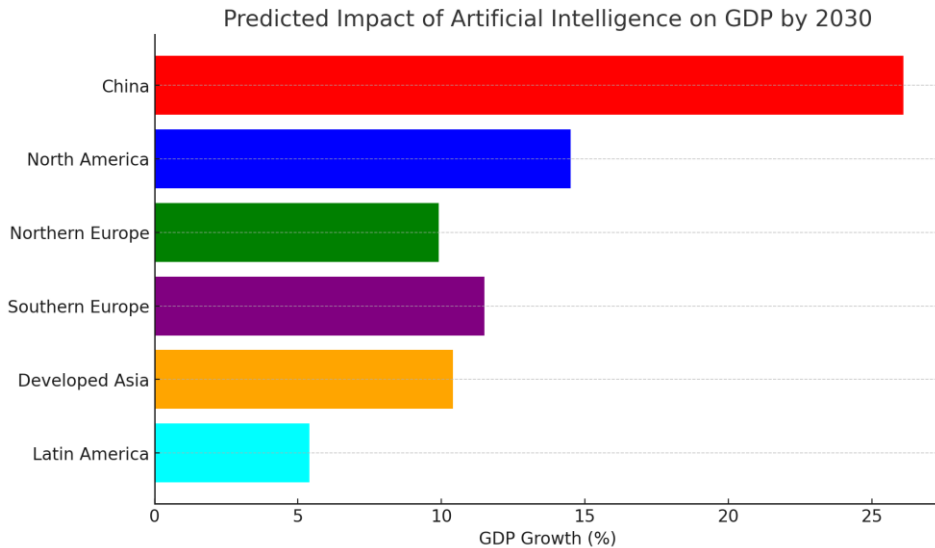
The Artificial Intelligence (AI) market is projected to undergo substantial growth and advancement until 2030. This growth is fueled by the widespread adoption of AI technologies across various industries, improvements in AI algorithms and infrastructure, and increasing investment in AI research and development. The market is anticipated to witness ongoing innovation and expansion, with AI becoming increasingly essential in both business operations and consumer-oriented applications.¹⁹⁰

Below, we have provided figures showing the predicted impact of artificial intelligence on the gross domestic product (GDP) by 2030. According to predictions of the impact of artificial intelligence on the GDP by 2030, it is estimated that China could be the country whose economy would benefit the most from artificial intelligence, with its GDP potentially increasing by 26.1 percent in 2030. In addition to China, it is estimated that North America, Northern Europe, Southern Europe, Developed Asia by 10.4 percent, and Latin America will benefit the most from the introduction of AI.

¹⁸⁹ STATISTA Artificial Intelligence - Worldwide, <https://www.statista.com/outlook/tmo/artificial-intelligence/worldwide#analyst-opinion>, visited: 1.7.2024.

¹⁹⁰ STATISTA Artificial Intelligence - Worldwide, <https://www.statista.com/outlook/tmo/artificial-intelligence/worldwide#analyst-opinion>, visited: 1.7.2024.

Figure 1. Predicted Impact of Artificial Intelligence on GDP by 2030



Source: author's processing on the database Statista (2023b): Impact of artificial intelligence (AI) on the gross domestic products (GDPs) worldwide in 2030, by region,

<https://www.statista.com/statistics/785877/worldwide-impact-of-artificial-intelligence-on-gdp/>

The market for artificial intelligence grew beyond 184 billion U.S. dollars in 2024, a considerable jump of nearly 50 billion compared to 2023. This staggering growth is expected to continue with the market racing past 826 billion U.S. dollars in 2030.¹⁹¹ The Global AI Index aims to make sense of artificial intelligence in 62 countries, scoring nations based on three pillars of analysis – Investment, Innovation and Implementation. Each dot represents a country in the Index. The US scored 100 out of 100, securing first place across all three main pillars – Implementation, Innovation, and Investment. In particular, the US excels in Investment due to high scores in the Commercial Investment sub-pillar. China scored 62 out of 100, maintaining a significant gap from the US, and ranked second in both Innovation and Investment, especially scoring high in the Development sub-pillar of Innovation. The next highest scoring nations are in Western Europe, East Asia, and North America. Singapore performs well across all areas, the UK has an advantage in Research and Commercial Investment, and Germany scores highly in

¹⁹¹ STATISTA (2024). Artificial intelligence (AI) market size worldwide from 2020 to 2030. <https://www.statista.com/forecasts/1474143/global-ai-market-size>

Implementation. South America and Africa lag significantly, with Nigeria and Kenya ranking at the bottom.¹⁹²

4. IMPACT OF AI ON COMPANIES

The world is facing a poly-crisis. The global economy is confronted with numerous global challenges and threats, including the COVID-19 pandemic, an increasing number of armed conflicts, and several natural disasters caused by climate change. The COVID-19 virus pandemic has significantly impacted the global economy, business activities, and people, forcing companies to confront many additional risks and challenges across various segments of their operations. However, the challenges arising from the crisis in the global environment can become opportunities for companies to improve. A whole spectrum of possibilities arises from Industry 4.0 and the result of the fusion of advanced technologies and the integration of physical and digital systems.¹⁹³

Artificial Intelligence (AI) represents a revolution in the business world, transforming the way companies operate and make decisions. AI technologies enable companies to automate routine tasks, reducing the need for manual labor and increasing productivity. AI-driven robots can perform complex tasks on production lines, while AI software can automatically process large amounts of data, speeding up analysis and decision-making. Eder et al. (2023) used manufacturing SME data from 2008 to 2015 to study the relationship between industrial robotics and labor productivity. The study results showed that small and medium-sized enterprises (SMEs) based on robots have twice the sales of SMEs that are not based on robots, and the use of robots by SMEs increased labor productivity by 5%.¹⁹⁴ The use of AI enables companies to offer personalized products and services. This leads to greater customer satisfaction and increased sales. AI algorithms in e-commerce recommend products based on previous purchases and user interests through the analysis of customer behavior data.

Chatbots and virtual assistants enable companies to provide 24/7 customer support. These systems can quickly respond to user inquiries, solve problems, and provide relevant information, thereby enhancing the customer experience. AI technologies optimize the supply chain by assisting in inventory management, demand

¹⁹²Tortois (2024). *The Global Ai Index*. <https://www.tortoisemedia.com/intelligence/global-ai/#data>

¹⁹³ Лутовац Баковић, М., Лутовац, М., Живковић, А. (2023). *Руско-украјински конфликт: Утицај на индустрију. XI Научни скуп ЕКОНБИЗ 2023 /економија и бизнис/ Тема научног скупа: Утицај геополитичких промјена на националну економију 22. и 23. јун 2023. године, стр. 17.*

¹⁹⁴ Eder, A., Koller, W., Mahlberg, B. (2023). *The contribution of industrial robots to labor productivity growth and economic convergence: A production frontier approach. Journal of Productivity Analysis. 2023, 1–25.*

prediction, and logistics optimization. For instance, AI analyzes sales data and market trends to forecast future inventory needs, reducing storage costs and the risk of product shortages. AI systems analyze large volumes of data from various sources, examine market trends and competition to identify new growth opportunities, providing managers with detailed insights and predictions that aid in making informed business decisions. It facilitates faster research and development of new products. Finally, AI technologies are utilized to enhance security in companies by monitoring and analyzing security data in real-time, detecting unusual behavioral patterns that may indicate security threats, enabling swift reaction and incident prevention.

In the realm of business, AI has a transformative impact. Although it is already deployed in thousands of companies worldwide, many of its significant potentials remain untapped. The influence of artificial intelligence is expected to grow in the coming decade, as manufacturing, retail, transportation, finance, healthcare, law, advertising, insurance, entertainment, education, and virtually every other sector are transforming their core processes and business models to leverage the benefits of machine learning. Currently, challenges lie in management, implementation, and business innovation.

According to PwC's 27th Annual Global CEO Survey, published at the beginning of 2024, 70% of CEOs expect that AI will significantly change how their company creates, delivers, and captures value in the next three years. More than two-thirds of surveyed CEOs who have already implemented some form of AI in their organization stated that as a result, they have shifted their broader technological strategies.¹⁹⁵ Generative AI is not just a technology, but a tool that helps clients scale their workforce, work faster, and focus on higher-value activities. Generative AI is a type of artificial intelligence that allows to create, enhance, summarize, and analyze unstructured data, such as text, code, voice and images.¹⁹⁶ All industries can benefit from the value created by generative AI. By prioritizing GenAI deployments through the flywheel concept shown below, businesses can focus on efforts that will accelerate that value creation over time, helping them better position themselves to capture, realize, and maximize GenAI's value and benefits.¹⁹⁷ The potential impact of AI varies significantly depending on the industry and organization. An analysis of the projected potential value of General AI (GenAI) suggests that if the technology were applied to current operational models, software companies could achieve the largest increase in profit margins of around 20 percentage points, while

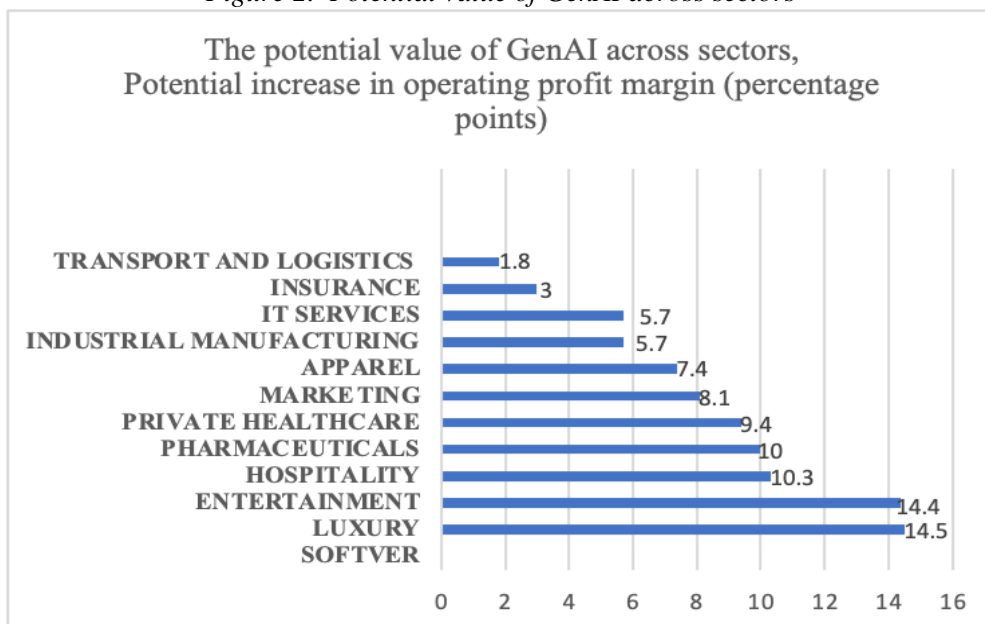
¹⁹⁵ PwC (2024). *The path to generative AI value: Setting the flywheel in motion*, <https://www.pwc.com/gx/en/issues/technology/path-to-generative-ai-value.html>, visited: 3.7.2024.

¹⁹⁶ PwC (2024). *Artificial Intelligence, Discover new paths to future value*. <https://www.pwc.com/gx/en/issues/artificial-intelligence.html>, visited: 3.7.2024.

¹⁹⁷ PwC (2024). *The path to generative AI value: Setting the flywheel in motion*, <https://www.pwc.com/gx/en/issues/technology/path-to-generative-ai-value.html>, visited: 3.7.2024.

transportation and logistics could achieve the smallest profit margin increases of around 1 percentage point.¹⁹⁸

Figure 2. Potential value of GenAI across sectors



Source: author's processing on the database PwC (2024). *The path to generative AI value: Setting the flywheel in motion*, <https://www.pwc.com/gx/en/issues/technology/path-to-generative-ai-value.html>, visited 28.6.2024.

5. IMPACT OF ARTIFICIAL INTELLIGENCE ON THE INDUSTRY

Industry is generator of export, economic growth and productivity. Industry is the driving force behind export, economic growth and productivity.¹⁹⁹ The dynamics of the world economy have changed permanently. The manufacturing process has become more complex, automated and sustainable. Nowadays, people are able to control machines simply efficiently. At the moment, we are witnessing the Fourth industrial revolution, also known as Industry 4.0, which is going to bring radical changes to the way we live and work. Billions of people are connected by means of

¹⁹⁸ PwC (2024). *The path to generative AI value: Setting the flywheel in motion*, <https://www.pwc.com/gx/en/issues/technology/path-to-generative-ai-value.html>

¹⁹⁹ Savić, Lj., Lutovac, M. (2019). *Partie 4. Ouverture commerciale et croissance économique: Industrial policy of the European Union position, importance and characteristics*. In: Rochdi Feki, Srdjan Redzepagic (Eds.), *Orienter l'investissement vers un développement durable et une croissance partagée*, Nice: CEMAFI International, 341-359.

mobile devices, unlimited possibilities for using the processor power, storage capacity and access to information. These possibilities will be multiplied by new technological advances in the areas such as artificial intelligence, robotics, the Internet of things, driverless vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage and quantum computing. Artificial intelligence is all around us, starting from driverless driving and drones, to virtual assistants and software.²⁰⁰

It can be said that AI is one of the main drivers of the Fourth Industrial Revolution due to its multidisciplinary nature, connecting AI with other fields to develop innovative solutions. Studies show that artificial intelligence could double global economic growth in the next 15 years. It is expected to impact growth in three ways. First, by improving productivity, as AI can increase labor productivity by up to 40%, enabling workers to accomplish more. Second, by creating "smart machines" in the form of systems and programs that can independently learn and solve problems. Third, by expanding innovations. McKinsey Global Institute predicts that by 2030, about 70% of companies will implement AI technologies, which will increase global GDP by about 1.2% annually.²⁰¹

In the digital age, the manufacturing sector has witnessed a gradual decline and a process of deindustrialization, which represents the lawful reduction of the industry's share in social production and employment.²⁰² This lawful trend of development leads to a post-industrial society, the highest phase of industrial development of humanity. The phenomenon of deindustrialization, characteristic of highly developed countries, is largely a result of the strong growth of scientific and technical progress in the industry. However, the advent of artificial intelligence (AI) presents a compelling opportunity to align AI technologies with the principles and advancements of Industry 4.0. Integrating artificial intelligence into manufacturing processes can significantly reduce production costs and challenges.²⁰³

Industry 4.0 transforms the manufacturing sector with dynamic, networked, complex industrial environments. These environments generate vast amounts of data and require technology and Artificial Intelligence (AI) to achieve intelligent,

²⁰⁰ Savić, Lj., Lutovac, M., Lutovac, M. (2019). „Contemporary economy at the age of the Fourth industrial revolution“. *Contemporary Trends in Insurance at the Beginning of the Fourth Industrial Revolution*, Kočović, J., Tomašević, M., Jovanović Gavrilović, B., Boričić, B., Petrović, E., Koprivica, M. (eds.), Belgrade: Faculty of Economics, University of Belgrade, 21-34.

²⁰¹ Vlada Republike Srbije (2020). *Strategija razvoja veštačke inteligencije u Republici Srbiji za period 2020-2025. godine*. Beograd: Vlada Republike Srbije.

²⁰² Savić, Lj. (2017). *Ekonomika industrije*. Beograd: Centar za idavačku delatnost Ekonomskog fakulteta, 4.

²⁰³ Alenizi, f., Abbasi, S., Mohammed, A., H., Rahmani, A.M., (2023). *The artificial intelligence technologies in Industry 4.0: A taxonomy, approaches, and future directions*. *Computers & Industrial Engineering*, volume 185.

efficient, and sustainable production processes. Using AI has created significant changes in the functioning of the industry. Among these changes, one can include improving maintenance and control, monitoring processes, optimizing the production process, managing services and techniques, and reducing the complexity of making changes. AI approaches are used in Industry 4.0 for these advantages:

1. The possibility of managing different branches using smart systems. Many events are organized by monitoring. When necessary, warnings are issued for errors or problems, and virtual experiences allow monitoring branches in different places.
2. Previously, the systems worked correctly, and if a problem occurred, an error would happen, and the system would stop working. However, with the help of monitoring systems, the system is continuously analyzed with integrated monitoring. This analysis helps to discover the problem before the error occurs, and the cost of managing it is reduced.
3. With the help of AI, scenarios can be simulated. Parameters can be optimized and improved using these scenarios, and finally, the scenario and system performance can be improved.
4. Finding patterns and predicting the future can be quickly done with the help of AI, which improves system management, reduces system costs in the short term, and better utilizes human resources and system assets.²⁰⁴

Artificial intelligence significantly contributes to the industry by making production more efficient, flexible, and reliable. It is integrated into industrial processes to improve production efficiency. This includes using AI for predictive maintenance, i.e., predicting machine failures before they happen, which can reduce unplanned machine downtime and maintenance costs. As the industry becomes increasingly digitized, data is continuously generated, processed, and analyzed, enabling the creation of digital twins.²⁰⁵ These digital models allow for more flexible and efficient planning, product and machine design, and production operations, resulting in faster production of high-quality, customized products at affordable prices.

Artificial intelligence is used in the industry to optimize manufacturing processes by streamlining workflows, improving efficiency, and reducing waste. One of the key aspects of AI integration into Industry 4.0 is the automation of quality control. Conveyors move autonomously through factory halls, enabling automated and efficient transportation of materials and products. Plants automatically optimize their energy consumption during operations, reducing costs and increasing

²⁰⁴ Alenizi, f., Abbasi, S., Mohammed, A., H., Rahmani, A.M., (2023). *The artificial intelligence technologies in Industry 4.0: A taxonomy, approaches, and future directions. Computers & Industrial Engineering, volume 185.*

²⁰⁵ Gabsi, A.E.H. (2024). *Integrating artificial intelligence in industry 4.0: insights, challenges, and future prospects—a literature review. Annals of Operations Research. Available at: <https://doi.org/10.1007/s10479-024-06012-6>*

sustainability. Machines perform continuous real-time quality checks of products during production and adjust parameters to maintain high-quality standards. AI offers many possibilities for use in manufacturing. The vast amount of data generated by factories can be utilized by intelligent software solutions to identify trends and patterns that can then be used to make production processes more efficient and reduce their energy consumption. In this way, factory plants continuously adapt to new circumstances and undergo optimization without the need for worker input. As networking levels increase, AI can learn to detect and recognize much more complex connections within systems that are not yet visible to the human eye.

AI optimizes logistical operations, from inventory management to distribution, reducing delivery times and costs. For example, it can analyze demand data and predict future inventory needs. Additionally, AI can be used to enhance personalized production. AI enables the customization of manufacturing processes to meet specific customer needs, allowing the production of personalized products at affordable prices. For instance, AI can adjust production lines to create specific product configurations based on customer orders. All these examples highlight AI's potential in processing complex and high-dimensional data, making it suitable for improving automation in industrial Cyber-Physical Systems (CPS), thereby accelerating the transformation towards Industry 4.0. However, the integration of AI into the manufacturing sector is limited. According to a 2023 study by the Boston Consulting Group, 89% of manufacturers believe that artificial intelligence is necessary, but only 68% have started implementing it. Of those, only 16% have met their AI-related goals. This can partly be explained by the inherent challenges in implementing AI projects, such as difficulties in building infrastructure and a lack of expertise.²⁰⁶ One of the main challenges in applying AI in the industry is the lack of standardization and interoperability between different systems and platforms. There are also concerns about data security and privacy. Research predicts that AI technologies will continue to evolve and their application will become more widespread across various sectors of the economy. Artificial intelligence significantly contributes to the industry by making production more efficient, flexible, and reliable. This includes the development of smart factories that use AI to optimize the entire production process.²⁰⁷ In the business world, it will transform the way companies operate and make decisions. Automating repetitive tasks, analyzing large amounts of data, and predicting trends enable companies to optimize their operations. At the state level, this leads to greater economic growth

²⁰⁶ Windman, A., Wittenberg, P., Schieseck, M, Niggeman, O. (2024). *Artificial Intelligence in Industry 4.0: A Review of Integration Challenges for Industrial Systems*, preprint, <https://www.researchgate.net/publication/380974186> *Artificial Intelligence in Industry 4.0 A Review of Integration Challenges for Industrial Systems*

²⁰⁷ Gabsi, A.E.H. (2024). *Integrating artificial intelligence in industry 4.0: insights, challenges, and future prospects—a literature review*. *Annals of Operations Research*. Available at: <https://doi.org/10.1007/s10479-024-06012-6>

and competitiveness in the global market. In the future, companies will need to invest in employee training and skills development necessary for working with AI technologies. Additionally, there is an emphasized need for collaboration between the industry, academia, and governments to overcome challenges and enhance AI application. Furthermore, applying AI in Industry 4.0 presents complex challenges, such as strict safety requirements of technical systems integrated with "black box" AI models and the lack of widely available, relevant, and high-quality data. The conducted analysis has shown that AI application in various economic sectors significantly improves efficiency and innovation. Based on the highlighted elements, it is concluded that the hypothesis can not be rejected.