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The transformative potential of generative artificial intelligence

Abstract: This paper analyses the transformative potential of generative artificial intelligence at macro, meso, and micro levels of social and economic structures. The aim is to determine the impact of these technologies on various aspects of society and economy, including business operations and the labour market. The potential of new technologies to increase productivity, transform business models, and create new professional roles has been examined through a comprehensive analysis of data and studies. It has been concluded that generative artificial intelligence can fundamentally change the labour market, globally increase gross domestic product, and improve both the public and private sectors. The paper provides insights into future trends and regulatory and structural changes that are necessary for optimising the application of generative AI.

Keywords: generative artificial intelligence (GenAI), transformative potential - macro, meso, and micro

Introduction

Society is globally witnessing accelerated development in the field of artificial intelligence (AI). This progress includes the implementation of technologies that provide machines with the ability to learn and perform cognitive tasks traditionally a matter referring solely to humans. This technological progress could have significant consequences on society and culture. Since AI is a cognitive technology, its impact pervades the crucial domains such as education, science, culture, and communication. AI-based systems are increasingly advising medical doctors, scientists, and judges (UNESCO, 2019).

Starting from the 1950s, there has been a multitude of papers that deal with the technical aspects of AI and AI applications in general. For example, a paper by Talib et al. (2020), provides a systematic overview of references that deal with hardware implementation of AI algorithms and machine

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learning (ML). The authors analysed 169 research papers published during the period between 2009 and 2019, whose focus was the implementation of neural networks as a tool for detecting objects in various applications (Talib et. al., 2020).

The research into the above-mentioned references also indicates that the published papers pay relatively little attention to a comprehensive consideration of socio-economic consequences that underlie AI. There is an obvious research gap in terms of understanding the impact of AI on social dynamics and economic structures, especially in the context of labour, education system, and policies globally. Stahl et al. (2023) note that their paper was the first to present a systematic overview of references that deal with AI impact assessment. The authors analysed 38 documents that address impact assessment so as to understand the purpose, extent, organisational context, expected issues, timeframes, processes and methods, transparency, and challenges. They concluded that there was a certain degree of convergence between various AI impact assessments, but that there was still no full consensus in terms of content, structure, and implementation. Impact assessments can be best understood as a means of encouraging thinking and discussion on social and ethical consequences of the AI ecosystem. The authors do admit that there are certain limitations of their study, including difficulty in defining AI and defining the extent of impact assessments and they also emphasise a need for additional research in order to better understand their impact and roles in a broader AI ecosystem. This paper provides an important contribution to understanding impact assessments and their potential role in AI man-

agement. Its findings are relevant to researchers, policy makers, and organisations in the field of AI.

The main feature of GenAI is that it has found its place in the area of intellectual, creative and generally better paid jobs, which stands for a true socio-economic revolution, or, to say the least, evolution.

To date, every industrial revolution has been marked by technology dominance in manufacturing, it mainly being replaced by manual labour, be it the steam engine or industrial robots (Fahle, Prinz & Kuhlenkötter, 2020). What makes GenAI special is its potential to affect jobs that require intellectual and creative skills. Not only does this significant change bring about technological innovation, but it also has a deep impact on the socio-economic context, which makes this technology extremely disruptive.

This is confirmed by a growing number of scientific and specialised papers that investigate GenAI as a disruptive technology. These papers cover a range of aspects of the application of GenAI across industries as well as its impact on business operations and social structures.

For example, the study published in the Nature Reviews Urology journal discusses how GenAI can transform science publishing, by asking the question whether this technology is disruptive or destructive for the existing work methods in this sphere. The study shows that GenAI can expedite the process of innovation and improve the quality of papers, but at the same time it also brings challenges regarding work authenticity and integrity (Bertolo & Antonelli, 2023).

Similarly, the MIT Technology Review reports on the impact of GenAI on business functions such

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as product innovation, supply logistics, and customer experience. This paper points out that not only does GenAI change the manner in which certain jobs are performed, but also the approach to innovation and competitiveness taken by organisations in their respective industries. The report shows that the majority of managers expect a substantial change to occur in the next five years, but at the same time it notes that there are technological and organisational obstacles that may interfere with a successful implementation of GenAI (MIT Technology Review Insights, 2024).

The document *The GenAI is out of the bottle: generative artificial intelligence in various domains*, which was published in Springer, analyses the application of GenAI across industries and its potential to cause significant change in business operations and society. Through six underlying hypotheses, the authors consider how GenAI democratizes the approach to knowledge, combines factographic knowledge and creative thinking, and changes the skill set necessary for creating content. Three industries are analysed - software engineering, healthcare and financial services - in order to demonstrate potential changes in the business models. This document underlines the rapid growth and potentials of GenAI, but also notes challenges such as ethical issues and the need for it to be regulated. In its conclusion, this paper contributes to understanding how companies can use GenAI for innovation and improvement of their business models (Kanbach, Heiduk, Blueher, Schreiter & Lahmann, 2024).

The article *How Generative AI Will Transform Knowledge Work*, published in the Harvard Business Review, deals with how GenAI can transform knowledge-based jobs and what challenges there are in GenAI application. GenAI has the potential to automate certain knowledge-based tasks, but this does not entail the replacement of all workers. On the contrary, GenAI can allow the workers to have more time that they could use for performing more important tasks, thus improving their performance and productivity. The text explains in detail the ways in which GenAI can support knowledge-based work, including reduced cognitive burden through the automation of structured tasks, improvement of cognitive abilities for non-structured tasks, as well as the streamlining of the workplace learning process. The authors also deliver recommendations to managers on how to assist their workers in terms of the optimal use of GenAI (Alavi & Westerman, 2023).

The authors of the article *How to Capitalize on Generative AI* (McAfee, Rock & Brynjolfsson, 2023) discuss the importance and risks of GenAI versus its potential benefits. The example of a large software company demonstrates how GenAI can improve efficiency and customer satisfaction, especially through assistance to customer support agents. GenAI should be viewed as a general-purpose technology, akin to electricity or the internet, which will have a rapid impact on economy, thanks to the already existing infrastructure. People can communicate with these systems easily, which lowers the barriers for their use. The authors recommend that business leaders should take steps such as the inventorisation of knowledge work roles, benefit assessment, and prioritisation of GenAI efforts with the highest cost-benefit ratio, along with the need to experiment with rapid iteration so as to maximise the benefits of GenAI.

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A comprehensive overview of references that deal with GenAI is still to be presented since the currently existing studies are in the early stages and mainly address technical matters. Future research should offer a deeper insight into long-term effects of GenAI on society, the labour force, and economic policies. This research will be crucial for understanding and efficiently managing transformations brought about by this revolutionary technology.

The first part of this paper presents the results of published studies and an overview of the existing GenAI references. The second part of this paper analyses the transformative levels of GenAI impact, which are divided into three segments: macro, meso, and micro levels. The third part of this paper shows research results and discussion, in which relative findings and their implications on the social and economic structures are presented. Finally, the fourth part of this paper summarises key conclusions and offered recommendations for future research and the application of GenAI in practice.

Methodology

The research presented in this paper deals with an extensive analysis of the impact of GenAI on the social and economic systems. The objective is two-fold:

1. To identify the ways in which GenAI is integrated into different sectors:
    o   How does GenAI promote innovation?
    o   What are the new professional possibilities created by it?

2. To investigate the challenges that come with GenAI:
    o   How does it affect the existing practices and paradigms?
    o   What are the potential dangers?

With this comprehensive research, we aim to provide a clear picture of the possibilities and challenges that GenAI poses for modern society.

Transformative potential of generative artificial intelligence on macro, meso, and micro levels

GenAI stands for a major milestone in the evolution of technological development, bringing with it extraordinary potentials for a fundamental transformation both of individual lives and of broader social and economic structures. Given the wide range of its impact, from individual to global levels, GenAI opens new perspectives in terms of efficiency, innovativeness, and adaptability. This technology pushes the boundaries of traditional methodologies, thus allowing for revolutionary changes in business modalities, education, and communication.

Wide availability of these tools has aroused growing curiosity of the general public. ChatGPT stands out as one of the most striking examples having become one of the fastest-growing consumer application ever. After it was first launched, in just two months ChatGPT attracted 100 million users (Baum et al., 2023), thus breaking all previous records in terms of the speed of user base growth, compared to any other digital service. Not only does this remarkable success illustrate the growing allure of GenAI technologies, but it also under-

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lines the potentials that these innovations have in the transformation of both business and personal aspects of our lives.

To be able to utilise all options offered by Gen AI to a maximum extent, it is imperative to have in-depth understanding of its implications at the various levels of transformation - **macro, meso, and micro levels**. The complexity of this technology requires a comprehensive approach which integrates interdisciplinary knowledge and strategic planning so as to identify and utilise the potentials of GenAI, along with a concurrent consideration of potential risks and ethical challenges. This approach allows for the implementation of strategic paradigms brought by GenAI to various spheres of society and economy.

At the macroeconomic level, GenAI holds the capacity for a thorough transformation of the economic and social infrastructures. This technology has a crucial role in the shaping of global trends and directing economic policies, with a potential to redefine the labour market. The implementation of GenAI may result in substantial change in the structure of labour, whereby certain occupations could discontinue, whereas other, new occupations could emerge. Such dynamics calls for an all-encompassing review of educational programmes and strategies for the training of the labour force, in order to meet the latest demands of the market.

Economic output of GenAI is potentially revolutionary. As Paul Krugman, winner of the Nobel Prize in Economic Sciences notes, productivity plays a key role in the long-term economic growth (Colford, 2016). Predictions indicate that an extensive use of GenAI in the next decade could raise the annual work productivity rate by approximately 1.5% in the United States of America, as well as in other developed countries. It is expected that such a trend will largely affect gross domestic product (GDP) globally, whose projected annual growth is up to 7%. The analyses conducted by various financial institutions, such as Goldman Sachs, suggest that the value of indices, such as S&P 500, could grow by up to 9% thanks to the improvements to productivity and corporate performances (Goldman Sachs, 2023).

Every year we can see dynamic growth of the AI market. The size of the global AI market in 2023 was approximately USD 208 billion, with a prediction that by 2030 it will grow to approximately USD 1.85 trillion. These figures not only illustrate the speed of AI technology development, but also its ever stronger integration into various segments of economy and society (Duarte, 2024).

For the purpose of a continued consideration of the impact of artificial intelligence on the social and cultural spheres, it is necessary to look into its economic implications. According to the assessment made in a 2023 report created by McKinsey Company, AI could contribute to global economy by adding the impressive USD 25.6 trillion. This number is indicative of the potentials AI holds to transform economic structures worldwide (Chui et al., 2023).

GenAI has the potential to significantly prompt the growth of gross domestic product (GDP) through several key mechanisms:

- **Raising labour productivity**: The automation of repetitive and time-consuming tasks allows workers to focus on more complex and creative activities, which directly

contributes to economic growth. Natural language processing and data analysis tools, as well as the automation of business processes, can transform the companies' operating models, reduce operating costs, and increase capacities.

- **Innovation and the development of new industries**: The use of GenAI makes it possible to create new products, services, and industries, which range from healthcare technologies to personalised digital assistants. Both the creation of new markets and the expansion of the existing ones significantly contribute to economic growth.
- **Creating new jobs**: In addition to the optimisation of existing tasks, GenAI creates a need for new types of occupations. The need arises for new jobs which require specialised skills in AI systems management, monitoring, and improvement, including AI ethics experts, AI security engineers as well as data analysts.
- **Supply chain and logistics optimisation:** GenAI can significantly improve supply chain efficiency through analyses and predictions by reducing losses and cutting operating costs, which contributes to overall economic well-being.
- **Improving public services and administration**: AI-assisted data automation and analysis can enhance the efficiency of public services, optimise resource allocation, and cut costs, which has a positive effect on economic growth.
- **Attracting foreign investments**: Efficient and innovative economic systems that use GenAI have become increasingly attracting of foreign investments, which contributes to the growth of foreign direct investments.

At the meso level of transformation, the focus of GenAI is aimed at specific industries and sectors, with an emphasis on how technology can prompt adaptation and innovation within the business environments. Some industries, such as finance, healthcare and the legal industry, are already using the possibilities GenAI offers quite noticeably for the purpose of reshaping their operations. This technology allows companies to automate routine tasks, create new products and services, and also alter their business models and operational strategies. Furthermore, GenAI plays a key role in the transformation of corporate culture and the development of new skills within teams.

AI also offers the possibility to automate a wide range of jobs, which affects the labour force in different ways. According to a 2023 report, approximately two thirds of jobs have the potential to be partially automated through the application of AI technologies. However, this does not necessarily mean the replacement of human labour, but complementing it instead, thus opening new possibilities for those workers who perform more complex tasks (Goldman Sachs, 2023).

GenAI can have a significant impact on the careers of professionals with high education, who work in the economically valuable sectors. Rakesh Kocchar notes that "workers who are more exposed to AI see more help than harm" (Kochhar, 2023). Such changes can rapidly and extensively affect the labour market by driving significant adaptation in the majority of professional fields (Schulz, 2023).

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According to an analysis by the McKinsey Global Institute, a major part of work tasks in the U.S. are facing the challenge of automation. Specifically, between 20% and 50% of jobs in the U.S. could be exposed to various levels of automation by 2030 (Kenan Institute of Private Enterprise, 2023). This projection suggests that almost a quarter of all work activities could be transferred to AI-based technologies, which implies substantial changes in the structure of the labour force and required skills. Such a transition calls for extensive adjustments both at an individual level, as well as at the organisational one, which encourages education and the development of new skills for the purpose of efficiently responding to such changed market requirements.

The challenges of work task automation are particularly noticeable among women, who are more significantly affected than men are. According to reports, women face the risk of job automation by 21% more than men. This phenomenon can be explained in part by the fact that men make up the majority in the labour market. However, women mainly have jobs in the sectors which are most susceptible to automation, such as admin support, client services, and the food industry (Kenan Institute of Private Enterprise, 2023).

A 2023 survey conducted among professionals in the U.S. showed that 37% of workers in the advertising and marketing sectors used AI as support in their business activities. By contrast, the healthcare

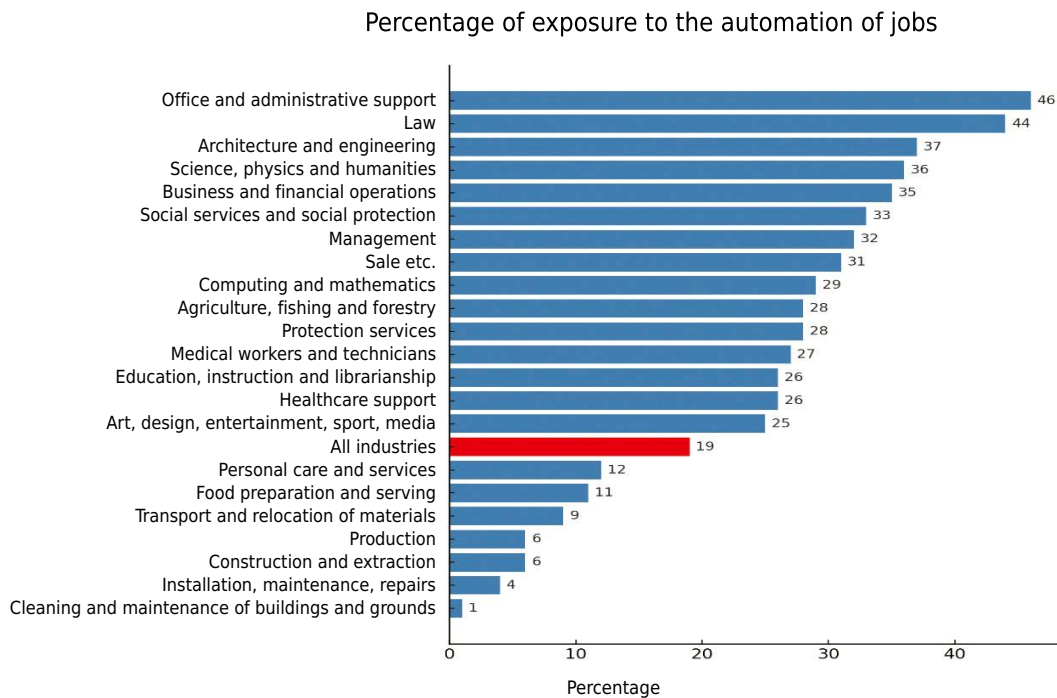### Percentage of exposure to the automation of jobs

Figure 1. Percentage of exposure to the automation of jobs which could be automated by AI (Goldman Sachs, 2023).

sector showed the lowest degree of the use of AI, with as few as 15% respondents who reported using AI in the work environment. The high acceptance level of AI technologies in marketing and advertising can be explained by the nature of this industry, which strongly integrates creative processes in the media, thus making room for a streamlined use of AI tools for optimisation and innovation purposes (Statista, 2024).

Specialised versions of GenAI, such as ChatGPT Enterprise, provide companies with advanced tools which are adapted to their business needs. This platform provides enhanced security and privacy, faster access to the models such as GPT-4 and expanded functions for the processing of complex tasks. Such platforms allow the automation of chatbots for user support; they facilitate creative processes such as content writing and marketing, and they also encourage integration with other platforms. These innovations are crucial for the improvement of operational performance and company competitiveness (Open AI), through:

- **Improving business processes**: GenAI allows the optimisation of business processes through automation and data analytics, thus increasing efficiency, cutting costs, and shortening task performance time. This ensures a more a prompter response to market requirements and redirecting resources to strategic initiatives.
- **Product and service innovation**: GenAI encourages the development of new products and services as well as the enhancement of existing ones. By analysing large quantities of data, companies can identify new trends and customer needs, which

allows the creation of targeted and innovative solutions, this being applicable to anything from personalised financial advice to advanced diagnostic tools in medicine.

At the micro level, GenAI research is directed towards individual users, small teams and specific uses in daily lives and the work environment. This technology allows individuals to enhance their productivity via professional assistants that provide support for various activities, including writing, research, and other creative tasks. Additionally, GenAI offers customised user experience in many applications, be it e-commerce or educational tools, thus significantly improving the quality of customer experience.

It is worth noting that GenAI transforms the access to information and resources, which allows the users to utilise their time and resources more efficiently. For example, platforms such as ChatGPT, can increase the workers' productivity in writing, in terms of generating ideas, text editing, or creating full textual content. This technology also contributes to reducing workplace inequality by allowing the lesser skilled workers to perform tasks equally well as their skilled peers. This in particular refers to improving grammar, spelling, and thought organisation, thus providing the workers who are less skilled at writing with an opportunity to create quality blogs, articles, e-books, and other content that is published online (Vukmirović, 2024).

In the context of scientific research, AI is now assuming a key role in the processes of data analysis and interpretation. Furthermore, a gradual replacement of traditional human labour by innovative technologies calls for the development

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of new capacities for work process resilience and adaptability. Even some prominent thinkers, such as Stephen Hawking, have voiced their concerns that AI could bring an existential threat to humankind, because of its potential to take control of many aspects on our daily lives and societal organisation (UNESCO, 2013).

The results of a 2023 study conducted by the authors from the National Bureau of Economic Research (NBER), whose focus was on quantifying the efficiency of resolving business tasks per hour, show that the workers who used GenAI tools had productivity which was by 14% higher than that of their peers who did not use those tools. This improved productivity was extremely perceptible in newly-hired workers as well as in lesser-qualified workers. On the other hand, in highly qualified professionals, the increase in productivity was less noticeable. These results demonstrate the potentials of GenAI tools to raise workplace efficiency levels, especially by encouraging productivity in less experienced team members, whereas in the already established professionals, GenAI is applied in more specific and more complex contexts (Brynjolfsson, Li & Raymond, 2023).

- **The impact on personalised productivity**: GenAI allows the users to customise the tools to their specific needs, which increases efficiency and satisfaction. The users can utilise GenAI to organise activities,
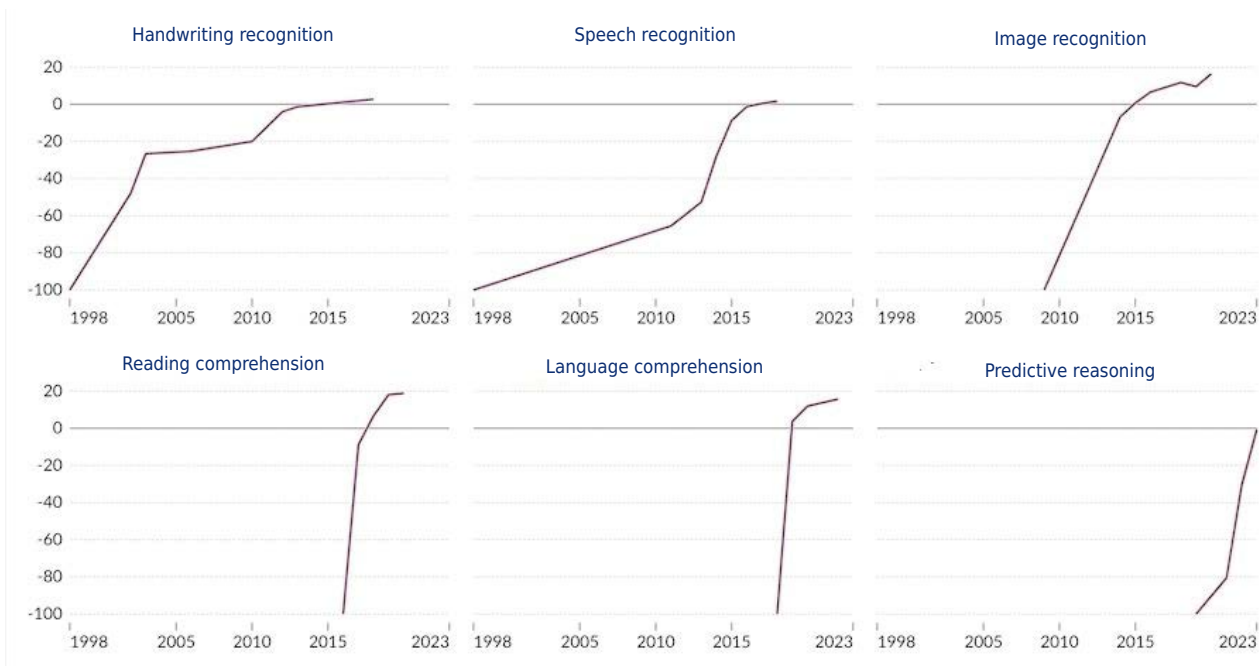
Figure 2. For each of the areas, AI initial performance was set at 100, while human performance was used as the basis, i.e., zero. As AI performance increases and exceeds the basis, it achieves better results than humans (Kiela et al., 2023).

manage finances, and for medical advice. Personalisation enhances productivity and engagement, but it also requires to be legislatively regulated for the purpose of protecting privacy and reducing bias. The micro level of transformation via GenAI represents significant advancement in the manner in which individuals and teams use technology because it shows how technological advancement can be customised to various aspects of human activity.

In 2023 research conducted by Our World in Data (Kiela et al., 2023), AI performances were tested and then compared with humans' performances in the same fields. Task performance was tested, and it ranged from image creation, design, to reading comprehension. The results show that AI surpassed human performance in understanding linguistic and text documents, but also in subject recognition in photographs. Also, AI performance is equal with human performance in terms of speech recognition, handwriting recognition, and predictive judgement.

GenAI: a step ahead

Although they are widely known as "neural networks", AI tools do not work in a manner that is similar to the human brain. AI machines rely mainly on advanced statistical methods for data processing and response generation. Basically, these machines carry out complex statistical analyses by using the algorithms that are based on word frequency and patterns in large data sets. Their ability to grasp abstraction, as well as the ability of deep reasoning, are limited because they do not

have internal world models which are a feature of human cognition (Goldman Sachs, 2023).

The learning performed by these machines is based on the analysis of enormous amounts of data, whereby patterns and correlations are identified, which allows the generation of relative responses to specific queries. Nevertheless, unlike humans, the machines cannot understand abstract concepts or complex interactions that are characteristic of human perception and thought. Hence, their intelligence is limited to reflexive and statistical tasks, without being able to truly understand and have awareness.

The "study of artificial intelligence" is planned "to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it" (UNESCO, 2019). This presumption represents the fundamental principle based on which modern AI systems are developed, in reliance of statistical and mathematical models which make attempts at simulating human cognitive processes.

Conclusion

This research has shown that generative artificial intelligence has the capacity for a deep and extensive transformation at macro, meso, and micro levels of social and economic structures. At the macroeconomic level, the implementation of generative artificial intelligence technologies can significantly raise the global labour productivity, encourage innovation, and create new professional opportunities, which ultimately leads to the growth

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of gross domestic product. The application of these technologies at the meso level allows the industries such as finance, healthcare and the legislative sector to redefine their business models and operational strategies, thereby additionally increasing their efficiency and competitiveness. At the micro level, the generative artificial intelligence tools offer individuals and small teams the possibility of enhancing personal productivity and improving customer experience by using personalised assistants and customised applications.

Nevertheless, while the potentials of generative artificial intelligence, as well as the technology itself, are no doubt immense, it should be pointed out that this transformation comes with substantial challenges and risks. Ethical issues, including data privacy, algorithm bias, and potential replacement of the human labour force, must be carefully considered and regulated. In order to fully utilise all benefits offered by generative artificial intelligence, it is necessary to develop interdisciplinary approaches and strategies that integrate technological development with ethical and social aspects. Only in this way will it be possible to maximise the positive effects of this revolutionary technology and minimise potential adverse consequences.

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