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FINAL REPORT FOR

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How Artificial Intelligence (AI) Impacts the Economy

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Abstract

Artificial Intelligence (AI) has emerged as a transformative force in modern economies, reshaping industries, labor markets, and global growth trajectories. This report delves into AI's historical development, current applications, and future potential, emphasizing its economic implications. From the foundational work of Alan Turing to recent breakthroughs like AlphaGo, the study highlights key milestones and challenges. AI has been able, based on deep analysis supported by evidence from credible databases such as the OECD, McKinsey, and the IMF, to create $15.7 trillion toward global GDP until 2030. The work would therefore hope to apply the knowledge of a possible maximum economic benefit that AI can offer amidst ethical and social problems.

Introduction

Overview of Artificial Intelligence and Its Role in the Economy

Artificial Intelligence, defined by the OECD as "systems designed to act with a level of autonomy to achieve goals," has become integral to economic transformation (OECD, 2023). Its applications, from enhancing productivity in manufacturing to driving innovation in healthcare, are projected to significantly impact global GDP. According to McKinsey's The Future of Work, 2023, AI could automate as much as 50% of routine work tasks in the next decade to come, freeing resources for higher-value activities but also creating challenges in labor markets.

Importance of the Study

The rapid proliferation of AI technologies now requires a significant deepening in the understanding of their economic contributions. Reports by institutions, such as those by the IMF in 2024, highlight the use of AI as being aligned with supporting policies for equitable growth. Against this background, this study provides a comprehensive insight into the past and present magnitude of AI in economic contributions.

Contribution of the Web of Science Core Collection Data

A search was conducted in the Web of Science database for articles related to economics and artificial intelligence. The Web of Science Core Collection platform has provided insights on the research topic "How AI impacts the economy." The highest number of publications by year was recorded in the year 2024, with 43 (28.11%), followed by the years 2023 and 2022. Most publications came from China, Russia, the USA, and India. Some of the most prevalent subject areas for these journals are Economics, Environmental Sciences, and Green Sustainable Science and Technology. Article types comprised 74.51% of the publications, while the dominant language was English at 94.77%, reflecting the global spread of this field. From 2020, the publications increase steeply to a peak in 2023 and 2024 with 153, 2,065 citations, and an h-index of 20, showing that academic interest is really increasing. Thus, the present review underlines the increased significance of artificial intelligence in economic research due to its power to transform the world.

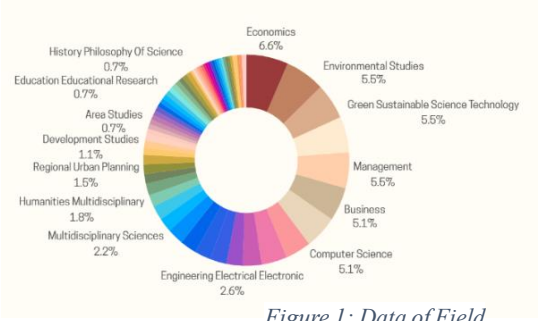

Figure 1: Data of Field

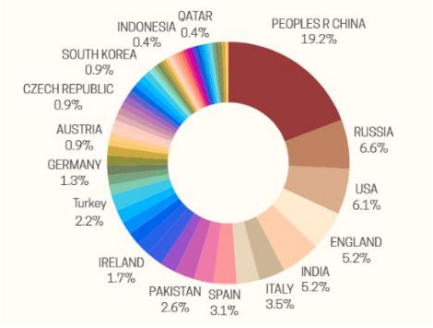

Figure 2: Data of Country

Structure of the Report

The report starts with a background of AI development, showing its growth through early innovations, stagnation periods, and the modern AI boom. Further sections discuss the economic contributions of AI through secondary data analysis: market growth and employment trends.

Finally, the report discusses economic indicators such as GDP contributions and makes recommendations on how to harness the power of AI responsibly.

1.Historical Description

1.1 Early Development (1950s - 1970s)

Alan Turing and the Turing Test: Alan Turing's paper Computing Machinery and Intelligence (1950) introduced the Turing Test, a measure of machine intelligence (Bruegel, 2018). He set the theoretical framework for AI by asking if machines could think like humans.

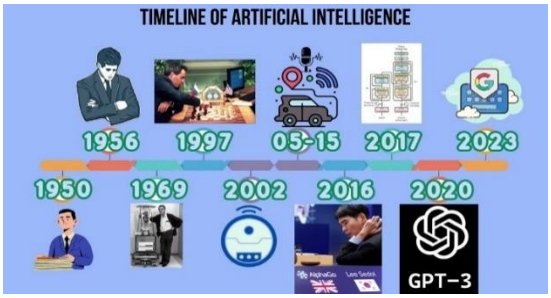

*Figure 3: Timeline of Artifical Intelligence Source: **Prof. Reza** (n.d.). Understanding AI and Its Applications [YouTube video]*

Early Expert Systems: The 1960s saw the first expert systems like DENDRAL and MYCIN which used rule based logic to solve specific problems in chemistry and medicine. These systems showed what AI could do but were limited by the lack of computer power and data at the time (TechTarget, 2023).

1.2 The AI Winters (1970s - 1990s)

Technical and Financial Challenges: During the AI winters the enthusiasm for AI disappeared due to technical bottlenecks and unmet expectations. Governments and private investors stopped funding, citing lack of practical applications and AI systems not being able to generalise beyond narrow tasks (NBER, 2023).

Unmet Expectations: The failure of early AI to deliver on the hype led to widespread scepticism. According to McKinsey (2023) this period was a major setback for AI research and development and delayed its economic impact.

1.3 Modern Era (2000s - Present)

Big Data and Machine Learning: The revival of AI in the 21st century was driven by the availability of big data, increased computer power and breakthroughs in machine learning algorithms. Neural networks which were dismissed became practical with the invention of deep learning (OECD, 2023).

Significant Achievements: Deep Blue and AlphaGo: IBM's Deep Blue showed AI could do complex tasks by beating chess champion Garry Kasparov in 1997, while Google DeepMind's

AlphaGo demonstrated AI's adaptive learning and strategic ability by beating Go champion Lee Sedol in 2016 (IMF, 2024).

2.Basic Analysis of Secondary Data

2.1 Global AI Market Size and Growth Trends

In less than two decades, Artificial Intelligence has grown from peripheral technology to a vital component in modern economic development. The global AI market surged from $4.06 billion in 2015 to $35.2 billion in 2020, growing at a CAGR of more than 40% (Statista, 2023). It is expected to grow further to $243.70 billion by 2025 and $826.70 billion by 2030. The United States is expected to lead with a market size of $66.21 billion in 2025 (Statista, 2023). Currently, 60 countries have developed national AI strategies, clearly reflecting AI's increasing importance in shaping economies and policies. This is majorly driven by the rapid development occurring in AI technologies. Innovations in machine learning, deep learning, and natural language processing have meant access and efficiency for AI. In addition, the exponential growth in digital data has really facilitated the making of more accurate predictions with the capability for better decision-making by AI models. Integration into industries such as health, finance, and logistics further underlines its transformative potential.

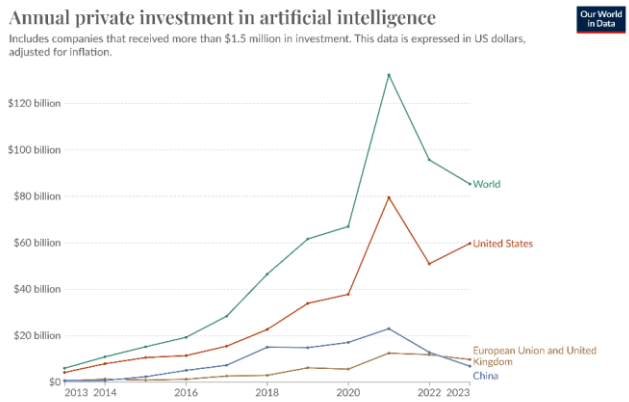

Figure 4:Annual Private Investment in Artificial Intelligence
Source: Our World in Data (n.d.). Artificial Intelligence

2.2 Employment Impact by Industry

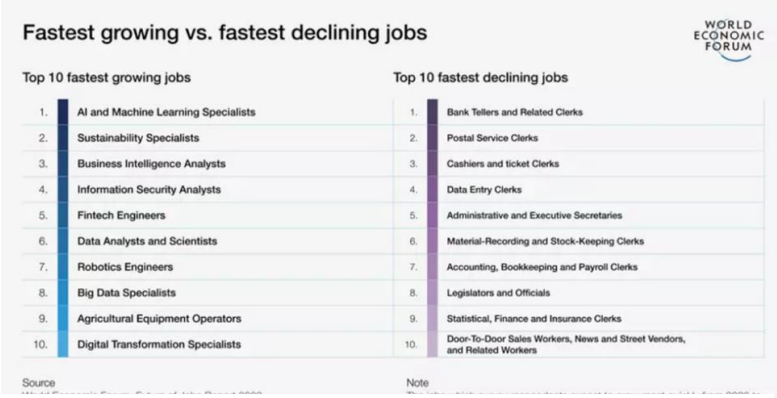

Figure 5: The Fastest Growing vs. Fastest Declining Jobs
*Source: **World Economic Forum** (2023). The Future of Jobs Report 2023:*

AI has a two-sided impact on employment. While it does open up many new avenues, especially in the high-skill domains, at the same time, it displaces routine-based jobs. According to the World Economic Forum's estimate for 2023, by 2025, AI will replace 85

million jobs. However, according to the same report, it will also create 97 million new jobs, bringing about a net positive impact if adequate training and reskilling programs are instituted. The chart below, The Fastest Growing vs. Fastest Declining Jobs, shows the effect of artificial intelligence on the workforce. AI and technology sector jobs, such as AI and machine learning specialists, sustainability experts, and business intelligence analysts, are growing, while the jobs that are susceptible to automation include data entry clerks, bank tellers, and postal service clerks. This underlines how AI generates new jobs in some industries but destroys them in others, bringing about immense changes in the workforce.

2.3 Productivity and Efficiency Gains

The "Impact of Generative AI on Technical Automation Potential" chart below shows how generative AI increases automation potential across manifold occupational groups in 2023. Accordingly, the most affected sectors are education, property maintenance, and production, with automation potential reaching as high as 82% in these industries. In contrast, AI has less effect on professions in healthcare and management because of human intervention. Therefore, it justifies that the generative AI enhances productivity and efficiency and is at varied stages of adaptation across industries. Generative AI fuels significant gains in productivity owing to its optimal use of available resources, economizing on costs, and stimulating creativity. In manufacturing, AI-powered predictive maintenance can reduce downtime by as much as 50% (McKinsey, 2023), while General Electric uses AI to monitor equipment and save operational costs. In logistics, AI enhances delivery times by 25% due to optimized routes and inventory management (PwC, 2024). In healthcare, AI, such as IBM Watson, reduces diagnosis time by 30% through fast data analysis (OECD, 2023). Meanwhile, in finance, AI prevents fraud by analyzing transaction patterns, saving institutions like JP Morgan Chase billions (Bruegel, 2018).

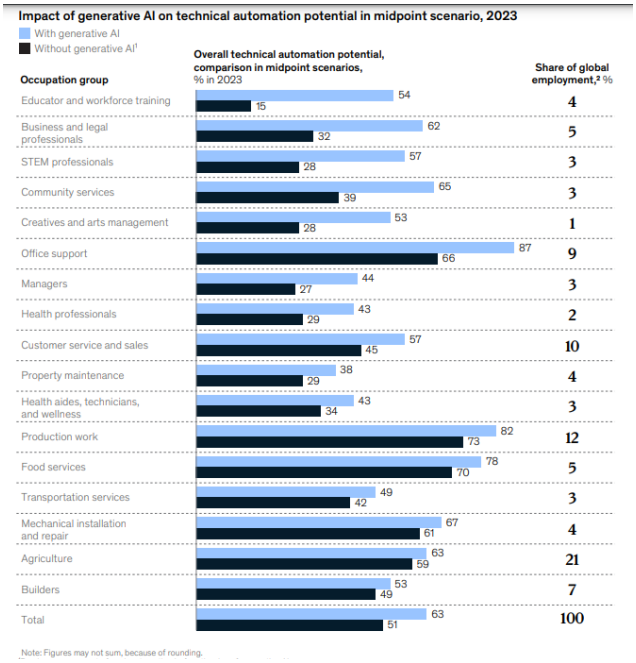

Figure 6: Impact of Generative AI on Technical Automation Potential
Source: McKinsey & Company (2023). The Economic Potential of Generative AI: The Next Productivity Frontier

2.4 AI's Role in Economic Inequality

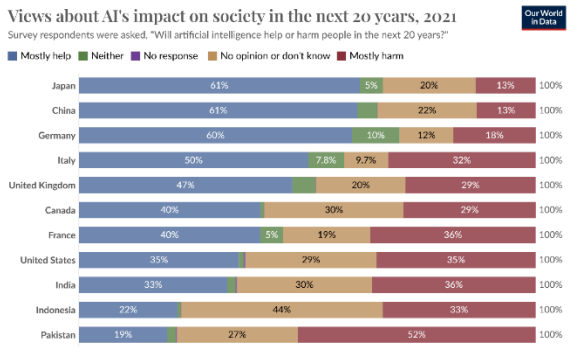

Figure 7: Views About AI's Impact on Society in the Next 20 Years
Source: ***Our World in Data*** *(n.d.). Artificial Intelligence*

While AI is a driver of economic growth, it also risks furthering income inequality. High-income countries and organizations that have more access to advanced AI technologies are likely to gain the most from it, further increasing the gap with developing nations. According to an IMF report in 2024, such a risk necessitates proactive policies in sharing technology equitably and international cooperation. The graph on "Views About AI's Impact on Society in the Next 20 Years" shows disparities across the globe regarding perceptions of AI: whereas in developed countries like Japan and Germany, the majority of respondents believe that AI will have a beneficial effect on society (61% and 60%, respectively), in developing countries like Pakistan and Indonesia, sizable pluralities believe it will be harmful (52% and 44%, respectively). This demonstrates unequal access to AI technologies in favor of developed nations. These results give way to the need for policies that are just to distribute the benefits of AI equitably and reduce inequalities, rather than increasing them.

2.5 Consumer Behavior and Market Dynamics

Dynamics AI also influences consumer behavior. AI-driven personalized recommendations have revolutionized the retail industry. For example, the recommendation engine of Amazon alone constitutes more than 35% of its total sales today (NBER, 2023). In the financial arena, AI-driven insights enable consumers to make informed investment decisions.

3.Application of Basic Economic Indicators in Economic Evaluation

3.1. AI's Contribution to GDP (Gross Domestic Product)

Artificial Intelligence (AI) has become the most critical catalyst for the global economic expansion characterized by acceleration of productivity, efficiency, and innovation. It is envisaged by McKinsey that the adoption of AI could enhance the global GDP by an annual growth rate of up to 1.2% resulting in a total of $13 trillion for the world economy by the year 2030. This effect is predominantly because it is widely applied in industries such as healthcare, manufacturing, and financial services.

Regional Variations: North America along with the Asia-Pacific region drive the GDP considering they use AI. North America experiences advantages mainly due to the technological foundation and the massive amount of money poured into the research and development, while Asia-Pacific is using “smaller” data sets and nearshore manufacturing services to its advantage (McKinsey Global Institute, "The Future of Work in the Age of AI.")

Case Study: China conducted the substitution of AI for human overseers in industrial production and e-commerce being able to achieve a 26% reduction in inefficiency. (IMF, "AI Will Transform the Global Economy.")

3.2. Impacts on Inflation and Employment

AI innovation is seen as the process of developing systems which perform tasks that usually require human intelligence. These machines are in a position of accomplishing the job and therefore lead to automation and cost optimization. Optimization of production expenses. For example, employ AI"-based logistics to transport a 10% reduction in price, and a 15% cost decrease is possible due to AI-based predictive maintenance (PwC, "AI Jobs Barometer Report"). Although AI is bringing about new labor in the fields of data science and machine learning, it is also removing traditional tasks, especially the routine ones. According to the World Economic Forum (WEF), 97 million people will get jobs around the world because of AI while 85 million jobs are expected to be lost by the year 2025. So, some of the ways to manage them are training the workforce and letting them attend social programs like unemployment insurance or universal basic income (WEF, "The Future of Jobs Report 2023"). A chart titled "Global Views About AI's Impact on Society in the Next 20 Years" shows that the perspectives of people in different age groups and such differ. Young people at the age of 15-29 are more hopeful and at least 40% of them believe AI will be the solution. However, only 31% of the elderly (65+) think that AI will improve lifestyles. Men and those with higher incomes generally have a more positive view of the technology, while those with less privilege express more concern.

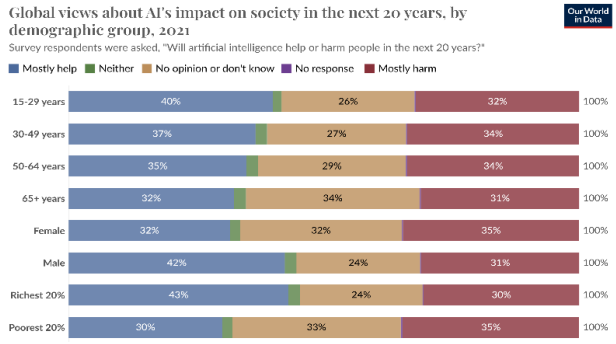

Figure 9: Global Views About AI's Impact on Society in the Next 20 Years
*Source: **Our World in Data** (n.d.). Artificial Intelligence*

3.3. Other Economic Indicators

a. Investments in R&D:

The opportunities in the domain of the essential concept of intelligence, information, and data are spectacular yet also quite tricky. Hence, the growth that AI has brought to R&D has been getting more and more significant. Data from the whole world reveals that countries have been spending on $125 billion in R&D in 2022. The primary focus is on advanced Machine Learning, Robotics, and Quantum Computing. For instance, two of the leading countries in AI-related patents are the US and Germany. Alphabet, the Google mother company, spent 15% of its income on AI research. It used deep learning and large language models the most (Statista, "AI Market Overview"; Alphabet, "AI R&D Investments and Applications").

b. Trade and Competitiveness:

AI technologies are reshaping global trade. Platforms like Alibaba use AI for personalized recommendations, boosting international trade. AI-driven analytics help businesses gain competitive advantages by anticipating trends and consumer preferences (NBER, "The Economic Impact of AI Adoption"; Bruegel, "AI's Role in Shaping Global Trade."). The "Annual Global Corporate Investment in Artificial Intelligence, by Type" chart illustrates a sharp rise in AI investments from 2013 to 2023, with mergers and acquisitions dominating, particularly in 2020 and 2021. Private investments also surged, reflecting growing corporate interest in AI.

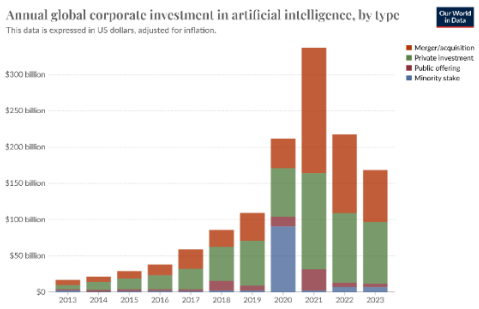

Figure 11: Annual Global Corporate Investment in Artificial Intelligence, by Type
Source: ***Our World in Data*** *(n.d.). Artificial Intelligence*

3.4. Broader Impacts on Productivity

AI significantly boosts productivity across sectors. In logistics and manufacturing, automation has reduced operational costs while increasing output. Studies show that firms adopting AI experience productivity growth of up to 30%. Regional Example: Germany's automotive industry reported a 25% productivity increase after integrating AI-powered robotics into assembly lines. (OECD AI Observatory.)

4. Recommendations and Solutions

4.1. Education and Workforce Development

The boosts to the economy really nudge redefining or upskilling of the workforces due to the huge impact of AI. Governments, educational institutions, and private organizations should come together to offer direct and applicable training. Key suggestions: Create AI education framework in schools and universities; provide for high-demand vocational training in areas like data analytic and machine learning, which would aid companies that would provide training on AI. One good example of this approach is Germany's dual system of education, which provides vocational training in alignment with an AI-relevant curriculum (OECD AI Observatory, 2023). The Top 10 Skills on the Rise chart lists competencies that are estimated to grow by 2027, such as creative thinking, technological literacy, and AI proficiencies. These skills reflect the rising demand for cognitive, technical, and adaptive abilities in an active and quickly transforming global labor market. This already suggests a strong and supporting framework for education and workforce developing, turn making individuals to meet expectations placed on them from technological growths.

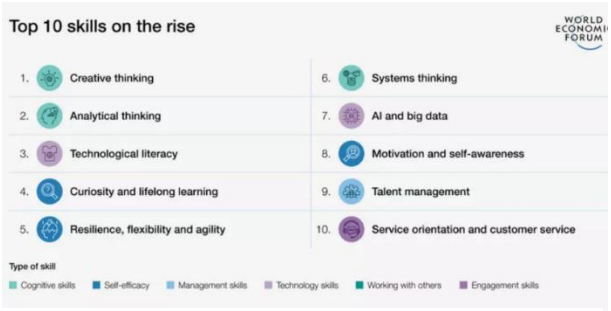

Figure 13: Top 10 Skills on the Rise
Source: World Economic Forum, Future of Jobs Report 2023

4.2. Policy and Regulation

Rapid development and emerging use of AI will demand rigorous policies to ensure its ethical use and to minimize risks of bias, inequality, and unemployment. Recommendations for this include: formulation of national AI strategies linked to appropriate global standards on ethics and transparency; establishment of AI governance principles focusing on accountability and fair distribution of benefits; and promotion of businesses to use AI with ethical considerations in view, preventing further aggravation of inequities. Good examples will include the European Union’s Artificial Intelligence Act to regulate the use of AI through its risk-categorized applications to reinforce consumer safety and data protection (European Commission, EU Artificial Intelligence Strategy).

4.3. Public-Private Partnerships

Collaboration between government and private entities is crucial for stimulating AI innovation and combating its threats. Initial recommendations: provision of grants to joint research programs for developing disruptive AI solutions for global challenges such as climate change will foster an atmosphere where private companies can partner with public bodies toward scaling AI-driven solutions in healthcare, education, and infrastructure; such can further assure equitable access to AI innovations across regions by the establishment of technology transfer programs. Some examples would be: the U.S. AI Research and Development Strategic Plan calls for public-private collaboration to speed up AI adoption in priority sectors. (U.S. National AI Initiative, 2023.)

4.4. Mitigating Employment Challenges

Automation using AI systems threatens to put millions out of work, primarily within their routine forms of employment. To combat this threat, they will require protection to ensure those vulnerable employees are proactively safeguarded. Key Recommendations: creation of unemployment insurance to serve as a safety net- monetary safety-for workers laid off in the reorganization, rotation programs taking workers from a declining industry into an emerging one, and establishing a social safety net, such as universal basic income, to provide equitable outcomes. Examples: Developed within Singapore’s Skills Future initiative is a financial incentive framework for workers to take up reskilling programs in keeping with Singapore's goal of transitioning its economy toward AI. (World Economic Forum, "The Future of Jobs Report 2023.")

Conclusion

Artificial intelligence (AI) is probably the greatest economic event of the century. AI seamlessly drives productivity, innovation, and growth in the global economy. It could contribute unused growth of about $15.7 trillion to the global GDP by 2030. Manufacturing, healthcare, and finance are set to be changed by AI: creating efficiencies while redefining what is considered the workforce. This displacement, though, will come at a cost, and it is going to involve substantial investments in retraining and up-skilling programs. For realizing the above potential, governments and organizations, should strive for education, build ethical governance frameworks, promote public-private partnerships, and work immensely to improve the collaborative spirit so as to provide equitable platform access to realize the diffusion of AI technologies, economic growth, and better life through responsible innovation.

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