
THE IMPACT OF ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML) ON ECONOMIC DEVELOPMENT

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Abstract: The emergence of Artificial Intelligence has come with it this transformative force that has moved across various sectors; hence there is a kind of reorganization of societies and economics worldwide. This study examines the impact of Artificial Intelligence (AI) and Machine Learning (ML), on economic development especially in the area of labor market transformation. The study shows that AI has made a lot of impact on productivity, innovation and economic growth generally.

The findings bring to light both opportunities and limitations of AI in economic context. However, this review provides a broad understanding of the importance of AI on economic development. AI is the name given to the broad spectrum of technologies by which machines can perceive, interpret, learn and act by coping human intellectual capabilities.

Keywords: Artificial intelligence, labor market, economic development, productivity, innovation.

Introduction

In the past few years now AI has metamorphosed from ordinary research topic to a wider scope encapsulating sectors like finance, manufacturing, healthcare and governance. "Up to 300million jobs worldwide could be affected in the coming years" (Goldman 2023). The automation by AI is increasingly taking over from humans in many industries and even in some homes across the globe. AI is efficient, smart and fast, but some research scholars are also clamoring of its negative impact on job formation, in the near future.

The gigantic force of Artificial Intelligence (AI) is changing our understanding of global economic growth, sustainable development and investment in environmental, social and governance aspect. People are now beginning to come to terms that it can contribute to long term financial sustainability. AI technologies that can introduce a new period of economic expansion include computer vision, natural language procession, virtual assistants and sophisticated machine learning. Nevertheless, it may not be easy for everyone to accept it. AI, with its appealing rate of evolution, can bring about new content: texts, images, new computational codes, possibly medical diagnosis, interpretations of data and so on.

The major objective of this study is to find out the impact of AI an ML on the labor market/employment. Again, this research is also aimed at examining the effect on productivity in the economic development.

The significance of the study is that it will help the emerging and developing economies to know the impact AI and ML have on the economies that are using them; and it will help them to know what they will expect and also how much to invest in order to gain reasonable impact.

Conceptual Review

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The idea of AI was born in 1950, with the Turning test, which is a test designed by mathematician and cryptologist Alan Turing, aimed at measuring the ability of an AI to imitate a human conversation. Marvin Lee Minsky in 1956 defined AI as “the construction of computer programs that engage in task performed unsatisfactorily by human beings” (Villani, 2018). AI covers an artificial rationality that optimizes the resolution of more or less complex problems, in a logical-deductive mode and in specific fields. It is part of cognitive science and the internet of things(IOT), big data, cloud computing and block chain.

Presently AI is segmented into two main stream. “Symbolic AI” is the first. Here, the computer is programmed so that it can manipulate knowledge. The “Machine Learning” is the second one and it covers adduced statistical models. However, the third wake is announced to be coming up.

The Impact of AI on The Economic Development

Great number of outstanding studies stresses that AI has the ability to significantly impact economic development in various ways. But this impact is not the same across all sectors and regions. There are bound to be challenges or disruptions with some industries, while some others may experience more significant changes and development. Moreover, the favorable adoption and integration of AI technologies need adequate infrastructure, data availability and supportive policies, which vary across different economies.

AI and ML can impact positively on the economic development. There will be creation of new industries and job opportunities in areas as AI development, data analysis and AI-powered services. By automation of tasks, optimization of processes, and better efficiency, increased output can be gained with same or fewer resources. For the fact that AI can analyze wide amounts of data to identify patterns and predict outcomes, knowledge-oriented decisions in various sectors can be achieved. With AI there is an advantage of cost savings for businesses and governments. This is as a result that AI can automate tasks, improve resources allocation and optimize supply chains.

AI can enhance healthcare and education in that it can improve diagnosis, treatment and personalize learning experiences. Furthermore, AI can contribute to achieving the UN sustainable development goals by improving resource efficiency, promoting sustainable practices and tackling challenges like climate change. Some challenges and negativity also come with the adoption of AI and ML. with AI automation there will be displacement of workers in certain sectors, hence bringing about the need for reskilling and adaptation.

AI can also bring about increased inequality. High income workers and firms may be the ones to have greater portion of the profit of adopting AI; and this will give rise to widening income disparities. Again, since AI systems rely on data, there are concerns about data privacy and security. There is also the challenge of ethical considerations in that AI that raises ethical questions about transparency, accountability and the possibility for misuse.

Even though AI and ML may be useful to some businesses and professions, it also poses as disruption to others. AI and ML have the ability to significantly enhance economic development by increasing productivity, driving innovation and improving decision making. Moreover, they can also help to empower more inclusive and sustainable economic growth by optimizing resource allocation and enabling access to services for underserved populations. However, it has its own challenges such as potential job displacement.

Methodology

In this research qualitative method of analysis is applied. Secondary data analysis method is also used, like journals, monthly reports, index reports from International Monetary Fund (IMF).

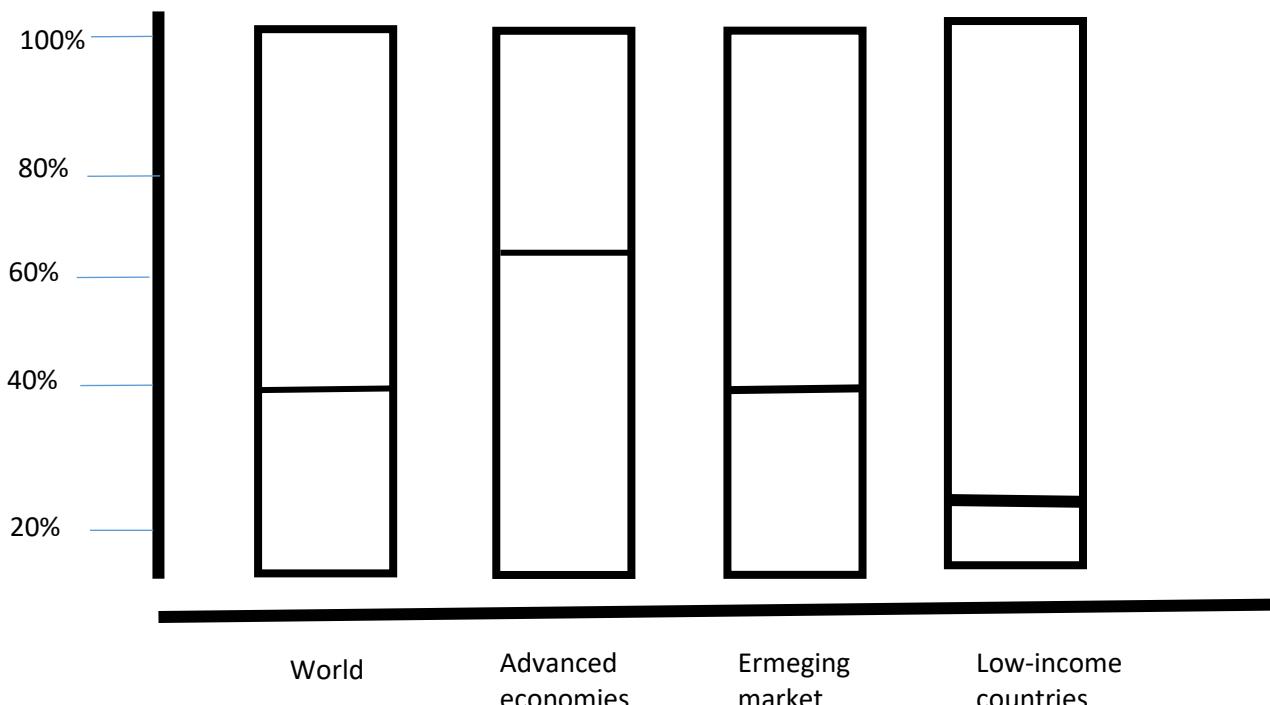
Data Presentation and Interpretation

AI Preparedness Index (AIPI) by the International Monetary Fund (IMF) assesses countries readiness for AI adoption.

AI Investment Potential Index (AIIPI) by AFD evaluates global readiness and attractiveness for investment.

The IMF released the results of exploratory research into the “impacts of AI on the future of work” A rough calculation of 60% of jobs in advanced economies will be affected, with the percentage falling to 40% in emerging economies, and 26% in low-income countries, because of differences in their current employment structures. (Figure 1)

Figure 1: AI's impact on jobs: most jobs are exposed to AI in advanced economies with smaller shares in emerging markets and low-income countries.

Employment shares by AI exposure and complimentary

Source: International Labour Organization(ILO) and IMF staff calculations.

The report estimated that half of the jobs impacted will be affected negatively, while the other half may see increases in productivity. The lesser impact on emerging and developing countries will tend to lead to fewer benefits in terms of increased productivity.

Table 1 below shows the top 10 countries that have invested in AI and how much they have invested in dollars as at 2022. U.S followed by China ranks the topmost.

Table 2 shows the number of robots per 10,000 employees in the manufacturing industry in 2021. South Korea records 1,000 robots for 10,000 employees.

Table 1: Top 10 countries that have invested in AI

Countries	U.S	China	Great Britain	Isreal	Canada	India	Germany	France	South Korea	Singapore
Amount Invested (billions of dollars) 2013-2022	248.9	95.1	18.2	10.8	8.8	7.7	7.0	6.6	5.6	4.7

Source(s): AI index report 2023

Table 2 shows the number of robots per 10,000 employees in the manufacturing industry in 2021. South Korea records 1,000 robots for 10,000 employees.

Table 2: Number of robots per 10,000 employees in the manufacturing industry in 2021

Countries	South Korea	Japan	Germany	China	Sweden	U.S	Switzerland	Italy	Canada	France
Number of robots	1000	399	397	322	321	274	240	217	191	163

Source(s): International Federation of Robotics 2021

Table 3: Top 20 AI readiness index

Global	Countries/Regions	Overall	Government	Technology	Data and

Position		Score		Sector	Infrastructure
1.	United States	88.16	88.46	83.31	92.71
2.	Singapore	82.46	94.88	66.69	85.80
3.	United Kingdom	81.25	85.69	67.26	90.81
4.	Finland	79.23	88.45	63.85	85.40
5.	Netherlands	78.51	80.42	66.17	88.92
6.	Sweden	78.16	80.76	67.37	86.36
7.	Canada	77.73	84.36	63.75	85.08
8.	Germany	77.26	78.04	67.68	86.07
9.	Denmark	76.96	83.50	63.24	84.14
10.	Republic of Korea	76.55	85.27	58.49	85.89
11.	France	76.41	82.10	60.61	86.53
12.	Japan	76.18	81.90	59.25	84.91
13.	Norway	76.14	84.24	59.25	84.91
14.	Australia	75.41	83.79	57.07	85.37
15.	China	74.42	83.79	61.33	78.15
16.	Luxembourg	73.37	82.67	50.66	86.80
17.	Ireland	72.80	74.70	61.11	82.59
18.	Taiwan, China	71.98	77.59	59.42	78.92
19.	United Arab Emirates	71.60	79.41	53.33	82.05
20.	Isreal	71.01	64.64	65.87	79.52

Source(s): Government AI Readiness

Index 2022, Oxford insights (Rogerson Hankins, Nettel & Rahim) (2022)

Table 3 highlights the level of preparedness of 20 countries for AI as at 2022. The report includes an index to measure the state of preparation of countries taking into account technology sector, government, data and infrastructure. United States is the most-ready country with the overall score of 88.16%.

Table 4: AI preparedness index: Region 2023 list

Region	Value
Sub-Saharan Africa	.034
North America	0.74
Europe	0.63
Asia and Pacific	0.52

Source: IMF AI preparedness Index

Table 4 shows AI preparedness index by region as at 2023. North America region is valued at 0.74, Europe is 0.63, Asia and Pacific 0.52 and Sub-Saharan African 0.34.

Table 5: AI preparedness index 2023 list: Analytical group

Analytical Group	Value
ASEAN-5	0.6
Emerging market economies	0.46
Euro area	0.67
European union	0.66
Latin America and the Caribbean	0.43
Low-income countries	0.32
Major advanced economics (G7)	0.72
Middle East and Central Asia	0.4

Source: IMF AIPI

Table 5 shows AI preparedness index by analytical group. Major advanced economics (G7)'s value is 0.72, Euro area is 0.67, European Union is 0.66 and others follow.

Findings

AI represents a driver of productivity and economic growth; it can increase efficiency and significantly improve the decision-making process by analyzing large amounts of data, yet at the same time it creates equally serious risk of job market polarization, rising inequality, structural unemployment and the emergence of new undesirable industrial structures. In manufacturing, AI facilitates predictive and smart factory systems that have led to significant efficiency gains; the finance sector also benefit from AI's predictive power in risk management and personalized financial services, improving both operational and customer engagement.

According to Goldman 2023, the effects of AI are likely to be felt more in advanced economies than in emerging markets.

Gaps and Opportunity

Even though a lot of research have been conducted on this AI and ML issue, but several gaps still remain. Not much work have been done on the effects of AI and ML on developing economies. Most studies on this are theoretical, and so there is the need for more empirical evidences. Furthermore, the general effects of AI's use on labour market is not yet certain.

Recommendation and Conclusion

In as much as AI increases productivity, it should still not be allowed to replace humans but let it be used to augment human capabilities. There is also the need for government to invest in education and training of workers in order to equip them with the skills needed to adapt to the changing job market. Furthermore, policies should be implemented to reduce the potential for increased inequality, such as providing social safety nets and promoting inclusive economic growth.

Many people perceive AI as an engine of productivity and economic growth. It has the power to increase the efficiency with which things are done and widely improve the decision-making process by analyzing large amounts of data. It can also generate the creation of new products and services, markets and industries, thereby boosting consumer demand and generating new revenue streams. All the same, AI may also have a highly disruptive effect on the economy and society. Awareness have been created that it could lead to the creation of super firms that could have detrimental effects on the wider economy. It also has the capability to widen the gap between developed and developing countries. Government should team up with academia, industry experts and other stakeholder to leverage their expertise and experiences in AI implementation. As soon as AI systems are implemented, government should follow with their continuous monitoring of their performances and examine their impact. Steady examination help identify any issue or biases and give room for necessary adjustment and improvement. With all of these we can gain the maximum potentials of these technologies and at the same time curb its negative impacts.

In summary, Artificial Intelligence (AI) is generally referred to as that computer system that are able to perform tasks that have, from the beginning, required human intelligence such as learning and carrying out other activities that require cognitive ability. An important characteristic of AI is its ability to identify patterns and relationships and to respond to queries that arise in complex scenarios for which the precise computational algorithm that is needed cannot be specified in advance. For the fact that AI possess the power to change how businesses and the federal government provide goods and services, it can as well as affect economic development, employment and wages and the distribution of income in the economy.

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