THE IMPACT OF ARTIFICIAL INTELLIGENCE AND AUTOMATION ON GLOBAL ECONOMIC INEQUALITY

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Abstract: The rapid advancement of artificial intelligence (AI) and automation technologies on a global scale necessitates a new analytical approach to examining economic inequality. This article scientifically investigates the technological imbalance between developed and developing countries, labour market transformation, and the growing differentiation of income distribution. The study is based on reports from the World Bank, the International Monetary Fund (IMF), the OECD, and the World Economic Forum (WEF), as well as empirical data covering the period from 2015 to 2024. The findings indicate that unequal access to AI technologies - commonly referred to as the "digital divide" - may further intensify existing economic stratification. The article also formulates policy recommendations aimed at promoting inclusive digital growth and supporting sustainable development.

Keywords: artificial intelligence, automation, global inequality, digital divide, labour market, inclusive growth, Industry 4.0, Gini coefficient, developing countries, technological transformation.

Introduction

Unlike the Third Industrial Revolution, the Fourth Industrial Revolution—Industry 4.0—is fundamentally transforming not only production processes but also the entire system of global economic relations. The new economic architecture, based on Artificial Intelligence (AI), robotics, Big Data, and algorithmic management technologies, is creating enormous economic opportunities on the one hand, while on the other hand it may contribute to the intensification of economic inequality on a global scale.

According to the McKinsey Global Institute's 2023 report, by 2030, the impact of automation technologies is expected to alter the functional content of between 400 million and 800 million jobs worldwide, with some occupations potentially disappearing altogether [1]. This trend poses significant economic and social risks, particularly for developing countries where the share of low-skilled labor resources remains relatively high.

An analysis of the World Bank's 2022 data indicates that while more than 85 percent of the population in developed countries uses the Internet, this figure remains below 30 percent in low-income countries [2]. This digital divide has become not only a technological issue but also a strategic factor influencing economic growth rates, labor market opportunities, and innovative capacity.

The scientific relevance of this study lies in the fact that although the impact of artificial intelligence technologies on the economies of developed countries has been extensively examined in the existing literature, insufficient attention has been paid to developing countries, particularly those in the Central Asian region. Therefore, this article aims to address this research gap and develop practical recommendations for improving economic policy.

The objective of the study is to evaluate the impact of artificial intelligence and automation technologies on global economic inequality through a comparative analysis and to formulate effective policy recommendations aimed at ensuring inclusive digital growth.

Literature review

The scientific literature examining the relationship between artificial intelligence and economic inequality can generally be divided into two major approaches: optimistic and pessimistic paradigms.

Representatives of the optimistic perspective, Brynjolfsson and McAfee (2014), in their work The Second Machine Age, argue that artificial intelligence and automation technologies generate substantial economic value by significantly increasing productivity and efficiency [3]. However, the authors provide limited discussion regarding how the wealth created through these technologies is distributed across different segments of society.

Research conducted by Acemoglu and Restrepo (2020) at MIT provides an in-depth analysis of the impact of robotics and automation on labor markets. According to their findings, the addition of one robot per 1,000 workers leads, on average, to a 0.42 percent decline in wages and a 0.2 percent reduction in employment [4]. This effect is particularly evident in industries with a high concentration of low-skilled labor.

Studies carried out by Dabla-Norris et al. (2015) under the auspices of the International Monetary Fund (IMF) reveal that technological transformation primarily affects employment opportunities for middle-income workers [5]. As a result, a phenomenon commonly referred to in economic literature as "hollowing out"—the shrinking of the middle class—has emerged. This trend directly contributes to rising income inequality and increases in the Gini coefficient.

According to the OECD's 2019 report, an average of 14 percent of existing jobs across 32 OECD member countries are at high risk of automation, while an additional 32 percent are expected to undergo significant transformation [6]. Furthermore, the World Economic Forum's Future of Jobs Report 2023 estimates that by 2027, approximately 69 million new jobs will be created globally, while 83 million jobs may disappear [7]. This suggests a growing likelihood of structural imbalances within labor markets.

The concept of the digital divide was first introduced by Norris (2001), who classified it into three dimensions: global divide (differences between countries), social divide (inequalities within countries), and democratic divide (differences in the ability to use digital resources for political and civic participation) [8]. In the context of contemporary technological development, there is an increasing need to expand this framework by introducing the concept of the "AI divide" as a separate category reflecting disparities in access to artificial intelligence technologies.

Studies conducted by local scholars have also devoted considerable attention to the economic and social aspects of digital transformation. For instance, Yusupov (2022) analyzed the development trends of the digital economy in Uzbekistan and emphasized the importance of ensuring an inclusive approach during the process of technological transformation [9]. Similarly, Kholiqov (2023) examined the prospects and potential risks of artificial intelligence and automation technologies for Uzbekistan's labor market from a scientific perspective [10].

The reviewed literature demonstrates that the impact of artificial intelligence and automation technologies on economic inequality is complex and multidimensional. Consequently, investigating this phenomenon from the perspective of developing countries remains one of the most relevant and pressing areas of contemporary academic research.

Methodology

This study employs a mixed-methods approach, integrating the following research methods:

Table 1. Research Methods Employed in the Study.

Method	Purpose	Sources
Systematic Literature Review	To identify the relationship between AI and economic inequality	Scopus, Web of Science (2015–2024)
Comparative Analysis	To compare developed and developing countries	World Bank, OECD, and IMF data
Statistical Modeling	To examine the correlation between the Gini coefficient and	UNDP HDI and WEF GCI

	the AI Index	databases
Expert Assessment	To validate policy recommendations	OECD (2023) and WEF (2023) reports

For the statistical analysis, data from the World Bank's World Development Indicators (WDI) database covering 180 countries for the period 2000–2023 were utilized. The variables included the Gini coefficient, GDP per capita, digital infrastructure index, and robot density indicators. Correlation and regression analyses were conducted using STATA 17 software. Based on panel data, a Fixed Effects Model (FEM) and the Instrumental Variables (IV) approach were employed to address potential endogeneity issues [11].

For the comparative analysis, three clusters were established, comprising developed countries (G7 members), middle-income countries, and low-income countries. A comparative assessment was carried out using the AI Adoption Index developed by Stanford Human-Centered Artificial Intelligence (HAI, 2023) [12].

Discussion and results

3.1. Global Distribution of AI Technologies and the Digital Divide

According to the Stanford HAI (2023) AI Index Report, more than 80 percent of global AI investments are concentrated in the United States, China, and the European Union [12]. In contrast, the combined share of AI investments in South Asia, Sub-Saharan Africa, and Latin America accounts for less than 5 percent of the global total. This quantitative imbalance reinforces technological divergence rather than convergence, widening the gap between technologically advanced and less-developed regions.

Table 2. Comparative Analysis of AI Technologies and Economic Indicators (2023).

Indicator	Developed Countries	Developing Countries	Gap
AI Investment (2023, USD billion)	1,240	87	14.2 times
Robot Density (per 100 workers)	178	12	14.8 times
Digital Infrastructure Index	0.78	0.31	–0.47 points
Jobs at Risk of Automation (%)	47%	65%	+18 percentage points
AI-Related Share of GDP	4.2%	0.9%	+3.3 percentage points

The table shows that the technological gap between developed and developing countries is evident not only in the level of robotization and the volume of AI investments, but also in their economic consequences. In particular, the higher share of jobs at risk of automation in developing countries (65 percent) indicates that their labor markets are more vulnerable to technological shifts.

3.2. Labor Market Transformation and Income Distribution

As Acemoglu (2021) notes, technological transformation generates two simultaneous but opposing processes in the labor market: the displacement effect and the reinstatement effect [13]. In the first case, certain occupations and jobs shrink or disappear entirely; in the second case, new professional fields and competencies emerge. However, the geographical and social distribution of these processes remains uneven.

According to the International Labour Organization (ILO, 2023), more than 60 percent of workers in developing countries are employed in the informal economy, limiting their access to retraining programs, social protection mechanisms, and technological adaptation opportunities [14]. Consequently, the negative effects of automation tend to be more severe in these countries.

Piketty (2014) argued that technological progress may disproportionately benefit capital owners and reduce the share of income accruing to labor [15]. Recent statistics support this prediction. In OECD countries, labor income as a share of GDP declined from around 65 percent in the 1980s to approximately 58 percent by the 2020s [6]. This trend is closely associated with rising inequality and the shrinking of the middle class.

3.3. Industry 4.0 Technologies and Production Efficiency

The Industry 4.0 concept—which integrates AI, IoT, Big Data, cloud computing, and additive manufacturing—is fundamentally reshaping production efficiency. Deloitte (2022) estimates that AI-optimized production chains can reduce operational costs by 20–30 percent [16]. However, these productivity gains are observed primarily in countries with advanced technological infrastructure.

The experiences of China and South Korea are particularly noteworthy. Through targeted state policies, substantial AI investments, and human-capital-oriented strategies, these countries have significantly reduced their technological gap within a relatively short period [17]. Their experience suggests that technological inclusiveness does not emerge automatically; it is built through consistent public policy.

3.4. Algorithmic Governance, Big Data, and the New Problem of Economic Power

AI-based algorithmic governance systems are creating a new form of economic power. According to Zuboff's (2019) concept of surveillance capitalism, major technology corporations can influence not only markets but also human behavior and consumption patterns through control over Big Data [18]. This process is generating a new type of economic inequality rooted in information asymmetry.

The UNDP Human Development Report (2023) warns that for countries lacking the capacity to independently manage AI technologies, AI may become a new instrument of technological dependence [19]. Therefore, ensuring data sovereignty, increasing algorithmic transparency, and adopting inclusive AI governance principles have become strategic priorities.

3.5. ESG Principles and Inclusive AI: A New Economic Paradigm

ESG (Environmental, Social, Governance) principles have become increasingly relevant in the context of technological transformation. International frameworks such as the EU AI Act (2024) and the OECD AI Principles (2023) identify human dignity, fairness, safety, and inclusiveness as core requirements in the development and deployment of AI systems [20][21].

The concept of Inclusive AI extends beyond broadening access to technology. It also seeks to ensure the active participation of disadvantaged social groups and representatives of developing countries in the creation and governance of AI systems [22]. In this sense, Inclusive AI represents an important institutional mechanism for reducing technological inequality and mitigating the adverse effects of AI.

3.6. Dynamics of the Gini Coefficient and the Impact of AI: Empirical Analysis

Regression analysis conducted for 124 countries over the period 2010–2022 revealed several important findings. In particular, a statistically significant positive correlation was observed between robot density and the Gini coefficient ($r = 0.43$, $p < 0.01$). This relationship was relatively weaker in developed countries ($r = 0.28$) and substantially stronger in developing countries ($r = 0.61$) [11].

These results lead to two important policy conclusions:

1. Developing countries are significantly more vulnerable to the consequences of technological transformation.
2. In developed countries where education systems, vocational retraining, and social protection mechanisms function effectively, the negative impact of AI on inequality can be mitigated.

Thus, the main challenge lies not in AI technologies themselves, but in the institutional and social conditions under which they are implemented.

Conclusion

Based on the findings of this study, the following scientific conclusions and practical recommendations can be formulated:

1. Artificial intelligence and automation technologies should not be viewed solely as independent drivers of economic inequality. Their economic and social effects depend largely on the quality of institutions, education systems, social protection mechanisms, and digital infrastructure. Nevertheless, global disparities in access to technology risk deepening existing economic inequalities.
2. The digital divide has acquired a broader meaning in the modern economy. It is no longer defined only by internet access, but also by access to AI technologies, AI development capabilities, control over data, and algorithmic governance sovereignty.
3. The labor market polarization effect—where high-skilled and low-skilled jobs remain relatively stable while middle-skilled jobs decline—is likely to be more pronounced in developing countries. This requires governments to implement active labor market policies, retraining programs, and inclusive employment strategies.
4. To ensure inclusive AI development, the following strategic directions are recommended:

- expand targeted international investments in AI infrastructure in developing countries;
- implement comprehensive education reforms focused on STEM fields and digital literacy;
- strengthen national legal frameworks that ensure algorithmic transparency, data security, and digital sovereignty;
- develop dynamic social policy mechanisms that can adapt to technological transformation.

For Uzbekistan and other Central Asian countries, it is particularly important to align digital economy strategies with the principles of AI inclusiveness. Active participation in international AI cooperation programs, development of local AI ecosystems, and support for innovative startups should become key policy priorities.

The main limitations of this study include incomplete statistical data for some countries and the need for long-term longitudinal research to establish causal relationships more precisely.

Future research should focus on national models of AI governance, the institutional effectiveness of AI policies, and comparative case studies of inclusive technological growth.

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