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STRUCTURAL TRANSFORMATION OF EMPLOYMENT IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE DIFFUSION

The rapid diffusion of artificial intelligence technologies has intensified discussions about their implications for employment and workforce development. This study investigates the main directions of labor market transformation associated with AI adoption. The research is based on a review of international scholarly literature and an analysis of statistical and analytical reports produced by organizations such as the World Economic Forum and the International Monetary Fund. By comparing evidence from different countries and sectors, the study identifies the key mechanisms linking AI and employment, including automation of routine tasks, productivity improvements, and changing skill requirements. Particular attention is given to employment polarization, income inequality, and the evolving role of human capital in the digital economy.

The findings demonstrate that AI does not lead to a simple reduction in employment but contributes to complex structural transformations characterized by the simultaneous creation of new jobs and the displacement of existing ones. The net effect depends on institutional adaptation, workforce reskilling, and national policy responses. The case of Kazakhstan is analyzed to illustrate regional dynamics and readiness for AI-driven transformation.

Keywords: artificial intelligence, labor market, employment structure, technological change, automation, skills transformation, income inequality, human capital, digital economy, Kazakhstan.

Кілт сөздер: жасанды интеллект, еңбек нарығы, жұмыспен қамту құрылымы, технологиялық өзгерістер, автоматтандыру, дағдылар, табыс теңсіздігі, адами капитал.

Ключевые слова: искусственный интеллект, рынок труда, структура занятости, технологические изменения, автоматизация, навыки, неравенство доходов, человеческий капитал.

JEL classification: J24

Introduction. The rapid development and diffusion of artificial intelligence technologies have become one of the most significant drivers of structural transformation in the global economy. AI is increasingly integrated into production processes, service delivery, and decision-making systems, fundamentally altering the nature of work and the organization of labor markets.

The relevance of this study is обусловлена growing concerns regarding the impact of AI on employment, including job displacement, changes in skill requirements, and increasing inequality. Historically, technological revolutions have most affected physical work (the work done by humans using their hands), whereas AI continues to expand the use of automation into new areas of cognitive and non-routine tasks and thus transform how people perform jobs.

Furthermore, AI also creates new economic opportunities by increasing productivity (the amount of work that can be done in a specific period), creating new job types or new versions of existing job types, and generally expanding the overall size of the economy. Thus, AI has two relevant effects upon employment rather than just eliminating jobs. The purpose of this study is to analyze the structural changes in employment caused by the spread of artificial intelligence, identify key mechanisms of transformation, and assess their implications for labor markets, including the case of Kazakhstan.

To achieve this goal, the study addresses the following objectives:

- to review modern theoretical and empirical approaches to assessing AI’s impact on labor markets;
- to analyze global trends in employment transformation;

- to identify key risks and opportunities associated with AI diffusion;
- to assess national features of AI-driven labor market transformation using Kazakhstan as an example.

Literature review. Contemporary research demonstrates that artificial intelligence (AI) is a key driver of labor market transformation, influencing labor demand, employment structure, and income distribution. In the academic literature, this impact is examined through the lenses of labor substitution, productivity growth, and structural economic change.

One of the central areas of research is the analysis of AI's impact on labor demand. In the study by Hampole et al., it is shown that tasks with a high degree of exposure to AI are associated with a decline in demand for the corresponding skills, reflecting the substitution effect of technology [1]. At the same time, overall employment levels change only marginally, as productivity gains and business expansion partially offset the reduction in labor demand [1, p. 2].

Additional empirical evidence is provided by Massenkoff and McCrory, who introduce the concept of "AI exposure." The authors note that occupations with higher levels of exposure to AI exhibit slower employment growth; however, no significant increase in unemployment is observed at the current stage [2]. This indicates the gradual nature of AI's impact on the labor market.

An important aspect is the redistribution of tasks within occupations. As demonstrated by Hampole et al., AI primarily affects specific tasks rather than entire occupations, allowing workers to reallocate their efforts toward less automatable functions [1, p. 4]. This mechanism mitigates the negative effects of automation and highlights the complementary nature of human–technology interaction.

Considerable attention in the literature is also given to structural changes in employment. According to Drydakis, the adoption of AI contributes to the creation of new jobs associated with digitalization and automation, while increasing demand for highly skilled workers [3]. At the same time, the risk of displacement rises for workers engaged in routine and low-skilled activities, thereby intensifying labor market polarization [3, p. 2].

The issue of polarization is closely linked to changes in income distribution. Gu and Wang identify key mechanisms through which AI affects inequality, including skill-biased technological change and the substitution of labor with capital [4]. As a result, demand for high-skilled labor increases, while the importance of medium- and low-skilled labor declines, leading to widening income disparities [4, p. 1–2].

Another important line of research concerns the transformation of human capital. Pelau et al. argue that while AI enhances labor efficiency, it may also lead to a decline in cognitive abilities and the development of technological dependency [5]. This underscores the need to adapt education systems and develop skills aligned with the requirements of the digital economy.

Thus, the analysis of the scientific literature shows that the impact of AI on the labor market is complex and contradictory. On the one hand, AI contributes to productivity growth and job creation; on the other hand, it intensifies labor substitution processes and inequality. The overall effect depends on the balance between these processes, as well as on the level of adaptation of economic systems and institutions to new technological conditions.

Main part. At the beginning of 2025, the global economic prospects appear to be a mix of guarded optimism and lingering worries. The World Economic Forum's September 2024 Chief Economists Outlook reveals that while there are signs of global conditions improving, there are also weaknesses that remain. More than half of the chief economists surveyed (54%) believe that economic conditions will remain stable in the near term. However, among those expecting a change, more would under current conditions expect the economy to deteriorate than strengthen.

The performances of the global economy in 2024 were characterized by a decline in inflation and the rise of an unusually robust economy throughout the period of disinflation. Although the decrease in inflation, and the looser monetary policy that follows, are reason for some optimism, the slow growth and political instability in many countries still place them at the risk of economic shocks. Despite multiple negative adjustments of growth rates in various economies, especially those of developing low-income countries, the International Monetary Fund (IMF) predicts that the growth rate will stay at 3.2 percent in 2025.

In certain economies, inflation has not only stayed constant, but it has also continued to rise in others. For example, service inflation is about twice as high as it was prior to the pandemic and is particularly prevalent in low-income nations. Due to supply interruptions brought on by climate shocks, regional conflicts, and geopolitical tensions, low-income countries are particularly vulnerable to the growing inflation.

One of the main sources of uncertainty is the prospects for economic growth; 42% of the firms polled anticipate that slower growth will have an impact on their operations. Regional differences exist in the relative importance of economic threats. Respondents in Eastern and South-Eastern Asia are more concerned about declining economic activity than those in Sub-Saharan Africa, who mainly highlight inflationary concerns. In contrast, regulatory issues seem less significant; yet, stricter anti-trust and competition laws are anticipated to have an impact on corporate practices and employment, impacting an estimated one in six workers worldwide.

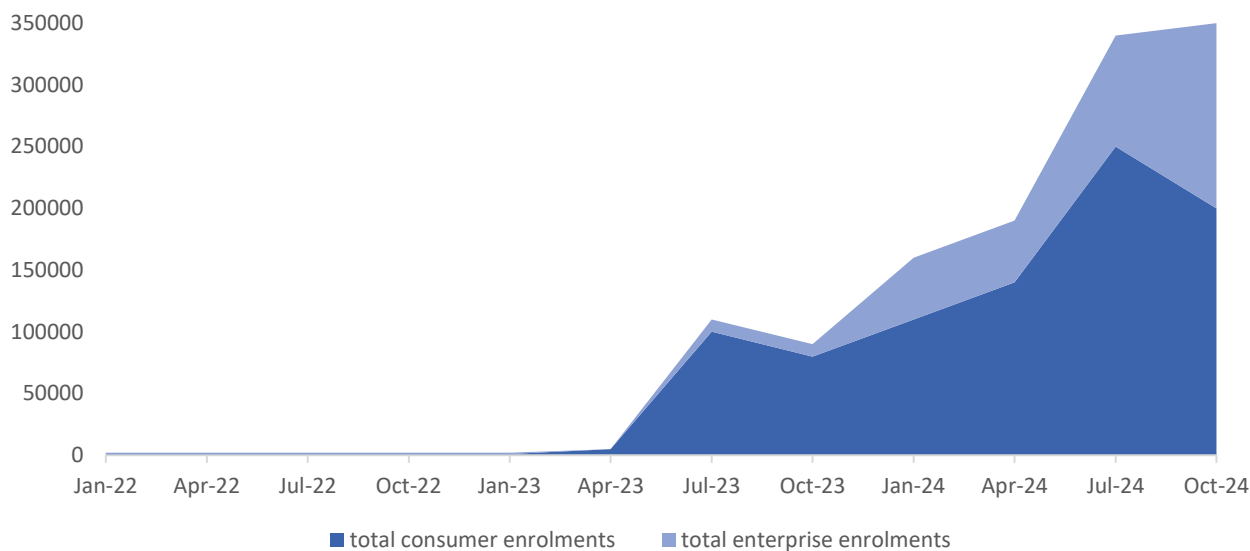


Figure –1. Demand for generative AI skills*

*Coursera analysis

A significant portion of The Future of Jobs Report (2025) addresses how technology is impacting employment, including artificial intelligence, and that job loss won't be the only outcome. According to the World Economic Forum (WEF), 22% of present employment (all formal positions) would be impacted by changes in employment for jobs produced and jobs lost (or displaced) by 2030. They estimate that 92 million jobs, or 8% of all jobs, will be lost while 170 million new jobs, or 14% of all jobs, will be created. Thus, there will be a net gain of 78 million jobs (7% of the total number of jobs) across all economies by 2030. At this moment in time, there are two main global demographics shifting in two very different ways: a few of the wealthier nations are experiencing a decline in their population of working age due to declining birth rates and longer life spans of the already existing population. They have increased dependency ratios, adding more stress on those who are already working, and doubts that there will be enough people working in the long-term. The lower-income nations, on the other hand, may experience a "demographic dividend" because of their population of young people who will soon enter into the labour market. The two groups together comprise about an equal share of the world's population of working-age individuals today (49% lower-income working-age to 51% higher-income working-age), but this is projected to change over time. Countries experiencing a demographic dividend (i.e., India and countries in Subtropical Africa), will provide new entrants into the global workforce in 2/3 of the cases. A Future of Jobs Survey shows that 40% of companies worldwide say that their transformation is driven by the aging/decline of working-age populations, and 25% are transformed with the growth of working-age populations whereas most developed economies are dealing simultaneously with both problems.

There are a few countries, specifically Australia, Germany, Japan, etc., which are being affected more by declining working-age populations. Only a handful of companies working in Sub-Saharan African countries see transformations due to aging/declining working-age populations (vs. the impact of growing working-age populations). When it comes to aging populations, companies in these regions have less confidence about the availability of talent and struggle even more to find qualified talent. On a more promising note, as companies face declining workforces, 60% of these businesses are placing greater importance on transitioning current talent to new roles as a means of addressing workforce issues. Similarly,

some experts predict that developed countries with an aging workforce will increasingly implement extensive automation systems to help alleviate the declining need for workers.

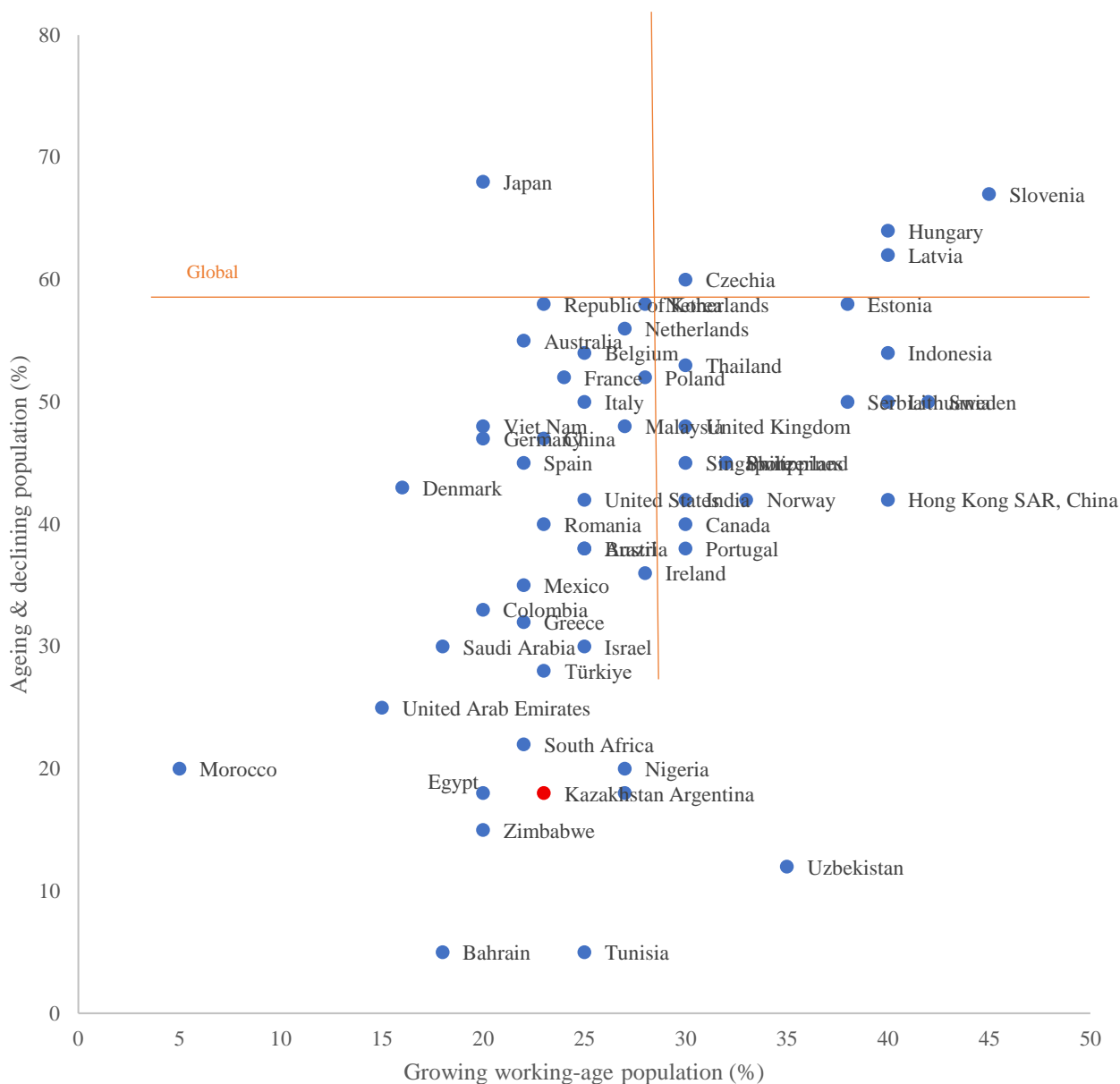


Figure – 2. **Fundamental demographic shifts***

**According to the World Bank*

39% of global employers surveyed believe they will experience this impact in the next five (5) years compared to 12% who do not see any correlation between these two factors. With the exception of North America, a greater proportion of employers in every region react to this trend. For instance, 79% of employers worldwide believe that shifting demographics will lead to more automation, but 67% believe that shifting demographic trends would lead to more augmentation. In contrast, how effective or otherwise will various economies and regions be at leveraging any potential dividend they may derive as a result of changing demographics? According to the World Bank, between now and 2030, an unprecedented (240 million) will be entering into the labor force as young adults. However, in these countries over the next ten years, only 420 million jobs are expected to be added. Thus, it is hypothesized that 800 million young adults will find themselves without any viable job opportunity. On the positive side, measurable percentages of employers surveyed who cite increasing workforce through young adults identify this demographic trend as a critical factor in their plans and want to accelerate their reskilling or upskilling efforts 92% of those who will be focusing on these areas before 2030.

Based on an analysis combining expectations of business respondents searching for growth (both within their organizations and as part of macro trends), the ILO's Future of Jobs Report 2025 estimates that through 2030, based on current forecasts, there will be, through the combination of new job creation and job loss through macro trends (which are often correlated with growth of jobs), a total of 22% of today's total formal jobs which can be defined by noted definitions of formal employment. Job creation through the creation of new jobs because of macro trends is estimated to yield approximately 170 million or approximately 14% of total formal employment today. The job loss associated with this same category through macro trends is likely to result in a loss of approximately 92 million or approximately 8% of total employment today resulting in net job growth between now and 2030 of approximately 78 million (or approximately 7% of total formal employment) [9].

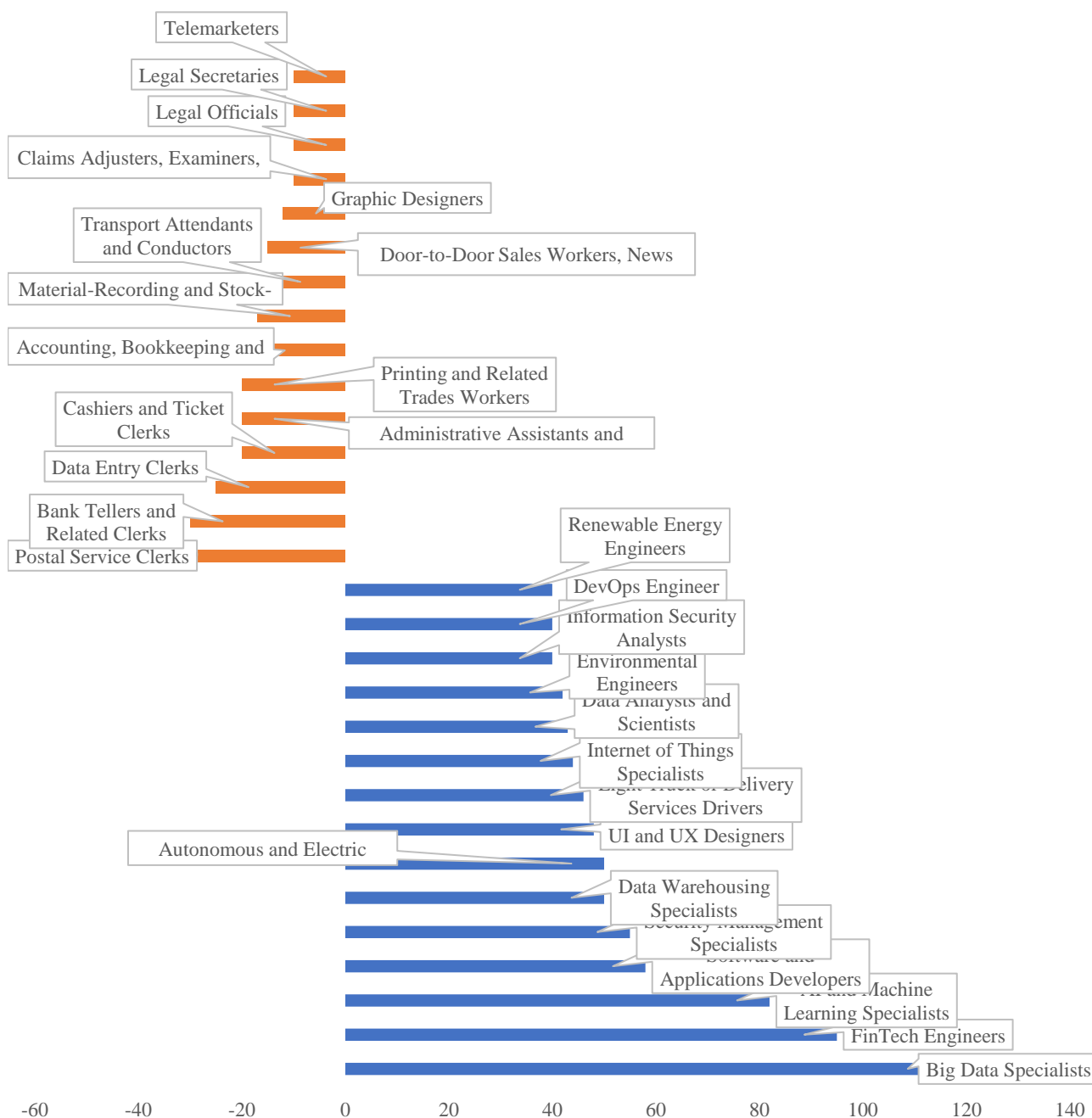


Figure – 3. **Fastest growing and declining jobs. 2025-2030***
 *According to the World Bank

According to the respondents' responses to the Future of Jobs Survey, analytical thinking is one of the most prized core skills for workers today. Among employers who took part in the Future of Jobs Survey, analytical thinking rated as the highest priority for seven out of ten firms (70%) listed analytical thinking as being required by their employees. Resilience, flexibility, and agility also ranked highly and together with leadership and social influence represent the most important skills that employers will require from their workforce today; therefore, providing evidence of the importance placed on adaptability, collaboration and so on, within the core skills of workers in the 21st century, in addition to cognitive skills. The next two highest-ranking core skill categories are creative thinking, and motivational and self-awareness to rank 3rd, and the remaining categories include problem-solving and personal resilience are all included within the top five. The point of this report is to reiterate the significance placed on the agility, creativity, and cooperative workforce from an employer's perspective - Problem-solving and personal resilience are critical to the success of a worker in today's work environment [10].

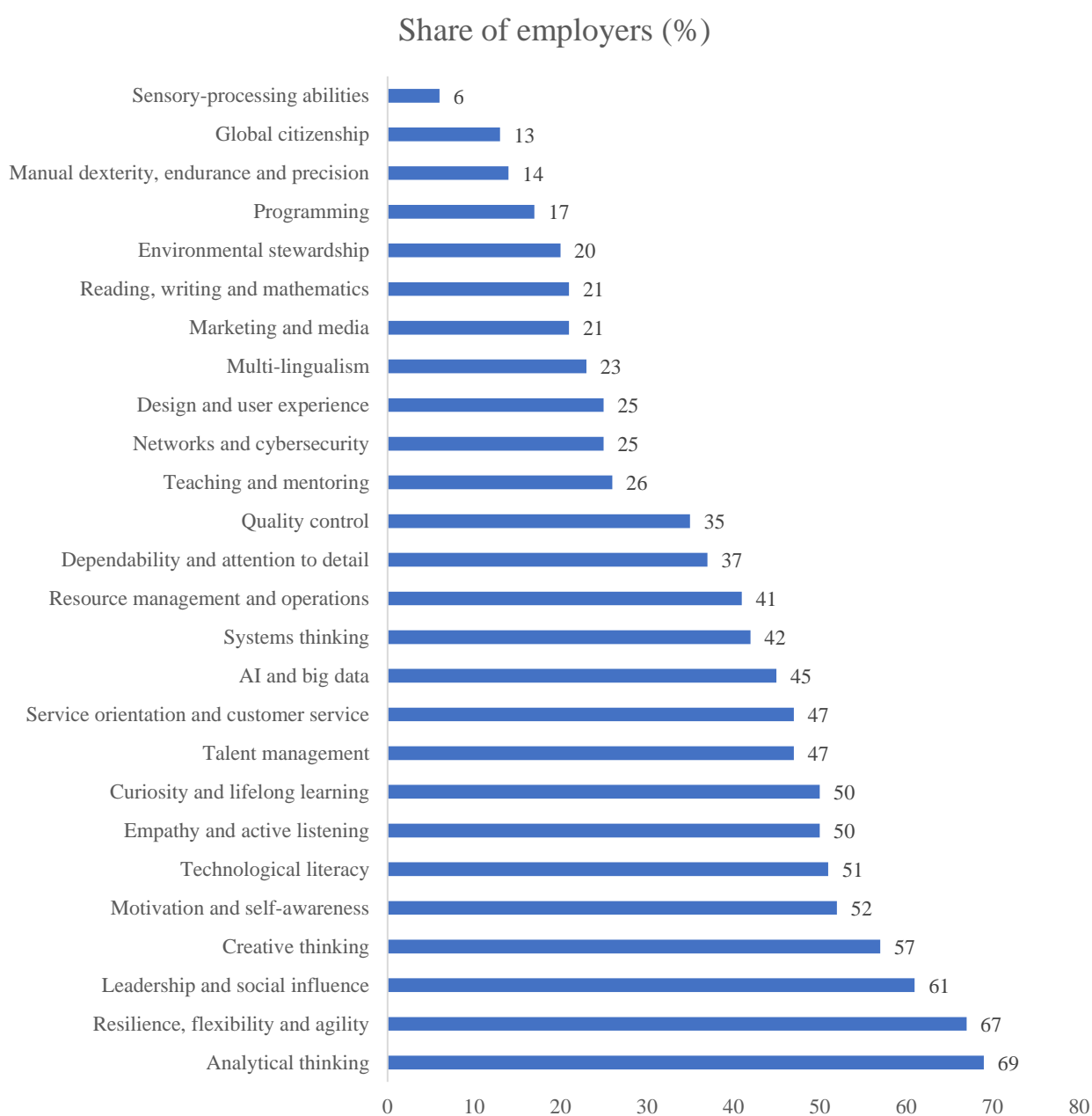


Figure – 4. Core skills in 2025*

*According to the World Bank

Technological literacy, empathy, active listening, curiosity (lifelong learning), and talent management are additional core skills to the ten most critical core skills. Technical proficiency and strong interpersonal skills, together with emotional intelligence and a commitment to continuing education, exemplify the importance of having both hard and soft skill sets in order to be successful in today’s workplace. Overall, while the core skills tend to align fairly closely across a range of industries and regions globally, some industries/regions show much sharper differences from the overall averages.

India is also carving an important path, leveraging its strong domestic digital public infrastructure – and sizable human capital – to advance the ‘INDIAai’ mission. The country’s hosting of the 2026 AI Summit will be an important milestone. Elsewhere in the region, countries including Armenia, Bhutan, the Maldives, Sri Lanka, and Türkiye are strengthening their AI infrastructure, building digital and innovation ecosystems, and exploring a wide range of different AI interventions and use-cases [11].

A report published by Kazakhstan’s Ministry of Artificial Intelligence measures the country’s progress in shaping “a new digital reality” driven by AI development. While Kazakhstan leads in Central Asia on AI adoption, the report acknowledges that the country has a “mid-tier” standing globally.

Kazakhstan now ranks 58th out of 195 nations surveyed in the 2025 Oxford Insights Government AI Readiness Index, a 16-spot improvement over 2024’s results, according to the report. The Oxford Insights index measures governmental readiness to “design, deploy, and regulate AI.” Kazakhstan’s ranking is above average for emerging-market economies, and compares favorably with such countries as Russia, Turkey and Malaysia, the report notes.

Data center capacity is set to rapidly expand, despite a deepening water deficit. The country intends to boost the number of IT racks from 4,000 in 2025 to 20,000 by 2030, and have 10 Tier III-IV-type Data centers operating within five years, according to the report. The government also aims to “achieve 100 percent high-speed internet coverage by 2027,” the report adds [12].

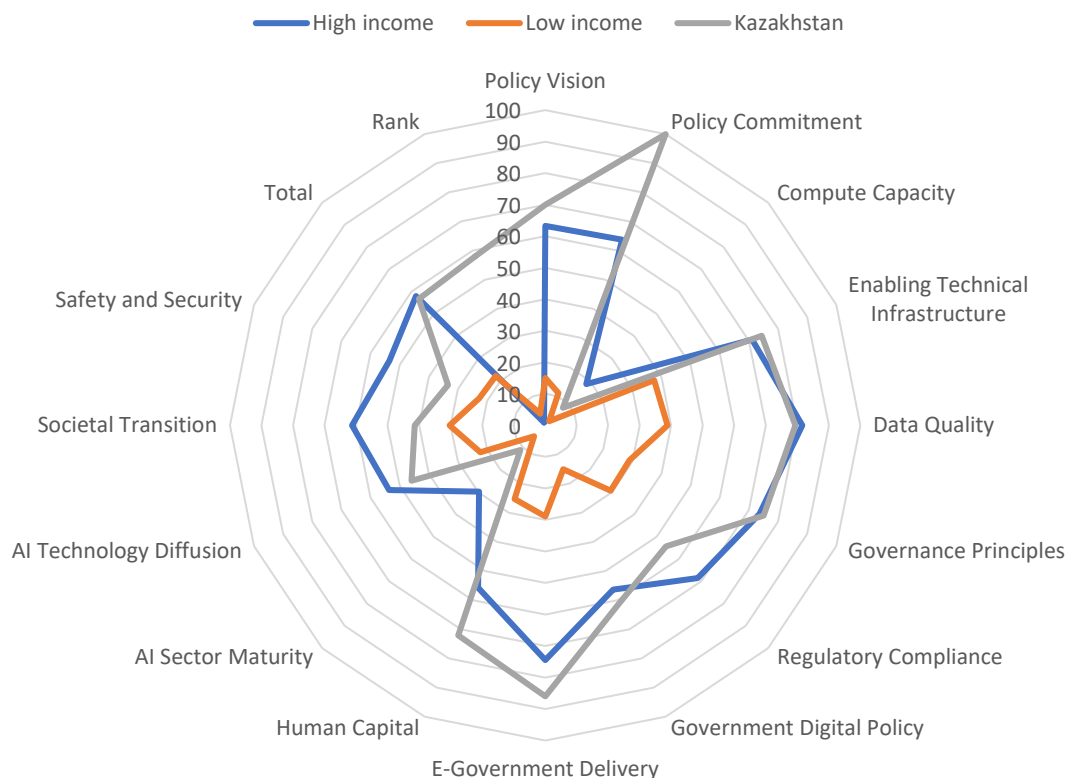


Figure – 5. **Government AI Readiness Index***
 *According to the World Bank

The report identifies several problem areas impeding the “scaling [of] AI across the real economy and building societal resilience for the AI transformation,” including a comparatively low level of corporate research & development and a lack of “societal readiness” to embrace AI solutions.

Government AI Readiness Index*

Pillar	United States of America	China	Japan	Israel	Russian Federation	Kazakhstan	Uzbekistan	Kyrgyzstan
Policy Vision	100	100	100	80	70	70	70	40
Policy Commitment	87,5	87,5	50	100	62,5	100	87,5	0
Compute Capacity	90,92	80,66	50,49	21,14	21,43	7,91	5,84	4,16
Enabling Technical Infrastructure	89,61	69,2	75,98	79,17	66,6	74,35	62,26	57,59
Data Quality	94,77	85,21	85,38	87,8	83,67	79,39	73,06	70,06
Governance Principles	75	100	75	100	75	75	74	17,25
Regulatory Compliance	90	82,28	85,92	80,76	73,29	54,25	84,25	44,7
Government Digital Policy	87,9	41,65	71,86	65,87	66,15	61,2	63,97	12,01
E-Government Delivery	97,84	56,39	73,57	75,35	73,42	85,98	64,87	81,68
Human Capital	74,56	81,43	81,69	68,31	59,58	72,11	72,95	43,51
AI Sector Maturity	100	67,29	50,8	45,54	38,55	11,11	21,01	3,32
AI Technology Diffusion	85,96	77,74	71	86,51	54,48	45,9	45,14	25,88
Societal Transition	56,55	54,69	61,5	55,96	44,25	41,44	42,75	36,27
Safety and Security	100	100	100	66,67	50	33,33	33,33	33,33
Total	88,36	76,27	72,24	71,32	59,57	56,7	56,11	33,28
Rank	1	8	14	16	49	58	62	119

*According to the World Bank

World Bank report showed that approximately 5% of existing jobs positions in Kazakhstan could be are being displaced in scenarios of widespread and effective implementation of AI. According the Google study AI is expected changes rather than replacments in many occupations. Around 54% of workers could experience changes in their job responsibilities through the integration of generative AI tools. Google also suggests that broader AI adoption may contribute between 0.5% to 2.0% of annual growth in GDP.

One of the important thing is that investment activity in the AI sector has been risen. In Kazakhstan for instant investments in AI-related ventures exceeded \$75 million, compared with \$14 million in 2023. This expansion is a result of growing interest in the creation and marketing of AI technologies.

The establishment of an institutional and legislative framework, the expansion of digital infrastructure, and the development of digital capabilities among the populace are the three main pillars of Kazakhstan's national AI policy. According to this concept, the growth of human capital, economic modernization, and global competitiveness are all significantly influenced by artificial intelligence.

Conclusion.The results of this study indicate that rather than only decreasing the quantity of jobs, AI is altering the structure of work. Task redistribution, the creation of new occupational positions, and shifting skill needs are all examples of its effects. International research shows that AI frequently automates certain jobs while preserving many professions, giving employees and businesses time to adjust to new technology.

However, labor market changes are not likely to be consistent. It is anticipated that while routine and repetitive work may lose value, demand for advanced digital and analytical talents would rise. If reskilling opportunities are not widely available, these trends may lead to increased polarization in employment and pay.

The benefits of AI-driven growth will largely depend on workers' capacity to pick up new skills, even if global projections typically indicate favorable net employment consequences by 2030. As a result, initiatives for lifelong learning, workforce development, and education systems are becoming more and more important.

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ЖАСАНДЫ ИНТЕЛЛЕКТТІҢ ТАРАЛУЫ ЖАҒДАЙЫНДАҒЫ ЖҰМЫСПЕН ҚАМТУДЫҢ ҚҰРЫЛЫМДЫҚ ТРАНСФОРМАЦИЯСЫ

Андатпа

Зерттеуде жасанды интеллекттің (ЖИ) экономикаға кеңінен енуі жағдайындағы жұмыспен қамту құрылымындағы өзгерістер қарастырылған. Халықаралық эмпирикалық және теориялық зерттеулерге талдау жүргізіліп, Дүниежүзілік экономикалық форум, Халықаралық валюта қоры және басқа да халықаралық ұйымдардың статистикалық деректері мен аналитикалық есептеріне салыстырмалы талдау жасалған. Әдіснамалық тәсіл әдебиеттерге шолу жасауды, салыстырмалы талдауды және құрылымдық-экономикалық талдау элементтерін үйлестіруге негізделген. ЖИ-дің еңбек нарығына ықпал етуінің негізгі механизмдері анықталған, оның ішінде еңбекті алмастыру, еңбек өнімділігінің өсуі, еңбек міндеттерінің трансформациясы және дағдыларға сұраныс құрылымының өзгеруі қарастырылған. Сонымен қатар, жұмыспен қамтудың поляризациясына, табыстық теңсіздікке және адами капитал трансформациясына ерекше назар аударылған.

Талдау нәтижелері бойынша ЖИ енгізілуі жұмыспен қамтудың жай ғана қысқаруына алып келмейтіні, керісінше жаңа жұмыс орындарының қалыптасуы мен жекелеген мамандықтар мен қызмет түрлерінің ығыстырылуымен қатар жүретін күрделі құрылымдық трансформацияларды туындататыны анықталған. Жиынтық әсердің институционалдық бейімделу деңгейіне, жұмыс күшін қайта даярлау ауқымына және ұлттық саясат ерекшеліктеріне тәуелді екендігі көрсетілген. Сонымен қатар, Қазақстан Республикасы мысалында ЖИ дамуына байланысты трансформацияларға өңірлердің дайындық деңгейі мен ерекшеліктеріне талдау жүргізілген.

Рахимбекова А.Е., Курманов Н.А., Мусабекова А.О., Иманбекова А.М.

СТРУКТУРНАЯ ТРАНСФОРМАЦИЯ ЗАНЯТОСТИ В УСЛОВИЯХ РАСПРОСТРАНЕНИЯ ТЕХНОЛОГИЙ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Аннотация

В исследовании рассмотрены структурные изменения занятости в условиях широкого распространения искусственного интеллекта (ИИ) в экономике. Проанализированы международные эмпирические и теоретические исследования, а также выполнен сравнительный анализ глобальных статистических данных и аналитических отчетов международных организаций, включая Всемирный экономический форум и Международный валютный фонд. Методологический подход основан на сочетании обзора литературы, сравнительного анализа и элементов структурно-экономического анализа. Выявлены ключевые механизмы влияния ИИ на рынок труда, включая замещение труда, рост производительности, трансформацию трудовых задач и изменение структуры спроса на навыки. Особое внимание уделено поляризации занятости, доходному неравенству и трансформации человеческого капитала.

По результатам анализа определено, что внедрение ИИ не приводит к простому сокращению занятости, а сопровождается сложными структурными трансформациями, связанными как с созданием новых рабочих мест, так и с вытеснением отдельных профессий и видов деятельности. Показано, что совокупный эффект зависит от уровня институциональной адаптации, масштабов переквалификации рабочей силы и особенностей национальной политики. Дополнительно проанализированы региональные особенности и степень готовности к трансформациям, обусловленным развитием ИИ, на примере Республики Казахстан.