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AI AND THE RECONSIDERATION OF WORKFORCES' SKILLS

Abstract. Modern trends have clearly shown that artificial intelligence is no longer just a futuristic concept of the future. The dynamics of its development and the possibilities of practical application have already made it a powerful force that is fundamentally changing the way people work and function every day. Its impact on the labour market is growing day by day, it is redefining which skills are important, how these skills are formed, and what the future work ecosystem will look like. Many inaccessible tasks that were considered unattainable in the past are easily performed by algorithms and smart machines, which forces people to think about what makes work valuable in an era where technologies have gained more capabilities, speed, and often even lower costs.

This paper examines the changing global skills structure driven by artificial intelligence and what this could mean for developing countries like Georgia. Drawing on a wide range of international research, policy reports, and economic analysis, the article identifies five key trends that are already shaping the workforce of tomorrow.

First, there is the growing dynamic of skills polarization. Routine middle-level jobs, administration, predictable technical functions, basic data processing are increasingly at risk of automation, while highly skilled creative and low-skilled manual labour are relatively stable. Second, a new skills landscape is emerging, where not only technical competencies are becoming the most valuable, but also digital literacy, creativity, emotional intelligence, problem-solving skills, and the ability to adapt quickly. Third, the gap between the rapid development of technologies and the slow adaptation of human skills is widening. This creates a so-called "skills vacuum." Fourth, education systems are increasingly out of step with the needs of the labour market, especially in countries like Georgia, where educational and vocational courses often fail to keep up with the digital and hybrid demands of the modern economy. Finally, the public policy response to all this is often fragmented and inconsistent. There are no long-term, national strategies whose main goal should be to prepare society for the transition period.

Such trends raise alarm bells, especially in countries where access to retraining and continuing education is limited, regional disparities are keeping people away from new opportunities, and public policies are not yet responding to the scale of technological transformation.

In Georgia, the above challenges are particularly alarming given the weak infrastructure and policies of the education system, where the involvement of labour market actors in the process is neglected, leading to inconsistent management of skills policies.

It provides a solid foundation for future research and highlights areas where timely action is vital to avoid negative impacts on the labour market. The article focuses on challenges that are not only caused by new technologies but are of a much deeper social, economic, and institutional nature. Preparing for the future requires a proactive and inclusive approach: better coordination between education and business, closer cooperation between the public and private sectors, wider access to lifelong learning, and a redefinition of which skills will be truly relevant in tomorrow's world of work.

Keywords: *Artificial Intelligence (AI), Labour Market Transformation, Skills Polarization, Digital Skills Gap, Human Capital Adaptation, Education and Training Mismatch, Future of Work, Policy Response in Skills Development*.

JEL Classification: J24; J21; J31; O33; O15; I25; J68.

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Introduction. The rapid pace of development of digital technologies in the last decade, especially in the direction of generative artificial intelligence, has brought the labour market into a completely new era. Algorithms, machine learning models and robotic systems perform those jobs that previously relied solely on human intelligence and experience. Such changes can no longer be considered only as a change in the number of jobs, it is much deeper and includes the content of work itself, values, criteria and skills that will be the main key to success in the future.

The impact of artificial intelligence on the automation of professions goes beyond technological change and has a profound impact on the dynamics of skills needed for the labour market. It is this very dynamic that determines how the value of human labour is measured and valued. Traditional technical and theoretical knowledge, which for centuries was sufficient for employment, is gradually losing its primary importance, as smart machines and digital technologies, enhanced by artificial intelligence, are replacing such activities. In the new reality, priority is given to skills that algorithms cannot replicate: creative thinking, independent solving of complex problems, analytical and critical vision, emotional intelligence, rapid adaptation, and daily integrated work with technologies. It is precisely such skills that make human labour unique and competitive in the era of automation.

In this transitional period state institutions, the education sector and employers are simultaneously facing new challenges. They will have to find answers to the following questions:

1. How to identify the most needed skills for the future and how to prioritize the country's labour market policy?

2. In what ways can the necessary skills be developed in a timely and effective manner in both formal and non-formal education?

3. How to ensure that training and certification are actually transformed into employment opportunities and values recognized by employers?

4. How to create a culture of lifelong learning and self-development, where the renewal of knowledge becomes a natural and constant process of life?

The main objective of the article is to analyze the mechanisms that are driving the transformation of skills demand in the new digital era and to highlight the impact of artificial intelligence on labour market dynamics. The study focuses not on specific sectors, but on a broad general picture that integrates the education system, the business sector, public policy and the perspective of individual skills development. The main focus is on the asymmetry that exists between the speed of development of artificial intelligence and the adaptation of human skills. This gap can become both a major challenge and a source of new opportunities.

The object of the research is the impact of artificial intelligence on the labour market and the subject is the system of employees skills and the dynamics of its transformation.

The main objectives of the research are:

– to analyze how the need and value of skills are changing in the digital era;

– to identify the risks of uneven distribution of skills and their impact on economic and social structures;

– to formulate recommendations that will help the state and private sectors in developing a strategic skills management system, by better linking education and labour policies.

Although, this paper builds on existing research and literature review, it lays a solid foundation for future empirical research that will explore the real scale of AI-induced skill transformation, both globally and in the Georgian context. The article may help society and institutions prepare for the future and promote constructive cooperation between technology and humanity.

Literature Review. The current changes in the labour market are largely related to the rapid spread of recent digital technologies, and in particular artificial intelligence. This process is not only changing the structure of professions, but also reigniting the global debate about which skills will be crucial for the future economy.

Frey and Osborne (2017) indicate that the likelihood of automation of an occupation is largely determined by how routine and predictable the work process is. According to their study, employees whose tasks can easily be replaced by an algorithm belong to a high-risk group.

Brynjolfsson and McAfee (2014) speak of a "second machine age" in which not only manual labour but also analytical and communication tasks are being automated. They argue that this trend is leading to a "polarization" of skills. The number of middle-level jobs is gradually shrinking and the gap between high- and low-skill sectors is growing.

According to the OECD (2020) report[1], the labour market of the future will require

1 *Skills outlook 2020: Learning for life*. Paris: OECD Publishing, 2020. doi.org/10.1787/9789264383737-en

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not only technical knowledge, but also competencies such as critical thinking, digital literacy, and the ability to adapt quickly.

According to a McKinsey Global Study, by 2030, an estimated 375 million people worldwide will need to retrain to meet new economic demands (McKinsey Global Institute 2021)[1]. This underscores the critical importance of "learning to teach" in a rapidly changing environment.

Rodrik (2007) argues that the key factor in technological change is not the level of innovation, but rather the flexibility of the institutional environment. In this context, the rigid structure of the education system increases the risk of skills shortages and slows down the adaptation of human capital (Arnania-Kepuladze, 2018)

Acemoglu and Restrepo (2020) emphasize that AI can be used not only to replace human capabilities, but also to enhance them, if technology is accompanied by targeted investments in human skills.

The World Economic Forum (WEF 2023)[2] reports that a country's competitiveness in the future will be largely determined by the skills ecosystem it develops, where lifelong learning, creativity, and digital culture come together.

The ILO (2019)[3] conclusion emphasizes that social equity, labour rights, and the humanization of the work process must be taken into account in the policy assessment of technological transformations.

There has not yet been a specific study conducted in Georgia on the impact of AI in terms of skills transformation. However, general assessments (PMCG 2022[4]; ISET Policy Institute 2023[5]) indicate several problems: a serious shortage of digital skills, weak links between education and the labour market, and uneven access to retraining opportunities at the regional level.

Research Methodology. The presented paper is based on high-quality secondary data analysis and draws on existing international and national studies to study the impact of artificial intelligence on structural changes in labour market skills. The study follows a theoretical-analytical framework that systematizes key concepts and interprets global trends to develop a new vision in the context of the Georgian labour market. The analysis includes a wide range of sources, including reports of international organizations (OECD, ILO, World Economic Forum, McKinsey Global Institute, UNESCO), academic articles and theoretical models (Frey & Osborne, Brynjolfsson & McAfee, Rodrik, etc.), economic and educational policy documents, as well as existing reviews of the Georgian labour market (e.g., PMCG, ISET).

The paper is an exploratory study that does not seek to confirm or refute a specific hypothesis, but instead examines the subject in depth and contributes to its theoretical understanding.This type of research is not strictly inductive or deductive. Its main goal is to identify and systematize patterns and regularities.

In our case, the transformation of skills is considered in four main aspects:

1. Polarization of skills and revaluation of their value.
2. The speed of adaptation of human capital to technological changes.
3. The readiness of education systems in the digital era.
4. Policy recommendations for effective management of skills.

The following analytical approaches have been used to study the problem:

1. Systematic comparison – comparative analysis of different sources and contexts.
2. Critical interpretation – deep understanding of existing data.
3. Conceptual mapping – drawing up diagrams and models connecting processes.

During the development process, an extensive literature review was conducted in the following areas:

1. Typology of skills (routine / non-routine, technical / socio-emotional).
2. Identification of sectoral and cross-sectoral influences.
3. Comparison of policy frameworks in different countries.
4. Parallel analysis of global models and Georgian practice.

1 *The future of work after COVID-19.* McKinsey Global Institute. 2021. URL: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19 (дата звернення 15.06.2025).

2 *The future of jobs report 2023.* Geneva: WEF, 2023. URL: https://www.weforum.org/reports/the-future-of-jobs-report-2023 (дата звернення 15.06.2025).

3 *Work for a brighter future – Global Commission on the Future of Work.* Geneva: International Labour Organization, 2019. URL: https://www.ilo.org/global/publications/books/WCMS_662410/lang--en/index.htm (дата звернення 15.06.2025).

4 *Assessment of digital skills in Georgia's regions.* Tbilisi: Policy and Management Consulting Group, 2022. URL: https://pmcg-i.com/projects/assessment-of-digital-skills-in-georgia (дата звернення 15.06.2025).

5 *Digital skills gap in Georgia: Bridging the divide.* Tbilisi: ISET, 2023. URL: https://iset-pi.ge/index.php/en/research/education/4142-digital-skills-gap-in-georgia (дата звернення 15.06.2025).

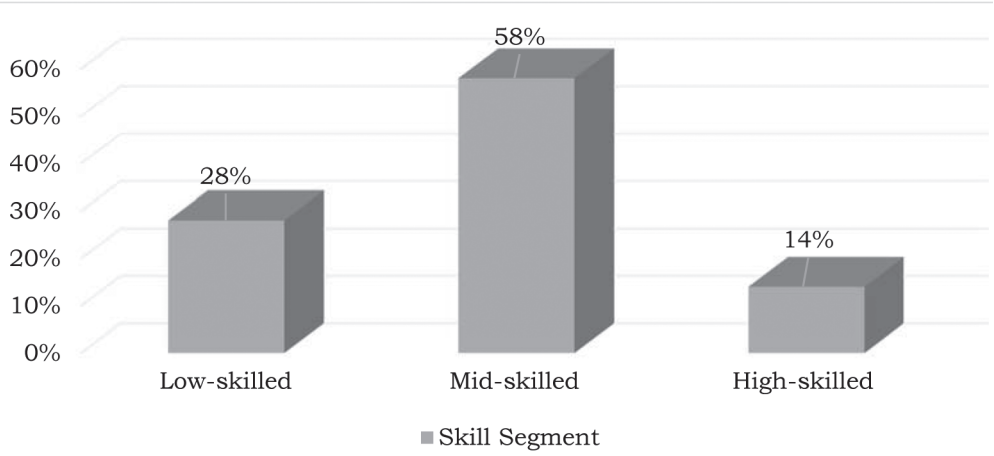

Fig. 1. Risk of automation by skill segment

Source: compiled by the author based on (Frey & Osborne, 2017)

One limitation of the study is the absence of primary data collection; however, this is partially offset by a broad and diverse literature base combined with a deep analytical approach.

Future research is recommended to:

1. Empirical research on specific segments of the Georgian labour market.
2. Analysis of skills demand and supply in individual sectors.
3. Assessment of the adaptive capacity of the education system in the face of the challenges of the digital era.

Main Results. The age of artificial intelligence is slowly creeping into the job market, changing not only who will be hired, but what skills will be valued and how those skills will be acquired, according to the school's new pulse-pounding Workplace Learning Report. A review of the literature identifies a number of systemic trends in terms of which a number of tendencies may be interpreted as general in the global and local context.

Skill Polarization and Associated Risks

The modern labour market is highly polarized: with an increased demand for high-level skills involving high-level knowledge creation and technological adaptability on the one hand, and low-level, non-routine skills on the other. However, human middle-skills (especially administrative, operational and routine-based jobs that are considered as most automatible) are currently under threat.

According to Frey and Osborne (2017), the threat of automation is greatest in middle skill jobs – 58%, while the proportion for low-skilled

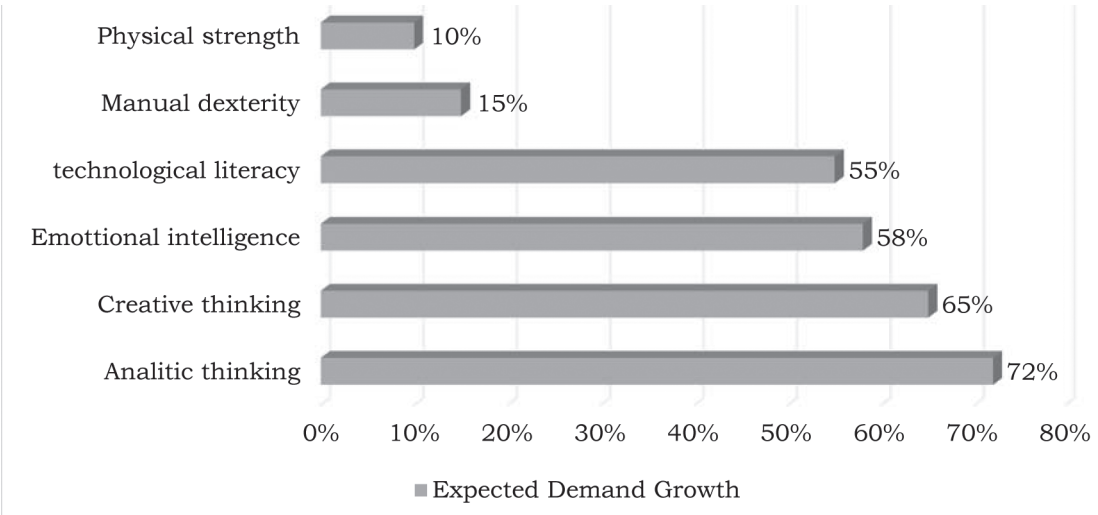

Fig. 2. Future skill demand growth

Source: compiled by the author based on McKinsey Global Institute (2021)[1]

1 *The future of work after COVID-19*. McKinsey Global Institute. 2021. URL: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19 (дата звернення 15.06.2025).

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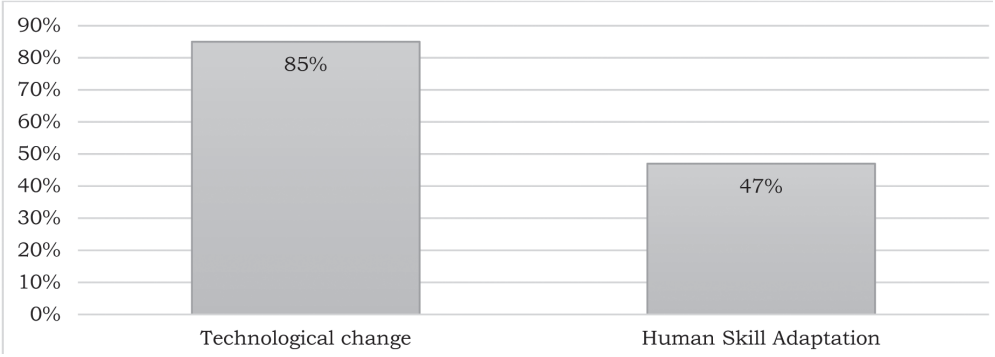

Fig. 3. Speed Gap: Technological change vs Human skill adaptation

Source: compiled by the author based on World Economic Forum (2023)*

**The future of jobs report 2023.* Geneva: WEF, 2023. URL: https://www.weforum.org/reports/the-future-of-jobs-report-2023 (дата звернення 15.06.2025).

is 30% and for high-skilled – just 14%. This trend runs the risk of economic segmentation and social polarization, especially in countries with weak mechanisms for labour mobility and limited access to upskilling.

In Georgia, where vocational retraining systems especially for the mid-tech segment operate in fragmented ways, such polarization may lead to structural disintegration of the labour force and deepening of regional economic decline.

A new skills hierarchy: from technical to emotional

The modern labour market is developing in such a direction that the demand for employment value is increasingly determined not by the technical and procedural skills of a specialist. Recent international reports (OECD 2020; McKinsey 2021)[1] [2] note that in the coming years the greatest increase in demand will be for the skills that require: Creativity and independent problem-solving ability; Emotional intelligence, collaboration, and cultural empathy; Digital thinking and the ability to make data-driven decisions.

Technical and technological skills are still of immense importance but no longer remain solely decisive in the value of labour. In new reality, the value of skills is assessed not in the amount of knowledge, but in the capability of building human relationships, creativity, synthesis.

As the graph above shows, analytical thinking and creativity lead growth forecasts, at 72% and 65%, respectively, followed by emotional intelligence (58%) and technological literacy (55%), indicating that surviving in the future work environment will mean mastering hybrid skills.

Much of the Georgian labour market notably the public sector and many regional enterprises remains captured by structures that prioritize routine administrative functions. This trend creates a temporary zone of protection from technological transformation only for the time being: the new hierarchy of skills necessitates structural adaptation at the levels of education, retraining and organizational culture.

The Imbalance in the Speed of Adaptation

One of the most significant structural challenges for the modern labour market is the imbalance in the speed of adaptation, the difference between the pace of technological progress and the speed at which individuals are able to transition to relevant skills. As indicated by both Rodrik (2007) and Acemoglu & Restrepo (2020), this momentary lag produces a "skills vacuum" in which the labour market outpaces demand and simultaneously cannot be filled with appropriately skilled personnel.

As can be observed from the graph above, the technological change index has achieved its level of 85% in relative units, while the index of adaptation speed of human skills has decreased below 47%; hence, systemic lag is obvious and it would lead to a sever economic fragmentation without being compensated by strategic retraining and policy response.

In Georgia, such disproportions are especially visible at the regional level. According to 2022 data of the PMCGs[3],

1 *Skills outlook 2020: Learning for life.* Paris: OECD Publishing, 2020. doi.org/10.1787/9789264383737-en

2 *The future of work after COVID-19.* McKinsey Global Institute. 2021. URL: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19 (дата звернення 15.06.2025).

3 *Assessment of digital skills in Georgia's regions.* Tbilisi: Policy and Management Consulting Group, 2022. URL: https://pmcg-i.com/projects/assessment-of-digital-skills-in-georgia (дата звернення 15.06.2025).

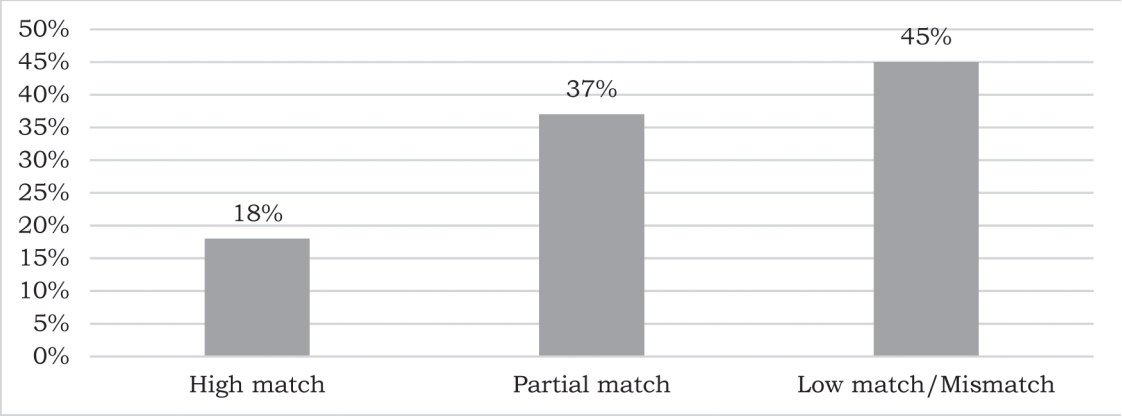

Fig. 4. Graduate competency match with job market

Source: compiled by the author based on ISET Policy Institute (2023)*

**Digital skills gap in Georgia: Bridging the divide*. Tbilisi: ISET, 2023. URL: https://iset-pi.ge/index.php/en/research/education/4142-digital-skills-gap-in-georgia (дата звернення 15.06.2025).

access to digital skills retraining courses in the regions is 42%, which means that most of the population is out of the range of the technology adaptation (PMCG 2022). From this data, it is obvious that faster technologie adaptation support requires: targeted reskilling programs; decentralized access to knowledge; parallel policies to technological development, taking into account the natural pace of human adaptation.

Education Systems and Labour Market Mismatch

One of the most critical problems observed in the post-Soviet space including in Georgia is the structural misalignment of the education system with the dynamics of the labour market. Universities, colleges, and vocational education institutions often fail to provide skills that directly respond to market needs, particularly hybrid, interpersonal, and technological competencies.

According to ISET, (2023)[1], 18% of graduates are estimated to be fully aligned with the labour market demand, in a further 37% of cases, partial alignment is estimated, while 45% are deemed unrelated or mismatched to demand. These figures show a systemic mismatch of the educational system programs and the real structure of labour demand.

We have to underline that having purely academic knowledge is not enough in today's economic-status quo. The economy demands interdisciplinary, hybrid and digital skills, which can be provided only by a flexible education system that catches up with changes in the market.

In Georgia, the gap is especially obvious in the areas where the vocational education does not fit either regional economic profile, or the global trends. Unbalanced distribution of skills literally means unbalanced distribution of opportunities for employment and mobility across the social scale.

Politics answers difficulties

The state has a key role in aligning labour-market skills with adaptation needs. A number of countries are already working on establishing such skills-focused strategic management frameworks, including: Introduction of the concept of lifelong learning; A voucher-based system for retraining; Training programs for specialists in various fields, taking into account current and future labour market needs.

The chart above shows the likes of Finland, Singapore and Germany have already established both national skills strategies and frameworks for lifelong learning and employer co-funded retraining programmes.

In Georgia, however, according to comparative analysis by the WEF[2] and ILO[3], such policies either don't exist or work only in fragmented form. There is no skills strategy on the national level; no system-wide approach to lifelong learning and increasing digital

1 *Digital skills gap in Georgia: Bridging the divide*. Tbilisi: ISET, 2023. URL: https://iset-pi.ge/index.php/en/research/education/4142-digital-skills-gap-in-georgia (дата звернення 15.06.2025).

2 *The future of jobs report 2023*. Geneva: WEF, 2023. URL: https://www.weforum.org/reports/the-future-of-jobs-report-2023 (дата звернення 15.06.2025).

3 *Work for a brighter future – Global Commission on the Future of Work*. Geneva: International Labour Organization, 2019. URL: https://www.ilo.org/global/publications/books/WCMS_662410/lang--en/index.htm (дата звернення 15.06.2025).

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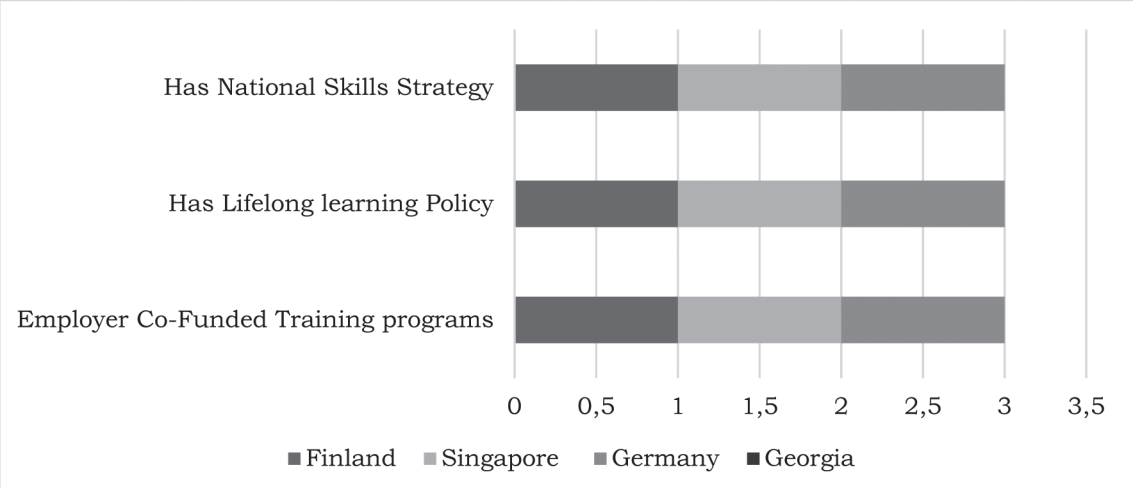

Fig. 5. Comparative skills policy adoption

Source: compiled by the author based on World Economic Forum (2023)*

**The future of jobs report 2023*. Geneva: WEF, 2023. URL: https://www.weforum.org/reports/the-future-of-jobs-report-2023 (дата звернення 15.06.2025).

capital; practically no employer engagement with the retraining system.

This reality reflects the reactionary, non-anticipatory nature of policy that fails to address the scale of the economic transformation coming into being under the conditions of artificial intelligence. Without a strategic response, the labour market of Georgia remains a limited employment space with low potential for social mobility where the skills-deficit directly becomes a factor driving economic backwardness.

Conclusion. The rapid development of artificial intelligence has led the labour market into a process of profound transformation. This change is driven by technological advancements, a reassessment of skill demands, and the speed of response of education systems. Based on the analysis of existing literature, five main trends have been identified that characterize both the global and Georgian labour reality:

1. Skills polarization – The labour market is splitting into two: high and low skilled segments are developing at different rates, and middle-level jobs are most at risk of automation. This limits social mobility and increases the risk of economic fragmentation.

2. New skills hierarchy – Technical skills are no longer the only key value; emotional intelligence, creativity, digital skills, and effective communication are gaining importance alongside them. This new hierarchy is transforming both organizational culture and the content of educational programs.

3. Uneven pace of retraining – Technologies are developing faster than people can keep up with the pace of skill upgrading, creating a so-called "skills vacuum." This is especially noticeable in developing countries and regions.

4. Mismatch between education and the labour market. Georgia's education system fails to reflect real demand. Hybrid and digital skills are not properly integrated into curricula, resulting in a workforce that is not aligned with employment needs.

5. Weak policy response – In countries with strategic skills management mechanisms, the transition process is more stable. In Georgia, however, there are no systematic frameworks for retraining, lifelong learning, and employer engagement.

The combination of these trends shows that the skills transformation is not just a technological problem. It is a social, economic and institutional challenge that requires integrated, forward-thinking and flexible policies.

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ШТУЧНИЙ ІНТЕЛЕКТ І ПЕРЕОСМИСЛЕННЯ НАВИЧОК ПРАЦІВНИКІВ

Сучасні тенденції чітко показують, що штучний інтелект більше не є лише футуристичною концепцією майбутнього. Динаміка його розвитку та можливості практичного застосування вже зробили його потужною силою, яка кардинально змінює спосіб роботи та функціонування людей щодня. Його вплив на ринок праці зростає з кожним днем, він переосмислює, які навички є важливими, як ці навички формуються та як буде виглядати майбутня екосистема праці. Багато недоступних завдань, які раніше вважалися недосяжними, тепер легко виконуються алгоритмами та інтелектуальними машинами, що змушує людей замислитися над тим, що робить роботу цінною в епоху, коли технології набули більших можливостей, швидкості, а часто й нижчих витрат.

У цій статті розглядаються зміни в глобальній структурі навичок, спричинені штучним інтелектом, та їх можливий вплив на такі країни, що розвиваються, як Грузія. На основі широкого спектру міжнародних досліджень, політичних звітів та економічних аналізів у статті визначено п›ять ключових тенденцій, які вже формують робочу силу майбутнього.

По-перше, спостерігається зростаюча динаміка поляризації навичок. Рутинні роботи середнього рівня, адміністративні функції, передбачувані технічні функції, базова обробка даних все більше піддаються ризику автоматизації, тоді як висококваліфікована творча та низькокваліфікована ручна праця є відносно стабільною. По-друге, з›являється новий ландшафт навичок, де найціннішими стають не тільки технічні компетенції, а й цифрова грамотність, креативність, емоційний інтелект, навички вирішення проблем та здатність швидко адаптуватися. По-третє, розрив між швидким розвитком технологій та повільною адаптацією людських навичок збільшується. Це створює так званий «вакуум навичок». По-четверте, системи освіти все більше відстають від потреб ринку праці, особливо в таких країнах, як Грузія, де освітні та професійні курси часто не встигають за цифровими та гібридними вимогами сучасної економіки. Нарешті, реакція державної політики на все це часто є фрагментованою та непослідовною. Не існує довгострокових національних стратегій, головна мета яких полягала б у підготовці суспільства до перехідного періоду.

Такі тенденції викликають тривогу, особливо в країнах, де доступ до перепідготовки та безперервної освіти є обмеженим, регіональні диспропорції унеможливлюють доступ людей до нових можливостей, а державна політика ще не відповідає масштабам технологічних перетворень.

У Грузії вищезазначені виклики є особливо тривожними з огляду на слабку інфраструктуру та політику системи освіти, де участь суб›єктів ринку праці в цьому процесі ігнорується, що призводить до непослідовного управління політикою у сфері навичок.

Вона забезпечує міцну основу для майбутніх досліджень і висвітлює сфери, в яких своєчасні дії є життєво важливими для уникнення негативного впливу на ринок праці. Стаття зосереджується на викликах, які не тільки спричинені новими технологіями, але й мають набагато глибший соціальний, економічний та інституційний характер. Підготовка до майбутнього вимагає проактивного та інклюзивного підходу: кращої координації між освітою та бізнесом, тіснішої співпраці між державним та приватним секторами, ширшого доступу до навчання протягом усього життя та переосмислення того, які навички будуть дійсно актуальними в завтрашньому світі праці.

Ключові слова: *штучний інтелект (ШІ), трансформація ринку праці, поляризація навичок, розрив у цифрових навичках, адаптація людського капіталу, невідповідність освіти та навчання, майбутнє праці, політичні заходи у сфері розвитку навичок.*

JEL Classification: J24; J21; J31; O33; O15; I25; J68.

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