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INNOVATIVE TECHNOLOGICAL SOLUTIONS AND THEIR IMPACT ON THE GLOBAL LABOUR MARKET

ІННОВАЦІЙНІ ТЕХНОЛОГІЧНІ РІШЕННЯ І ЇХ ВПЛИВ НА ГЛОБАЛЬНИЙ РИНОК РОБОЧОЇ СИЛИ

Sikorskyi Yurii
PhD in Economics, e-mail: 591173@ukr.net
ORCID ID: https://orcid.org/0009-0009-6049-8887

Сікорський Юрій
Кандидат економічних наук, e-mail: 591173@ukr.net
ORCID ID: https://orcid.org/0009-0009-6049-8887

Abstract*. At the present stage, the labour market is significantly influenced by the development of technologies, in particular, artificial intelligence. The article analyses current developments in the field of artificial intelligence and their impact on the global labour market. According to Goldman Sachs, global GDP is expected to increase by 7% and labour productivity by 1.5 percentage points over the next decade. Analysts predict that changes in workflows caused by artificial intelligence could affect 300 million jobs worldwide. It is emphasised that historical analysis shows that jobs lost due to automation were compensated by the creation of new ones. It is emphasised that the knowledge and ability to work with artificial intelligence significantly increase the competitiveness of employees in the labour market, which is reflected in higher material motivation. According to the CEPR, specialists with AI skills can earn 8-17% more than the average in the labour market. It is emphasised that the introduction of new technologies requires the adaptation of jobs and the development of new professions, which will contribute to long-term growth and productivity. The proposed strategies for employee adaptation include professional reorientation, continuous training and flexibility. It is reserched that it is important for enterprises to invest in innovation, retraining and flexible organisational structures to remain competitive in the face of rapid changes in the labour market. Further research will include an analysis of state policy in the labour market under the influence of artificial intelligence.*

Keywords*: innovative technologies; automation; artificial intelligence; adaptation; labour market.*

Анотація. Ринок праці на сучасному етапі перебуває під значним впливом розвитку технологій, зокрема, штучного інтелекту. Стаття аналізує сучасні зрушення у сфері штучного інтелекту та їх впливу на глобальний ринок праці. За даними Goldman Sachs, збільшення глобального ВВП на 7% і підвищення продуктивності праці на 1,5 процентних пункти протягом наступного десятиріччя. Аналітики прогнозують, що зміни у робочих процесах, спричинені штучним інтелектом, можуть вплинути на 300 млн робочих місць у всьому світі. Акцентовано, що історичний аналіз свідчить, що робочі місця, втрачені через автоматизацію, компенсувалися створенням нових. Наголошено, що знання та вміння працювати зі штучним інтелектом значно підвищують конкурентоспроможність працівників на ринку праці, що відображається у вищій матеріальній мотивації. За даними CEPR, фахівці з навичками роботи зі штучним інтелектом можуть отримувати на 8-17% більше, ніж в середньому на ринку праці. Акцентовано, що впровадження нових технологій потребує адаптації робочих місць та розвитку нових професій, що сприятиме довгостроковому зростанню та підвищенню продуктивності праці. Запропоновані стратегії адаптації працівників включають професійну переорієнтацію, постійне навчання та гнучкість. Досліджено, що підприємствам важливо інвестувати в інновації, перепідготовку персоналу та впроваджувати гнучкі організаційні структури для збереження конкурентоспроможності в умовах швидких змін на ринку праці.

Подальші дослідження включатимуть аналіз державної політики на ринку праці під впливом розвитку штучного інтелекту.

***Ключові слова**: інноваційні технології; автоматизація; штучний інтелект; адаптація; ринок праці.*

Introduction. The modern world is under the influence of rapid technological development, which has a significant impact on all sectors of the global economy, including the labour market. Innovative technologies, such as artificial intelligence, are changing traditional forms of employment and requiring new skills and competences from workers. On the one hand, these technological changes contribute to increased productivity and economic growth, but on the other hand, they pose challenges for the workforce, including the risk of rising unemployment and income inequality. The introduction of innovative solutions in various sectors of the economy not only optimises production processes but also changes the structure of labour demand. New professions are emerging that require high qualifications and technical knowledge, while traditional jobs may disappear or change. In this context, it is important to investigate how technological innovations affect the labour market, what positive and negative effects they have, and what strategies can be implemented to minimise the negative effects and maximise the positive effects. Accordingly, it is important to analyse the impact of innovative technological solutions on the global labour market, assess their economic consequences and identify key areas of adaptation to new conditions.

Literature review. Numerous works by Ukrainian and foreign scholars have been devoted to the impact of modern technologies on the dynamics of the labour market. Corrocher N. et al. *(Corrocher N. et al., 2023)* study the relationship between innovation and the labour market. The authors analyse how technological changes affect employment, the structure of professions and wages. The study emphasises the importance of innovation for economic growth, but notes that it can also lead to increased inequality in the labour market. The main challenges identified by the authors relate to the adaptation of workers to new conditions and the need to upgrade skills to remain competitive in the labour market.

Acemoglu D., Lelarge C., Restrepo P. *(Acemoglu D., Lelarge C., Restrepo P., 2020)* analyse the impact of automation on business in France. The study shows that enterprises that actively implement robotics have significant advantages in labour productivity. However, this also leads to job losses, especially among low-skilled workers. The authors emphasise the need to develop policies that would facilitate retraining and support workers at risk of unemployment due to automation.

Another paper by Acemoglu D., Restrepo P. *(Acemoglu D., Restrepo P., 2018)* analyses the long-term effects of technological progress on economic growth and employment. The authors note that technology can increase the overall welfare of society, but its distribution can be uneven. It is noted that technological changes lead to changes in the demand for different types of labour, in particular, the demand for highly skilled workers is growing, while the demand for low-skilled labour is decreasing. This highlights the importance of investing in education and training to adapt the workforce to new conditions.

Aghion P. et al. *(Aghion P. et al., 2020)* examine the effects of automation on labour markets. The paper emphasises that automation leads to an increase in labour productivity, which can contribute to lower product prices. At the same time, automation can have an ambiguous impact on employment: on the one hand, it can reduce the demand for labour in certain sectors, and on the other hand, it can create new jobs in other sectors. Depending on the skill level of workers, automation can have either a positive or negative impact on wages.

Agrawal A. et al. *(Agrawal A. et al., 2019)* focuses on the diversity of consequences of the introduction of artificial intelligence into the labour market, in particular in the context of automated forecasting. The paper shows that automation can improve labour productivity at an enterprise, on the other hand, it can lead to job losses. The study draws attention to the need to adapt the workforce to new market conditions, in particular through retraining and upskilling.

Aksoy C., Özcan B., Philipp J. *(Aksoy C., Özcan B., Philipp J., 2021)* study the impact of robotics on the gender wage gap in Europe. The authors analyse how the introduction of robotics affects the employment and remuneration of women compared to men. It is noted that automation in this context has an ambiguous impact: on the one hand, it can reduce the wage gap by increasing

productivity and reducing monotonous tasks, on the other hand, it can deepen inequality due to the greater likelihood of robots replacing jobs held by women.

Barbieri L. et al. *(Barbieri L., Piva M., Vivarelli M., 2019)* investigate the impact of investments in R&D and technological change on employment in Italy. The results of the analysis indicate that innovation and technological change contribute to employment growth, especially in the high-tech sector. The authors emphasise the importance of supporting R&D to stimulate economic growth and create new jobs.

Barth E. et al. *(Barth E. et al., 2020)* study the impact of robotisation on wage inequality within an enterprise. The authors found that the introduction of robots in production processes leads to an increase in wage inequality within the enterprise. This is because automation increases the productivity and wages of highly skilled workers, while reducing the need for low-skilled labour, which leads to a decrease in their wages or the reduction of these jobs.

Chuvardinsky V. *(Chuvardynskyi V., 2017)* studies the issues of innovative development of the labour market in Ukraine, analyses the risks and opportunities that arise in this context. The author notes that the innovative processes taking place in the economy have a significant impact on the labour market, contributing to the creation of new jobs and professions. At the same time, there is a growing need to adapt the workforce to new working conditions and master new skills. The paper draws attention to the risks associated with automation and digitalisation, which may lead to an increase in unemployment among unskilled workers.

Kolot A., Herasymenko O. *(Kolot A., Herasymenko O., 2018)* examine the latest global trends in employment and income and their impact on social inequality. The authors emphasise that technological progress, globalisation and changes in labour organisation cause significant changes in the structure of employment and income levels. It is emphasised that these changes can increase social inequality, as not all groups of the population are equally ready for change and can adapt to new conditions. The authors analyse possible ways to overcome social inequality through education, professional development and the creation of new employment opportunities.

Obelets T. *(Obelets T., 2020)* studies the current trends in the labour market transformation, which are influenced by globalisation and technological changes. The author emphasises that the labour market is undergoing significant changes due to the development of digital technologies, automation of production and changes in the requirements for employee qualifications. It is noted that these changes lead to a decrease in demand for traditional professions and an increase in the need for specialists with a high level of digital and technological literacy. In addition, the challenges associated with the adaptation of employees to new working conditions and the need for reforms in the education system to train qualified personnel are considered.

The identified body of work analyses in depth the impact of modern technologies on the labour market. However, in this context, insufficient attention is paid to the issue of adaptation to these changes by key stakeholder groups, namely employees and enterprises, which requires more detailed study.

The purpose of the article is to analyse the impact of modern innovative technologies on the global labour market and to highlight strategies for adapting to these changes.

Main results of the research. The current development of artificial intelligence technology has the potential to cause significant changes in the global economy, as evidenced by a study by Goldman Sachs *(Goldman Sachs, 2024);* through the introduction of tools that use data processing methods based on artificial intelligence, it is possible to achieve an increase in global GDP by 7% (or almost USD 7 trillion) and increase labour productivity by 1.5 percentage points over the next decade. Despite considerable uncertainty about the potential of generative artificial intelligence, its ability to create content indistinguishable from that created by humans and to overcome barriers to human-machine interaction has significant potential with possible large-scale macroeconomic implications. Goldman Sachs analysts [Goldman Sachs, 2024] note that these technologies could lead to changes in work processes that would affect the equivalent of 300 million jobs worldwide.

A study by Goldman Sachs *(Goldman Sachs, 2024)* shows that about 65% of professions in the US are subject to some degree of automation through artificial intelligence. For those professions

that are subject to automation, between a quarter and half of the work performed by humans can be replaced by machines. However, not all of this automated work will lead to a reduction in employment. Analysts note that most jobs and industries will be subject to only partial automation, which makes them more likely to be complemented rather than replaced by artificial intelligence.

Historical analysis shows that jobs lost to automation have been compensated for by the creation of new jobs in other industries. The emergence of new occupations following technological innovation is the main driver of long-term employment growth. For example, information technology has led to the emergence of professions such as web designers, software developers and digital marketing specialists. Furthermore, the growth in disposable income that accompanies job creation is driving demand for workers in service sectors such as healthcare, education, consulting, and more. In particular, 60% of today's workers are employed in occupations that did not exist in 1940; this indicates that more than 85% of employment growth over the past 80 years is attributable to the creation of new jobs caused by technological change *(Goldman Sachs, 2024)*.

It is worth noting that AI skills help to strengthen an employee's position in the labour market, which is reflected in higher financial motivation. The demand for specialists with the relevant skills is growing rapidly. This is causing significant changes in the labour market, including in the level of remuneration. One of the important metrics reflecting this trend is the premium for AI skills that employers are willing to offer to specialists. Data from the CEPR study *(CEPR, 2024)*, shown in Fig. 1, illustrates the assessment of the premium for AI skills in various areas:

– *Administrative services*: this sector shows the highest premium for AI skills, which is about +17% of the average salary. This may be due to the high demand for automation of routine tasks and increased efficiency of administrative staff;

– *Information services*: the premium to material motivation in this sector is about +12%. The high demand for specialists with knowledge of artificial intelligence is explained by the need to develop and maintain information systems that incorporate elements of artificial intelligence;

– *Finance*: the premium in this sector is approximately +11%. The financial sector is actively implementing artificial intelligence to analyse data, manage risks and improve forecast accuracy;

– *Manufacturing*: the premium in this sector is about +9%. AI is used to optimise production processes, supply chain management and quality control;

– *Professional services*: the premium in this area is about +8%. The use of AI in professional services includes legal advice, audits, and other intellectual tasks.

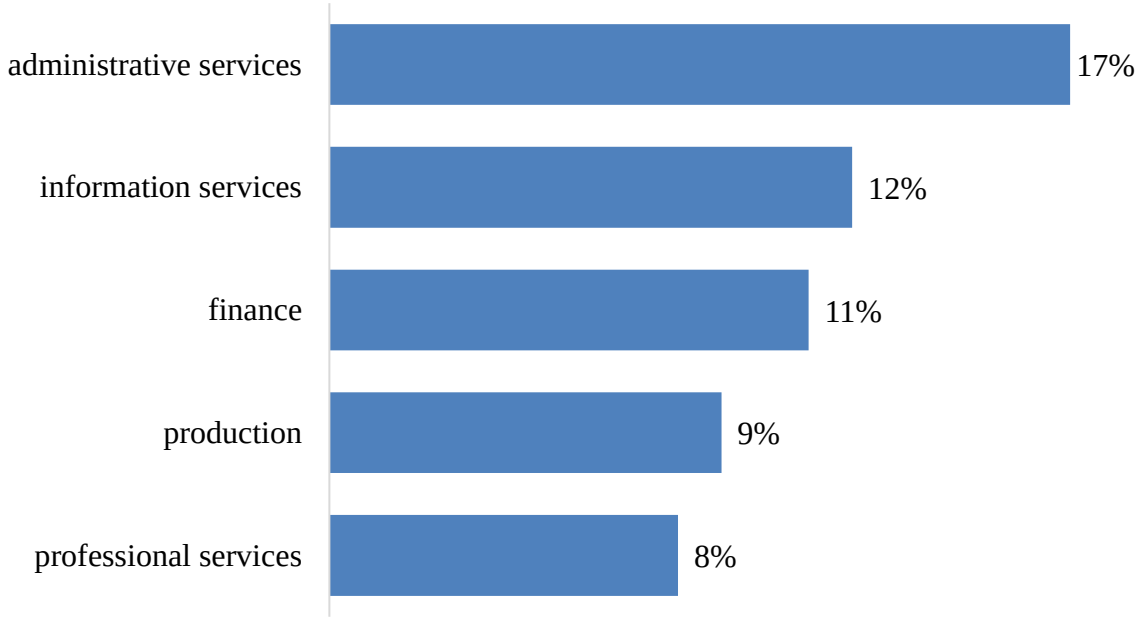

Figure 1. The level of premium to the financial motivation of a specialist for skills in artificial intelligence, %.
Source: based on CEPR research (CEPR, 2024).

While there is considerable uncertainty about how artificial intelligence will actually affect the global economy and society, there are already signs of a significant impact. The introduction of new technologies will require the adaptation of jobs and the development of new professions, which will contribute to long-term growth and productivity.

Let us highlight the key adaptation strategies in this context. Adaptation strategies for employees and businesses are important for maintaining competitiveness in the face of rapid changes in the labour market and technological progress. One of the main approaches for employees is professional reorientation, which includes advanced training and new knowledge. This allows them to remain in demand and competitive in the labour market. A modern employee must be prepared for continuous lifelong learning, which includes both formal training in the form of courses and workshops, and informal learning through self-education and practical experience. Flexibility and the ability to adapt to change are also key characteristics, including the willingness to change jobs, learn new professions and technologies. For businesses, innovation is critical. Investing in innovations and new technologies helps to increase labour productivity, which is essential in an increasingly competitive environment. It is important for businesses to invest in staff retraining, which not only improves the skills of employees but also increases their loyalty. Flexible organisational structures allow businesses to adapt more quickly to changes in the market. This may include decentralisation of management, the use of project teams and flexible working arrangements, which can help to increase the organisation's responsiveness and adaptability. This analysis is summarised in Table 1.

Table 1

Strategies for adapting employees and businesses to the impact of artificial intelligence

Areas of influence	Comments.
Employee adaptation strategies	
Professional reorientation	One of the main approaches to adaptation for employees is professional reorientation. Improving skills and gaining new knowledge helps employees remain competitive in the labour market.
Continuous training	A modern employee must be prepared for continuous learning throughout his or her life. This includes both formal learning in the form of courses and trainings, as well as informal learning through self-education and practical experience.
Flexibility and adaptability	Employees must be flexible and ready to adapt to change. This includes the willingness to change jobs, learn new professions and technologies.
Adaptation strategies for enterprises	
Innovative development	It is important for businesses to invest in innovation and new technologies. This allows them to increase productivity and efficiency, which is critical in an increasingly competitive environment.
Staff retraining	Businesses should invest in retraining their staff. This not only improves the skills of employees, but also increases their loyalty to the company.
Flexible organisational structures	Flexible organisational structures allow for faster adaptation to market changes. This may include decentralising management, using

	project teams and introducing flexible working hours.

Source: author's analysis.

Accordingly, as part of adapting to changes in the labour market due to the impact of artificial intelligence technology, it is important for employees to reorient their professional lives by improving their skills and acquiring new knowledge. This allows them to remain competitive in the labour market and find new career opportunities. It is important to identify which professional skills are most in demand and focus on developing them. Continuous learning should become an integral part of professional life. Employees should draw up an individual learning plan that includes both attending courses and learning new knowledge independently through online platforms. Flexibility and adaptability are key qualities for a modern employee. Attending workshops and trainings aimed at developing adaptability, as well as considering working in different positions to gain diverse experience, will help to improve these skills. It is important for businesses to invest in innovation and new technologies to increase productivity and efficiency. Conducting an audit of current technologies and processes, identifying areas for improvement, and developing a plan for introducing new technologies will help achieve this goal. Staff retraining is another important aspect for businesses. Developing retraining and professional development programmes for different levels of staff, providing access to training resources and motivating employees to participate in these programmes will help to improve their skills and loyalty to the company. The introduction of flexible organisational structures will allow companies to adapt more quickly to changes in the market. Decentralising management, creating project teams for specific tasks, and introducing flexible working hours will help to increase productivity and employee satisfaction. These measures will help both employees and businesses to effectively adapt to the changes caused by the introduction of artificial intelligence and remain competitive in a volatile environment.

Conclusions. In summary, the analysis of current developments in the field of artificial intelligence indicates a significant potential of these technologies to influence the global economy and labour market. According to Goldman Sachs, the introduction of tools that use advanced natural language processing methods could lead to a 7% increase in global GDP and a 1.5% increase in labour productivity over the next decade. While there is considerable uncertainty about the potential of artificial intelligence, its ability to create content indistinguishable from human-made content and break down barriers to communication between humans and machines is a significant advance with potentially large-scale micro and macro implications. Goldman Sachs analysts estimate that changes in workflows caused by artificial intelligence could affect the equivalent of 300 million jobs. Historical analysis shows that jobs lost due to automation were compensated by the creation of new ones. The growth in disposable income that accompanies the creation of new jobs contributes to an increase in demand for workers in the service sector.

The ability to work with artificial intelligence significantly increases the competitiveness of employees in the labour market, which is reflected in higher financial motivation. The demand for AI specialists is growing rapidly, leading to significant changes in the labour market, including in the level of remuneration. CEPR's data on the premium for AI skills in various industries indicates that specialists can earn 8-17% more than the average in the labour market.

The introduction of new technologies requires the adaptation of jobs and the development of new professions, which will contribute to long-term growth and productivity. Employee adaptation strategies include professional reorientation, continuous training and flexibility. It is important for businesses to invest in innovation, retraining and flexible organisational structures to remain competitive in the face of rapid changes in the labour market.

Prospects for further research include the formation of a state policy on the impact of artificial intelligence on the current and future state of the labour market.

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v