УМАНЕЦЬ Т.В.
д-р екон. наук, проф.
завідувачка відділу розвитку підприємництва Державної установи
«Інститут ринку і економіко-екологічних досліджень Національної академії наук України»
Французький бульвар, 29, м. Одеса, Україна, 65044
E-mail: uman_tat@ukr.net
ORCID: 0000-0002-8852-4540

ДАНИЛІНА С.О.
канд. екон. наук, доцент
ст. наук. співроб. відділу розвитку підприємництва Державної установи
«Інститут ринку і економіко-екологічних досліджень Національної академії наук України»
Французький бульвар, 29, м. Одеса, Україна, 65044
E-mail: damilynasa@gmail.com
ORCID: 0000-0003-2814-6434

ШАТАЛОВА Л.С.
канд. екон. наук, доцент
ст. наук. співроб. відділу розвитку підприємництва Державної установи
«Інститут ринку і економіко-екологічних досліджень Національної академії наук України»
Французький бульвар, 29, м. Одеса, Україна, 65044
E-mail: shatalovaliudmyla@gmail.com
ORCID: 0000-0003-2671-5138

АДАПТАЦІЯ РИНКУ ПРАЦІ ДО ВИМОГ ЦИФРОВІЗАЦІЇ ЕКОНОМІКИ: СВІТОВИЙ ВІМІР

Актуальність. Цифрова економіка, все активніше входячи в наше повсякденне життя, змінює багато підходів, що склалися до організації та управління їх трудовою діяльністю. Цифрові технології та шостий технологічний устрій найближчими десятиліттями призведуть до часткового заміщення людської праці машинним. У результати цифрвізації від 9 до 50% всіх існуючих професій можуть зникнути в найближчі десятиліття. Вже до 2036 року може бути автоматизовано від 2 до 50% роботи, вираженої у людино-годинах, а до 2066 року ця частка може досягти 46-99%. В країнах «великої двадцятки», за даними Європейської Комісії, річний обсяг цифрової економіки оцінюється в 3,2 трлн. євро та становить близько 8% сукупного ВВП. Отже, сьогодні необхідно виявити характерні риси адаптації ринку праці до вимог цифрвізації економіки, враховуючи світовий досвід.

Мета та завдання. Метою статті є виявлення характерних рис адаптації ринку праці до вимог цифрвізації економіки на базі світового досвіду.

Результати. У статті наведено основні риси, яких набуває світовий соціально-економічний розвиток у XXI столітті під впливом цифрвізації економіки, а саме: інтенсивний розвиток технологій й інновацій, посилення значення сфери послуг; прискорене включення до процесу глобалізації; трансформація трудових відносин в умовах змін у комунікаційних технологіях та мотивації трудової поведінки людей в контексті "дистанційних відносин" між працівниками та їх роботодавцями; процес формування гнучкого, віртуального ринку праці у вимогах цифрвізації. Визначено, що особливістю Четвертої промислової революції є цифрвізація, яка на ринку праці створює умови до скорочення додаткових робочих місць та посилення процесу "стиснення" вже сформованих. Досліджено основні тенденції зміщення роботозамінювальної технікою та програмним забезпеченням робочих місць у США та європейських країнах на наступні 20 років на основі оцінювання прикладних досліджень у сфері цифрової економіки. Наведено результати перевороту в умовах розвитку цифрових економік та надано йому характеристики шляхом аналізу впливу цифрвізації на структуру ринку праці. В інноваційних умовах розвитку цифрових економік видно зміну структури, у тому числі у структурі ринку праці, процес формування цифрових платформ. Обґрунтовано нову структуру цифрової економіки, зокрема цифрові платформи, які використовуються для формування цифрової економіки. Означено перспективи подальших досліджень.
Висновки. Представлені результати дослідження є певним базисом теоретико-методологічного осмислення основ адаптивного управління бізнес-процесами в умовах цифровізації економіки України, тому що необхідно враховувати зміни відносної структури робочих місць під впливом нової технології певного фактору виробництва при підготовці кадрів.

Ключові слова: цифровізація економіки; зайнятість населення; ринок праці; структура робочих місць; адаптація ринку праці; креативний клас; креативна економіка.

UMANETS T.V.
Dr. Econ. Sciences, Professor
Head of the Department of entrepreneurship development of a state institution
«Institute of Market and Economic&Ecological Research of the National Academy of Sciences of Ukraine»
Frantsuzkyi boulevard, 29, Odessa, Ukraine, 65044
E-mail:uman_tat@ukr.net
ORCID: 0000-0002-8852-4540

DANYLINA S.O.
PhD in Economics, Associate Professor,
Senior Researcher of the Department of entrepreneurship development of a state institution
«Institute of Market and Economic&Ecological Researches of the National Academy of Sciences of Ukraine»
Frantsuzkyi boulevard, 29, Odessa, Ukraine, 65044
E-mail: danilynsa@gmail.com
ORCID: 0000-0003-2814-6434

SHATALOVA L.S.
PhD in Economics, Associate Professor,
Senior Researcher of the Department of entrepreneurship development of a state institution
«Institute of Market and Economic&Ecological Researches of the National Academy of Sciences of Ukraine»
Frantsuzkyi boulevard, 29, Odessa, Ukraine, 65044
E-mail: shatalovaludmyla@gmail.com
ORCID: 0000-0003-2671-5138

ADAPTATION OF THE LABOR MARKET TO THE REQUIREMENTS OF DIGITALIZATION OF THE ECONOMY: THE GLOBAL DIMENSION

Topicality. The digital economy, becoming more and more part of our daily lives, is changing many of the approaches to the organization and management of their work. Digital technologies and the sixth technological device in the coming decades will lead to a partial replacement of human labor by machines. As a result of digitalization, from 9 to 50% of all existing occupations may disappear in the next decade. By 2036, from 2 to 50% of work expressed in man-hours can be automated, and by 2066 this share can reach 46-99%. In the G20, according to the European Commission, the annual digital economy is estimated at 3.2 trillion euro and is about 8% of total GDP. Thus, today it is necessary to identify the characteristics of the adaptation of the labor market to the requirements of digitalization of the economy, taking into account world experience.

Aim and tasks. The aim of the article is to identify the characteristics of the adaptation of the labor market to the requirements of digitalization of the economy on the basis of world experience.

Research results. The article presents the main features of global socio-economic development in the XXI century under the influence of digitalization of the economy, namely: intensive development of technology and innovation, strengthening the importance of services; accelerated inclusion in the globalization process; transformation of labor relations in the conditions of changes in communication technologies and motivation of people’s labor behavior in the context of "remote relations" between employees and their employers; the process of forming a flexible, virtual labor market in the context of digitalization. It is determined that the feature of the Fourth Industrial Revolution is digitalization, which in the labor market creates conditions for the reduction of additional jobs and intensification of the process of "compression" of those already formed. The main trends in the replacement of robotic hardware and software jobs in the United States and the European Union for the next 20 years based on estimates of international companies. The characteristics of changes in the structure of jobs in the labor market due to the introduction of such new technologies as: "Big data" - by industry, sector and area of activity; industrial Internet of Things - specialists in specialties; production automation and robotics; mobile internet, cloud technologies and digital platforms. The emergence of the creative class in the development of the digital economy is substantiated and given a description by analyzing the definitions of the concept of "Creative Class", the characteristics of the elements of its structure and
performance. It is proved that due to digitalization the preconditions for the formation of a creative economy are created. Prospects for further research are identified.

**Conclusion.** The presented results of the research are a certain basis of theoretical and methodological understanding of the basics of adaptive business process management in the digitalization of Ukraine's economy, because it is necessary to take into account changes in the relative structure of jobs under the influence of new technology.

**Keywords:** digitalization of the economy; employment; labor market; structure of jobs; labor market adaptation; creative class; creative economy.

**Problem statement and its connection with important scientific and practical tasks.** The digital economy, becoming more and more part of our daily lives, is changing many of the approaches to the organization and management of their work. Digital technologies and the sixth technological mode in the coming decades will lead to a partial replacement of human labor by machines. As a result of digitalization, from 9 to 50% of all existing occupations may disappear in the next decade. By 2036, from 2 to 50% of work expressed in man-hours can be automated, and by 2066 this share can reach 46-99%. In the G20, according to the European Commission, the annual digital economy is estimated at 3.2 trillion euro and is about 8% of total GDP. So today, considering the impact of digitalization on the economy of Ukraine, it is necessary to identify the characteristics of the adaptation of the labor market to the requirements of digitalization, taking into account world experience.

**Analysis of recent publications on the problem.** The problems of digital economy development and transformation processes taking place in society under the influence of digitalization are paid attention to by such Ukrainian scientists as: Apalkova V.V., Burkinsky B.V., Vyshnevsky O.S., Geets V.M., Gritsenko A.A., Knyazev С.I., Kraus N.M., Laiko O.I., Lyashenko V.I., Mantsurov I.G., Melnik M.I., Umanets T.V., Fedulova L.I., Filippova S.V., Schlafman N.L. et al. [1-5]. The development of digital technologies and their impact on business processes are considered in the works of Budanov V.G., Guseva О.Yu., Keshelava A.V., Kraus N.M., Natorina О.A.

**Allocation of previously unsolved parts of the general problem.** Along with sufficient work on this research problem, the problem of seeing the development of digitalization and its impact on the transformation of elements of social production (materialized and living labor) remains underdeveloped. This is especially true of the theoretical and methodological understanding of the basics of adaptation of the labor market to the requirements of digitalization of Ukraine's economy.

**Formulation of research objectives (problem statement).** The aim of the article is to identify the characteristics of the adaptation of the labor market to the requirements of digitalization of the economy on the basis of world experience. Achieving a certain goal necessitated the formulation and solution of the following tasks:
- identify the main features that have acquired global socio-economic development in the XXI century under the influence of digitalization of the economy;
- identify the processes of adaptation of the labor market to the requirements of the digital economy;
- to characterize the changes in the structure of jobs in the labor market through the introduction of new technologies;
- to substantiate the emergence of the creative class in the conditions of digital economy development and to give it a characteristic.

**An outline of the main results and their justification.** A feature of the Fourth Industrial Revolution is digitalization, which creates conditions in the labor market to reduce additional jobs and intensify the process of "compression" of existing ones. The emergence of fundamentally new creative professions and engineering specialties will be accompanied by the elimination of many traditional ones. According to some estimates, by 2035 cyberphysical systems will displace up to 50% of those employed in routine work [6].

Thus, the transition of most countries to a post-industrial society, the formation of the knowledge economy and the digital economy has led to the fact that in the XXI century, global socio-economic development has acquired new features:
- intensive development of technologies and innovations,
- strengthening the importance of services,
- accelerated inclusion in the process of globalization,
- transformation of labor relations in the context of changes in communication technologies and motivation of labor behavior in the context of "remote relations" between employees and their employers,
- the process of forming a flexible, virtual labor market in the context of digitalization.
Foreign experience shows that with the development of the digital economy, the share of intellectual labor will increase compared to traditional manual labor. This will allow the use of so-called atypical types of employment, which are becoming more and more popular.

Over the next 20 years, global economic trends may lead to a 50% reduction in the availability of certain categories in the world and the emergence of a class of redundant people, the destruction of the usual mechanisms of "guarantees of the future" (career guidance, long-term employment or a decent pension), retraining of personnel to the requirements of the digital economy due to robotics and automation of economic processes [7]. For example, Paul Krugman argues that with the introduction of digital technology, "smart machines make smart ones unnecessary people" [8], i.e. there will be a reduction in demand for specialties related to finance, accounting, law and other specialties related to highly skilled labor [6]. Installation of one industrial robot replaces from three to six workers, i.e. one additional machine per thousand workers reduces the level of employment on 0.18-0.34 [9].

A number of scientists in their research found a trend of replacement of robotic hardware and software jobs in the United States and the European Union over the next 20 years [10, 11] (Table 1).

<table>
<thead>
<tr>
<th>State</th>
<th>Proportion of jobs to be replaced by robotic hardware and software over the next 20 years, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>47.0</td>
</tr>
<tr>
<td>France</td>
<td>35.0</td>
</tr>
<tr>
<td>Germany</td>
<td>59.0</td>
</tr>
<tr>
<td>EU countries</td>
<td>45.0 – 60.0</td>
</tr>
</tbody>
</table>

Compiled from sources [10; 11]

According to the consulting company McKinsey & Co, the introduction of existing technologies will provide automation of labor worth 2 trillion dollars, and over the next 5 years due to the diffusion of digital technologies, industrialized countries will lose about 5 million jobs [12].

The main trend in the labor markets of both developed and developing countries in the coming years will be a huge increase in unemployment among low- and medium-skilled workers.

The number of disappearing professions will exceed the number of professions of the future. However, unlike in previous years, jobs are shrinking faster than they are being created. Employers expect that by 2025 the share of unclaimed occupations will decrease from 15.4% to 9% (a decrease of 6.4%), and the number of new ones will increase from 7.8% to 13.5% (an increase of 5.7%) from the total number of employees of the respondent companies [13].

Researchers at the World Economic Forum estimate that the introduction of new technologies and the redistribution of work between humans and machines will reduce 85 million jobs. Instead, 97 million new roles will appear. They will be more adapted to new technologies. More and more people are looking for jobs in radically new areas of activity: 50% of people who came to the field of artificial intelligence and data processing, previously worked in completely different fields. If we take the sphere of sales, this share is 75%; in content creation – 72%; engineering – 67% [14].

Companies will have difficulty implementing new technologies due to a lack of qualified staff in the local labor market. In the absence of ready-made talents, employers are expected to offer retraining and advanced training to just over 70% of their employees by 2025. However, only 42% of people will take advantage of retraining and advanced training opportunities with the support of the employer [15].

The lack of qualified personnel will be felt more acutely in new professions. Difficulties will arise when finding data analysis specialists, as well as specialists in artificial intelligence and machine learning, software and application developers. Demand for cross-functional skills is growing: critical thinking and analysis; problem-solving skills, as well as self-management skills, namely: active learning, psychological stability, resilience and flexibility.

At the same time, employment is projected to grow in such areas as the creative economy, the digital and virtual economy, the eco-restoration sector, human-oriented services and the newly created technology sector. Due to the introduction of new technologies, employment in the world will grow every year in such areas:

- "big data" – 2.95% (Table 2).
Table 2

<table>
<thead>
<tr>
<th>Industries, sectors and areas of activity</th>
<th>Annual relative change of jobs, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch of mathematics and computer engineering</td>
<td>+4.59</td>
</tr>
<tr>
<td>Management sphere</td>
<td>+1.39</td>
</tr>
<tr>
<td>Financial sector of the economy</td>
<td>+1.34</td>
</tr>
<tr>
<td>Trade sphere</td>
<td>+1.25</td>
</tr>
<tr>
<td>Office sphere</td>
<td>-6.06</td>
</tr>
</tbody>
</table>

Compiled from sources [16]

- industrial Internet of Things – 2.27% (Table 3).

Table 3

<table>
<thead>
<tr>
<th>Specialists in:</th>
<th>Annual relative change of jobs, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>computer specialties</td>
<td>+4.54</td>
</tr>
<tr>
<td>design and engineering development</td>
<td>+3.54</td>
</tr>
<tr>
<td>maintenance, repair and installation of equipment</td>
<td>-8.0</td>
</tr>
<tr>
<td>office sphere of activity</td>
<td>-6.2</td>
</tr>
</tbody>
</table>

Compiled from sources [16]

Employment in industry will be strongly influenced by new production technologies and 3D printing (the number of jobs will be reduced by 3.6% annually) and to a much lesser extent – robotics and the development of automatic transport (a reduction of 0.83%).

- production automation and robotization – 0.36% (Table 4).

Table 4

<table>
<thead>
<tr>
<th>Type of introduction of new technologies</th>
<th>Change of jobs, million units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation</td>
<td>+2</td>
</tr>
<tr>
<td>Robotization</td>
<td>-7</td>
</tr>
</tbody>
</table>

Compiled from sources [17; 18]

According to available data, 19% of workers may be replaced by 81% in the near future. Soon, work can give businesses very tangible benefits: replacing workers with work can reduce costs by 90%, while moving production to a country with a cheap economy can save up to 65% on wages.

In the United States, according to experts, up to 47% of work by 2034 will be done by robots [19]. Productivity in robotic areas of production is 5 times higher than in areas without automation. McKinsey research indicates that less than 5% of occupations can be fully automated, and there is potential for partial automation in almost all industries. Almost half of the functions can be automated using today's best-known technologies. Due to the growing use of robots and artificial intelligence, at least 21 new specialties will appear in the next decade. Today, the robot is becoming an active player in the labor market, competing more and more. Soon the works will design and make their own. They will be given almost all the functions that a person can perform, except for strategic, social and areas of creative thinking;

- mobile internet, cloud technologies and digital platforms – 2.47%. McKinsey data, based on a study of the economies of 160 countries, shows that by 2025, digital smart talent platforms will help create more than 72 million jobs and bring in more than 2.7 trillion USD in global GDP. Such platforms change the classic approaches of companies to search for both customers and employees. It is estimated that by 2025, more than 540 million will be able to use various digital platforms. At least more than 230 million people will be able to save time looking for work by reducing the duration of unemployment. In addition, more than 200 million people who are economically inactive or part-time can work through interactive talent platforms. More than 60 million people will be able to find a job that best suits their skills or preferences, and another 50 million can move from informal employment to the formal sector of the economy [11].

Websites, portals
and social networks for job search and employment, such as LinkedIn, CareerBuilder and Monster, have already become one of the leading international employment agencies in the market. Employment portals are the largest sites in terms of the share of the population they cover. For example, LinkedIn has an audience of more than 400 million users, representing 150 businesses in 200 countries [20].

Thus, in parallel with the transformation of the Internet space into an integral part of life, the concept of "creative class" appears, which is associated with the concepts of "network" or "virtual" class, or those people whose daily lives are largely shaped by constant presence of IT technologies.

However, the digitalization of employment leads not only to the emergence and expansion of new professions, but also to the exclusion of certain professions and areas of employment.

Considering the creative class as a phenomenon of post-industrial society, it should be noted that the main feature of its identification is involvement in management (Table 5).

**Table 5**

<table>
<thead>
<tr>
<th>Author</th>
<th>The essence of the concept of &quot;Creative Class&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. Galbraith</td>
<td>Over time, corporations will be dominated not by the owner, but by the technology structure – a whole set of scientists, engineers and technicians, sales, advertising and sales professionals, public relations experts, lobbyists, lawyers and people familiar with the bureaucracy and its activities, as well as intermediaries, managers, administrators.</td>
</tr>
<tr>
<td>Ronald Frankenberg</td>
<td>It is a community of people of different career-oriented professional competencies, or it is a socio-economically and geographically mobile category of people who “go beyond the communities to which organizations send them,” that is, they are “spiralists”</td>
</tr>
<tr>
<td>Richard Florida</td>
<td>These are representatives of creative professions, which today form, in fact, a new social class, whose representatives have unique properties and are able to influence the development of individual spheres or society as a whole. In addition, members of this class are characterized by constant career growth and a high level of material well-being, which is associated with their full commitment to professional activities and their demand in modern society.</td>
</tr>
<tr>
<td>R. Boshma and M. Fritsch</td>
<td>It is the main driver of growth of cities and regions, which creates a new order of society.</td>
</tr>
</tbody>
</table>

Compiled from sources [21-24]

In the 20th century Joseph Schumpeter, noting entrepreneurship as the fourth factor of production, has already considered entrepreneurs as a creative class, because, in his opinion, they are the ones who shape innovative solutions and play a key role in social progress [25].

Successful economic development today is impossible without creating comfortable and attractive conditions for creative workers. These conditions include extreme individual freedoms, diversity and openness. According to Florida theory, the level of technical innovation is higher in cities with a higher percentage of creative bohemians. The creative class needs those for whom its activities are of some value.

Thus, the whole society can be divided into two classes according to the theory of Florida and the opinion of M. Chiksentmich [23; 26]:

- **creative class** are workers of creative work, i.e. people who are employed in the intangible sector of the economy, who achieve individual success through their education and creative abilities. They are characterized by such features as: meritocracy, personal self-realization, individual freedoms, the superiority of intangible benefits to financial success and openness. The main elements of the structure of the creative class are:

  1. The core is people engaged in science and technology, architecture, painting, design, education, art, music, whose economic function is to create new ideas, technologies, forms or new content of something that existed before.

  2. Creative professionals are people who are engaged in solving complex problems, which are characterized by independence of thought and a high level of education and human capital. They may not create something fundamentally new, but they are constantly improving, making minor innovations in existing phenomena and processes in business and finance, law, health care and other related fields.
3. The rest of the creative class are those for whom the search for something new in everyday life and the general spirit of creativity are important.

The result of the creative class is creative work – a socially significant, based on a high level of education, creative work that requires the employee to regularly participate in solving complex, non-standard, new tasks and apply independent critical thinking in everyday work.

- the service class or the "acceptor class" are representatives of our usual professions that do not require a creative approach, or people who are not focused on work as an exciting process, but on work as a means of income, social status, etc. This is a class that implements the results of the creative class.

The above is a prerequisite for the formation of a creative economy, which as the main tool has knowledge, resource – information, and product – innovation. Its main components are "information economy", "knowledge economy" and "innovation economy".

In the creative economy, digitalization is replacing physical capital with human capital as a major factor in the development and share of national wealth. The process of developing a new type of economy is to improve the quality of human capital, quality of life and the production of knowledge, new technologies, innovations and high quality services. The main "added value" in the creative economy will be created in the creative process, thanks to new knowledge and intellectual property rights to the results of such work. The creative economy is based on a developed venture capital system. The product of the creative economy is not only new products, but also the formation of new institutions and systems of production. The result is the development of outsourcing (contract manufacturing) and "virtual companies" that outsource virtually everything – manufacturing, logistics, advertising, accounting, retaining only a small staff of administrators, marketers and developers. Such firms retain only those functions related to the production of intellectual property, creative development or trademark. In the United States, the main decline in employment is due to the loss of jobs by workers who are not in the creative class. Creative workers, although they also experienced a nominal reduction in employment, the rate of decline was insignificant – 1% [27].

Conclusions and perspectives of further research. According to the results of the study, the main trend in the labor markets of both developed and developing countries in the coming years in the digitalization of the economy will be a huge increase in unemployment among low- and medium-skilled workers. Thus, the digitalization of employment leads not only to the emergence and expansion of new professions, but also to the exclusion of certain professions and areas of employment. "New" jobs will not correspond to the traditional model of full employment (on-demand work, part-time work, etc.), as new technologies will fragment the work process. However, non-standard employment does not mean the demand for low skills. On the contrary, non-standard operations will require the highest level of qualification, which will put workers in a more vulnerable position in the labor market, for whom quality education will not be available. For example, according to the China National Information Center, rapid growth in the e-commerce sector has led to the creation of 10 million jobs in online stores and related services, accounting for about 1.3% of all jobs in the country [10].

The presented results of the research are a certain basis of theoretical and methodological understanding of the basics of adaptive business process management in the digitalization of Ukraine's economy, because it is necessary to take into account changes in the relative structure of jobs under the influence of new technology.

ЛІТЕРАТУРА


10. Глобальний ринок праці відчує вплив роботизації вже в наступному році. PCWEEK. URL: https://www.pcweek.ua/themes/detail.php?ID=155649


13. References


from interaction between subjects of the market of innovative technologies]. *Ekonomichni innovatsii – Economic innovations*, 23 (3 (80), 342-351 [in Ukrainian].


