# FACTOR OF INFLUENCE OF DIGITAL ECONOMY TO DETERMINATION OF LEVEL OF UNEMPLOYMENT IN UKRAINE

# ФАКТОРИ ВПЛИВУ ЦИФРОВОЇ ЕКОНОМІКИ НА ВИЗНАЧЕННЯ РІВНЯ БЕЗРОБІТТЯ В УКРАЇНІ

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**Bilyk O.I.**
Candidate of Economic Sciences,
Associate Professor at the Department of Administrative and Financial Management
Lviv Polytechnic National University
**Khymych O.V.**
Candidate of Economic Sciences,
Associate Professor at the Department of Administrative and Financial Management
Lviv Polytechnic National University

***Introduction***. *Digitalization radically alters business landscapes, business processes (both essential and subsidiary) and the nature of work, and redefines the boundaries of production, distribution and consumption. Technological innovations are transforming both the manufacturing and services sectors by increasing the use of artificial intelligence and automated systems (online platforms, robotics, machine learning, big data, etc.). These trends create both threats and opportunities for employers and employees who need adjustments in job organization, job allocation and skills.*

***Purpose***. *The purpose of the article is to research and identify the main causes of unemployment and the impact of digitization on the unemployment rate. The authors used the works of V. Heitz, E. Libanova, I. Marchenko, J. Perry, T. Cooper, A. McAfee, T. Kremer, A. Okun and others in their research.*

***Problem statement***. *The article outlines ways to reduce unemployment with structural changes in the economy. The uprise of the digital economy has led to changes in employment structure. The digitalization of the economy, or the fourth industrial revolution, as some experts have acknowledged, has implications for job creation / destruction. Therefore, the main emphasis in the current conditions of structural changes in the economy is to develop within the working population such qualities as flexibility, and from employers – a deeper study of the consumer benefits of their products (jobs, services). The benefits of technological change in employment are also substantiated in the article. Among the benefits is the ability to attract people with disabilities using the latest digital technologies.*

***Materials and methods***. *The authors modeled the opportunities for Ukraine's economy in the cross-section of regions applying Oaken's law. The authors also used statistical and analytical methods.*

***Results***. *The authors substantiated and proposed new types of unemployment in the digital environment. Social activation will also be developed for greater communication, exchange and mutual assistance, which simplifies the job search process.*

***Conclusions***. *At the end of the article, the authors drew conclusions on ways to reduce the unemployment rate in Ukraine and outlined further areas of research.*

**Key words:** *digital economy, unemployment, employment, qualifications, wage.*

***Вступ***. *Цифровізація радикально змінює бізнес-ландшафти, бізнес-процеси (як основні, так і допоміжні) та характер роботи, а також переглядає межі виробництва, розподілу та споживання. Технологічні інновації перетворюють як виробничий сектор, так і сферу послуг шляхом зростання використання штучного інтелекту та автоматизованих систем (онлайн-платформи, робототехніка, машинне навчання, великі дані тощо). Ці тенденції створюють як загрози, так і можливості для роботодавців і працівників, які потребують коригування організації роботи, розподілу робочих місць і навичок.*

***Мета***. *Метою статті є дослідження та визначення основних причин безробіття, впливу цифровізації на рівень безробіття.*

***Проблематика***. *У статті окреслено шляхи зменшення рівня безробіття з урахуванням структурних змін в економіці. Поява цифрової економіки призводить до змін у структурі зайнятості. Цифровізація економіки, або четверта промислова революція, як визнали деякі експерти, має наслідки для створення / знищення робочих місць. Тому основний наголос в сучасних умовах структурних змін економіки ставиться на вироблення у працездатного населення таких якостей як гнучкість. Від роботодавців вимагається більш глибше дослідження споживчих переваг їхньої продукції (робіт, послуг). У статті також обґрунтовано переваги технологічних змін у сфері зайнятості, однією з яких є можливість залучення до роботи осіб з обмеженою дієздатністю за рахунок застосування новітніх цифрових технологій.*

***Матеріали й методи***. *Автори змоделювали можливості для економіки України в розрізі областей, застосувавши закон Оукена. Також автори застосували статистичний та аналітичний методи. У дослідженні було використано праці В. Гейца, Е. Лібанова, І. Марченко, Дж. Перрі, Т. Купер, А. Макафі, Т. Кремер, А. Окун та інших.*

***Результати***. *Авторами обґрунтовано та запропоновано нові типи безробіття в умовах цифровізації, наголошено на розвитку соціальної активізації для більшої комунікації, обміну та взаємодопомоги, що спрощує процес пошуку робочих місць.*

***Висновки***. *Вкінці статті автори виклали висновки щодо шляхів зменшення рівня безробіття в Україні та окреслили подальші напрями дослідження.*

**Ключові слова:** *цифрова економіка, безробіття, зайнятість, кваліфікація, заробітна плата.*

**Introduction**. Unemployment is the most important issue of our time. Despite all the systems of social security, unemployment creates conditions for emergence of negative situations, sometimes financial problems or even poverty and loss of individual identity. In economic terms, loss of productive capacity and total disqualification of the unemployed causes a long-term crisis, and that is what makes the topic so relevant.

The works of such Ukrainian and foreign scholars as V. Heytsa, E. Libanova, I. Marchenko, J. Perry, T. Cooper, A. MacAfi, T. Kremer, A. Okun and others were devoted to the influence of IT-technologies on employment, the study of the essence and causes of unemployment as well as the ways to overcome them.

The research of the impact of the digital economy on the unemployment rate in Ukraine. **The aim of the research** is to reveal the main problems of employment.

Traditionally, the employment growth is in line with general economic development. The economic process is characterized by its microeconomic, sectoral basis due to constant structural changes. It is connected with the rise and fall of the life cycle of some commodities, with technical progress and changes in international competitiveness and informational technologies. This structural change causes structural unemployment. However, there is a redistribution of production factors within the developed market structure that eliminates unemployment or, at least, reduces it to a "natural" level.

The economic process is characterized by constant destruction and creation of employment. It demands labour fluctuations at sectoral, regional, professional and internal levels. These regulation flaws lead to frictional unemployment. A certain percentage of this unemployment will continue to exist in the ideal world [1]. The frictional rate of unemployment is not constant and may change in the economic process. Globalization has had a positive impact on the economic growth of European Union countries while employment has had a negative influence until very recently.

Particularly, the offer of low-skilled work continues to decline due to international competition and restrictions of rationalization. The EU's eastern expansion will further enhance the effect. Generally, immigration does not have the negative effect of employment. On the contrary, migrants create additional employment where they are employed by the new local workers who offer new products and services [2].

The labour movement from Ukraine to European countries has both a positive and a negative effect: Ukrainians were particularly affected by unemployment because of often inadequate market qualification and affiliation to the risk groups and also because of a limited labour law [3]. To Ukraine it means the flight of the economically active population. However, as for a Ukrainian citizen who is employed abroad, synergistic effect may take place: occupation, punctual payment, social package. Generally, observing the dynamics of unemployment rate from 2000 to 2017, a positive trend should be noted: the unemployment rate has gradually dropped (table 1) [4].

Usually the labour market, which is unprotected, leads to a reaction to stability and inflexibility taking into account companies' needs of structural relocations for their employees. The advantages of mobility from industrialization trends are more than offset by the advantages of mobility from the increased household income and the perception of social barriers. And though the spatial property seems to be surmountable thanks to technological changes and virtual organization of work, it still requires an educational reform.

Insufficient flexibility on the labour market is reflected, among other things, in insufficient ability to provide a part-time work that is one of the elements of non-material encouragement for employees. At the same time, tough labour laws and collective bargaining rules impede the creation of flexible employment structures that can create additional employment. New employment will emerge only in those areas where high flexibility is required. Normative labour relations will inevitably continue to decrease in importance and will gradually lead to small, low-paid, and time-limited events, which in turn pose significant problems to social security.

The technological change offers significant opportunities for employment through creative forms of work with tele-objects and an increasing need for "informational and temporal management". Still, job offers will demand high-level qualification and continuous learning. Low-skilled employees will be able to take part in new offers only if it is possible to make the processing process of the technology itself easier.

Potentially increasing demand for personal services through technically suited labour flexibility and individualization trends will be able to actually generate employment only if it can be transferred from self-employment into a low-paid industry. And vice versa, employment in a wider service sector will increase rapidly and compensate the loss. The increase of free time, increasing demand for elderly care services or a high-skilled consult creates new products that provide work and offer services; former state benefits will be replaced with services offered by quasi-governmental or private suppliers.

Table 1

**Unemployment rate in Ukraine, 2000-2017**

| Years | Population | Economically active population | Unemployed population | Unemp loyment rate, % | Registered unemployed |
|---|---|---|---|---|---|
| 2000 | 48923,2 | 21150,7 | 2630 | 12,40 | 1178,7 |
| 2001 | 48457,1 | 20893,6 | 2440,3 | 11,70 | 1063,2 |
| 2002 | 48003,5 | 20669,5 | 2128,6 | 10,30 | 1028,1 |
| 2003 | 47622,4 | 20618,1 | 1994 | 9,70 | 1024,2 |
| 2004 | 47280,8 | 20582,5 | 1888,2 | 9,20 | 975,5 |
| 2005 | 46929,5 | 20481,7 | 1595,2 | 7,80 | 891,9 |
| 2006 | 46646 | 20545,9 | 1513,7 | 7,40 | 784,5 |
| 2007 | 46372,7 | 20606,2 | 1416,7 | 6,90 | 673,1 |
| 2008 | 46143,7 | 20675,7 | 1424 | 6,90 | 596 |
| 2009 | 45962,9 | 20321,6 | 1956,6 | 9,60 | 693,1 |
| 2010 | 45778,5 | 20220,7 | 1784,2 | 8,80 | 452,1 |
| 2011 | 45633,6 | 20247,9 | 1731,7 | 8,60 | 505,3 |
| 2012 | 45553 | 20393,5 | 1656,6 | 8,10 | 467,7 |
| 2013 | 45426,2 | 20478,2 | 1576,4 | 7,70 | 487,6 |
| 2014 | 42928,9 | 19035,2 | 1847,1 | 9,70 | 458,6 |
| 2015 | 42760,5 | 17396 | 1654 | 9,50 | 461,1 |
| 2016 | 42584,5 | 17303,6 | 1677,5 | 9,70 | 407,2 |
| 2017 | 42386,4 | 17193,2 | 1697,3 | 9,90 | 352,5 |

Several hundreds of thousands of employment places could be created only in private households and non-profit organizations. As already mentioned, employment ensures the market cyclicality: from product manufacturing, jobs, services, demographic development and social sphere to general state's financial security. The higher the unemployment rate, the greater the distance of GDP.

The collectivity between the level of cyclical unemployment and the decrease of the actual product volume compared to another product at full delay of the law: if the actual level of unemployment exceeds its natural level by 1%, then the economy does not support real GDP as 2.5%. Based on Okun's law, the empirical research of the full employment's impact on the GDP growth was conducted (table 2) [4, 5].

Thus, the GDP growth in projected figures is obvious. In an optimistic forecast for the "service culture's" development there are more than a million new jobs in the field of personal and technological services. They include, among other things, consistent regionalization and reorganization of employment services and labour market policy that allow direct coordination of labour demand and offer as well as new approaches in tax policy and its popularization.

In addition to the increase of efficiency of deviation from direct taxation, targeted incentive mechanisms no longer have to fund unemployment, but rather encourage start-ups more than before. It can be provided by a "voucher system". Models that aim for "combination of wages" may prove to be useful if they are related to a creation of apparent sector of low wages. However, technological progress can be perceived in two ways: the so-called Luddites' error, that explains that although automation displaces workers, it simultaneously leads to lower prices, can serve as an argument [6].

Low prices, in turn, stimulate consumer demand and create a basis for new industries that need more employees. Digital economy promises a significant amount of data that is ready for decision making in companies, governments and even international civil society organizations. Digital instruments are able to provide an understanding of future expansion of opportunities and employment. Firstly, data collection (personal, market and other sources of large data) must be improved, as well as its analysis. Finally, decision-making has to be based on an ability to employ a person.

In the light of the development of technologies and their impact on the change

Table 2

**Potential effect from full employment**

| | GDP/GRP, mln UAH 2016 | Unemployed population, thous. of people | Actual unemployment rare, % (4/3) | Natural unemployment rate, % | Additional GDP according to Okun's law, mln UAH |
|---|---|---|---|---|---|
| Ukraine | 2385367 | 1677,5 | 9,70 | 9,63 | 4472,56 |
| Autonomous Republic of Crimea | | | | | |
| Vinnytsia Oblast | 74411 | 71 | 9,70 | 7,28 | 4496,59 |
| Volyn Oblast | 35744 | 49,7 | 11,50 | 7,49 | 3587,06 |
| Dnipropetrovsk Oblast | 244478 | 121,7 | 7,90 | 5,91 | 12143,43 |
| Donetsk Oblast | 137500 | 122,9 | 14,10 | 8,19 | 20315,05 |
| Zhytomyr Oblast | 47919 | 63,7 | 11,20 | 8,62 | 3092,37 |
| Zakarpattia Oblast | 32390 | 56,3 | 10,00 | 7,28 | 2199,82 |
| Zaporizhia Oblast | 104323 | 81,4 | 10,00 | 6,55 | 8997,86 |
| Ivano-Frankivsk Oblast | 51404 | 53,5 | 8,80 | 6,65 | 2765,54 |
| Kiev Oblast | 128638 | 53,5 | 6,80 | 5,69 | 3554,70 |
| Kirovohrad Oblast | 46021 | 53,1 | 12,40 | 7,97 | 5100,66 |
| Luhansk Oblast | 31356 | 57 | 16,00 | 7,83 | 6407,08 |
| Lviv Oblast | 114842 | 87,9 | 7,70 | 6,55 | 3312,71 |
| Mykolaiv Oblast | 57815 | 53,3 | 9,70 | 6,97 | 3951,41 |
| Odessa Oblast | 119800 | 72,5 | 6,80 | 5,08 | 5157,39 |
| Poltava Oblast | 116272 | 82,6 | 12,60 | 8,37 | 12292,86 |
| Rivne Oblast | 39469 | 56,3 | 10,60 | 8,53 | 2038,24 |
| Sumy Oblast | 46287 | 48,8 | 9,30 | 7,77 | 1775,69 |
| Ternopil Oblast | 31072 | 52,8 | 11,50 | 8,82 | 2082,47 |
| Kharkiv Oblast | 154871 | 84,6 | 6,40 | 5,89 | 1959,12 |
| Kherson Oblast | 38743 | 55,9 | 11,20 | 7,44 | 3646,36 |
| Khmelnytskyi Oblast | 48859 | 53 | 9,40 | 7,48 | 2342,38 |
| Cherkasy Oblast | 59412 | 59,8 | 10,40 | 7,98 | 3588,48 |
| Chernivtsi Oblast | 21239 | 35,7 | 8,70 | 7,05 | 877,26 |
| Chernihiv Oblast | 43362 | 53,9 | 11,30 | 8,60 | 2924,59 |
| Kyiv | 559140 | 97,3 | 6,70 | 5,04 | 23141,41 |
| Sevastopol | ... | | - | | |

unemployment level, we suggest you familiarize yourself with the classification feature of employment – employment by the degree of use of IT technologies (Fig. 1).

It should be noted the falsity of thoughts on increasing unemployment with the expansion of the process of implementation of IT technologies. As shown in Figure 1, the digitalization process will change the direction of employment: supplemented by technologies that require another (possibly more limited) education and will assist the relevant institutions in managing social risks [8].

In addition, the employee will be able to more simplier and easily perform the tasks assigned to him, as well as combine different types of work and create new startups. Of course, the structure of employment in certain industries will change: expansion of the use of IT technologies can simultaneously lead to the creation of labor force, caused by the disclosure of scalability in certain sectors, while increasing productivity in other labor-intensive industries, which leads to the destruction of jobs.

Important for Ukraine is the implementation of the Concept for the Development of the Digital

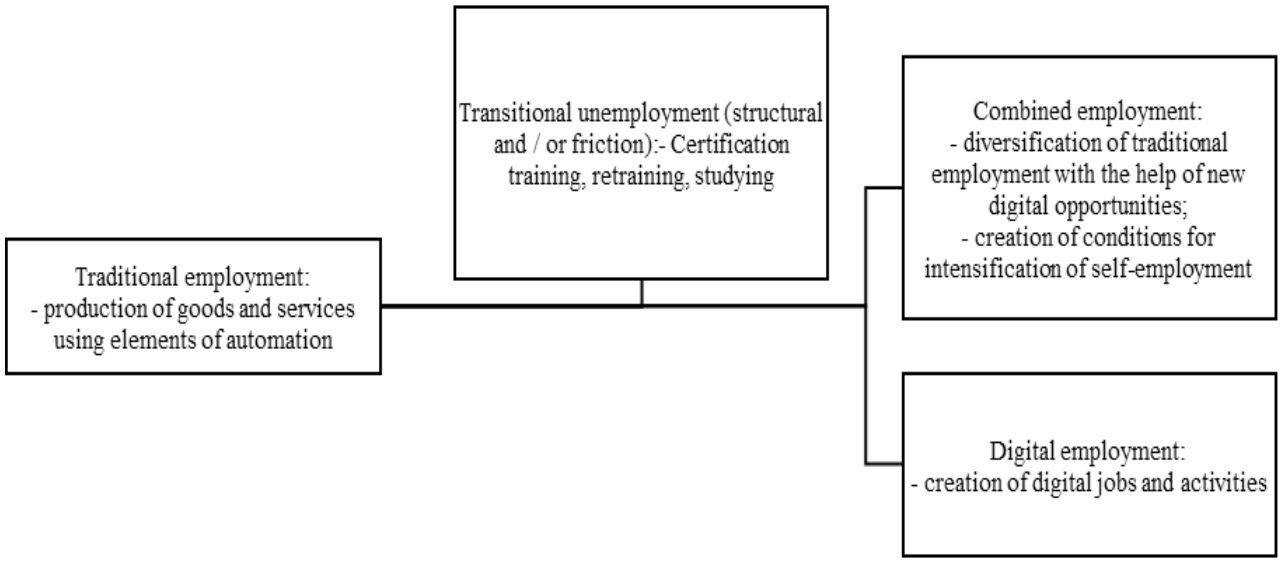


**Fig. 1. Transformation of types of employment (by degree of use of IT technologies)**

Economy and Society of Ukraine for 2018-2020, approved by the prescript of the Cabinet of Ministers of Ukraine from January 17, 2018, number 67-r, what will promote the emergence of new digital markets, and improve access to e-government [9].

**Conclusions**. Thus, the main advantage of the expansion of digital technology are: creation of additional workplaces in financial services, wholesale trade and healthcare sector in connection with the process of decentralization in Ukraine; creation of jobs in the service sector (for example, financial services, education, health care, etc.); the growth of some sectors in services (software development and business process outsourcing); expanding opportunities for "working from home" (maternity leave or caring for a sick family member, persons with disabilities) and the self-employed; simplification of opportunities to get job since there are no location restrictions.

Besides, thanks to IT-technologies, the job search opportunities are expanding in modern conditions. Extension of Internet accessibility has led to an improvement of prospects of re-employment by increasing the Internet use for job search without reducing overall search efforts. Further scientific research is the study of the negative effects of expanding digital possibility and ways to overcome them.

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