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DIGITAL EMPLOYMENT: UKRAINE'S RANKING IN THE GLOBAL DIVISION OF DIGITAL LABOUR

ABSTRACT

The paper reviews information on the formation and development of a new form of employment – digital one – and identifies its impact on the country's place in the global dimension. The overall objective of the study is to verify the trends of digital employment in Ukraine and assess its place and role in the global distribution of the digital workforce. The literature review indicates a lack of research on the gap between the level of technological development of the country and the use of digital employees in the national economy. This is particularly imperative for developing countries, which technologically remain far behind, and to which Ukraine belongs.

The scholars used a certain sequence to conduct the study of this issue, particularly: at first, in accordance with the characteristics of digital employment, the authors identified the types of business where the largest number of digital workplaces is concentrated. Secondly, the researchers analyzed the statistical indicators of digital employment in Ukraine for 10 years and revealed the development tendencies of this segment. Thirdly, the study compared the data on employment, wages and the obtainability of the favorable domestic talent development environments for the country of reference and a neighboring country with a higher level of economic development. Fourthly, the research identified the factors influencing the spread of digital employment and defined the place and role of Ukraine in the global digital landscape.

The study uses methods of analysis and synthesis, abstraction and generalization in the verification of digital employment trends, statistical and analytical methodologies in the study of the state and trends inherent in the digital segment of national employment markets. The knowledge base of the research consists of the official statistics of Ukraine, Poland, analytical materials of UNIDO, The World Economic Forum, OECD, Eurostat.

The object of the study is the digital segment of the labor markets of Ukraine and Poland, as these countries have similar preconditions for economic development, they are geographically located in Eastern Europe and border each other. At the same time, Poland has a higher level of economic development and is a recipient country for Ukrainian migrant workers.

The paper presents the results of empirical analysis, which showed that technological lag is the major precondition for the low demand for digital employment in Ukraine. Accordingly, this determines that Ukraine is basically a resource colony in the digital global environment, which supplies highly qualified digital workers. The experts and practitioners can use the results of the study to elaborate a strategy for the development of Ukraine's economy in the context of digitalization.

Keywords: waves of innovation, digitalization, digital employment, digital employees, information and communication technologies

JEL Classification: J21, J24, J31, F22, F66

INTRODUCTION

In market conditions, the center of economic activity has shifted to the main section of the entire market economy – the enterprise [1]. It is at this level that the necessary goods are produced for society and necessary services are determined. The enterprise employs the most qualified personnel. There, issues of efficient resource consumption, application of high-performance machinery and technology are settled. The enterprise

organizes the production process, develops strategic, current and operating plans, and conducts effective management. The enterprise performs innovation and investment activities and takes measures to economically use financial resources. In the market economy, the only enterprise that can survive is the one that determines the requirements of the market in the most competent way, builds and organizes the production of goods that are in demand, and provides high incomes for the most qualified employees.

The purpose of the enterprise is to meet public needs and make a profit [2]. Naturally, one should agree that business is the economic activity of business people, their art and ability to bring in increasing profits to the enterprise, ensure a high level of efficiency. In an open economy, business development contributes to the saturation of the consumer market with goods and services, activates economy restructuring, stimulates the introduction of scientific and technological achievements, and acts to raise production efficiency to its maximum values. Technologies used at the enterprise play a significant role and impact greatly all components of the internal environment of the enterprise and are interrelated with them. An economic component is a totality of economic processes that include capital and cash flows, and economic indices of the enterprise. Among factors of the internal environment of enterprises, a special place belongs to the information component – a set of organizational and technical means that provide channels and networks of the enterprise with relevant information for effective communication in enterprise management. With the advent and development of information networks, including the Internet, the success of the enterprise is increasingly determined by the level of information technologies applied. The result of business people's production activities is selling products (works, services) to the consumer and making a certain amount of money. The financial result of the enterprises is the difference between earnings and production costs. Effective management of the enterprise requires knowledge of its features which allows for predicting its behavior during changes in both the external and internal environments. Economic and mathematical modeling of the enterprise operation is one of the possible ways to solve the problem [3]. Such a model allows focusing on those sides of the enterprise that are significant in current conditions.

LITERATURE REVIEW

Many scientists investigated the impact of innovative technologies on the economic and social development of national economies in their publications.

Particularly, Wu J., Guo S., Huang H., Liu W., & Xiang Y. (2018) study the impact of digital technologies on the achievement of the Sustainable Development Goals, adopted by the Resolution of the UN General Assembly on August 25, 2015 [1]. Chris D'Souza & David Williams (2017) compare the digital transformation and its impact on the economy with previous industrial revolutions. The authors determined that investments in digital technologies contribute to higher productivity by providing workers with more tools to do their work; stimulating businesses to modernize equipment, due to cheaper digital technologies and multi-factor productivity (MFP). The latter raises productivity due to other technological changes, dynamic reallocation (including through outsourcing and offshoring), and economies of scale [2]. Basing on the global tendencies of ICT development and their use as a factor of competitive advantages, Bilan, Mishchuk, Samoliuk & Grishnova (2019) proved in their research [3] that sustainable socioeconomic growth has acquired features of permanent digital development. For developing countries, steep ICT development can enforce new impulse of economic progress, which in turn, is proved by correlation analysis and modeling of ICT factors that influence the main financial results.

Within the framework of our research, we are mostly interested in the papers, which are devoted to the processes of digitalization of the national economy. Lyashenko and Vishnevsky (2018) investigated the tendencies of digital economy development, substantiated the connection of digitalization processes with the development of business models using platform technologies, and determined that digital capital in Ukraine is in the process of formation.

The latter notion was confirmed in a collective monograph by Vishnevsky et al. (2020) [5], where the authors assess the transformational potential of the digitalization of Ukraine's economy and substantiate recommendations for its improvement.

In a report prepared by the Razumkov Centre, Pishchulina (2020) [6], a leading expert at this organization, highlights the main trends in the digital economy of Ukraine. As a part of a scientific report, Buleev (2020) [7] emphasizes the social aspects of the digitalization of the economy and its influence on the development of society and the middle class.

Erik Brynjolfsson, Avinash Collis (2019) note that traditional efficiency indicators for the national economy do not work in the new conditions. A significant number of global digital comforts are free for consumers (e-mail, social media, e-maps, e-commerce, information content, music, etc.). Researchers suggest an alternative GDP-B indicator, which supplements GDP by estimating the value of free digital comforts for consumers based on the results of the survey [8].

It is worth noting that the study of UNIDO (Industrial Development Report 2020) «Industrialisation in the Digital Age» is one of the most interesting ones among the latest studies of international organizations on the impact of digitalization, which states that the 10 leading economies account for 90% of world patents and 70% of related exports [9].

The introduction of digital technologies in business processes radically changes the forms of job arrangement and employment. Digital employment is no longer limited to borders; there is a spread of digital outsourcing and outstaffing. The rapid changes taking place in the field of employment under the influence of digital technologies require constant monitoring and updating of the information regarding the status, dynamics of digital employment services, factors influencing their development, and identifying challenges facing digital employees.

In the framework of our study, it is expedient to identify works devoted to the issues of transformation of the labour sphere under the influence of the introduction of digital technologies in business processes. Heeks Richard (2017) focuses on the impact of digital technologies on developing countries. The author identifies the advantages and disadvantages of remote (online) work and notes that most of them apply not only to developing countries [10].

Pianta (2018) [11] investigates and summarises development trends. Based on these trends, the scholar identifies twelve facts of interactions between technology and employment. Among others, the author emphasizes that technology is a driver of inequality, which in particular causes a growing gap between productivity and pay, and the first value is growing much faster than the latter.

Kalenyuk et al. (2020) carried out a thorough analysis and systematized the features of the formation of corporate intellectual capital in the digital economy, revealing its impact on the content and nature of the job [12].

Fedirko et al. (2021) conduct a simulation of the changes in IT sector employment in the European Union until 2025. Based on official statistics regarding the number of highly qualified unemployed people, the authors predict a decrease in unemployment due to the increasing demand for IT professionals [13].

The issue of a quantitative assessment of the digitalization impact on the development of the economy with an emphasis on the labor sphere in the context of globalization is poorly studied and understood. In particular, this relates to determining the ranking of Ukraine in the global distribution of labor, the effectiveness of digital employment within the national economy, and assessing the factors that increase its productivity.

The overall objective of the research is to verify the development trends of digital employment in Ukraine, to available verification, define the country's ranking and role in the global distribution of the digital workforce.

RESEARCH METHODS

The research used general and specific methods of scientific knowledge: dialectic, analysis, and synthesis, abstraction and generalization in the study of digital employment, verification of trends in its development, determining the factors influencing its spread, as well as the justification of Ukraine's ranking and role in the global digital division of labor, statistical analysis in the study of the state and trends inherent in the digital segment of national labor markets.

RESULTS

Accordingly, basing on the proposed criteria, digital employment is applied not only in the IT sector. Its areas of application include the types of economic activity, where one can see the creation of a digital product / service and the management of digital business processes. Thus, the markets that are actively growing and shaping the demand for digital workers include the following: online medical information services, digital insurance and banking services, online education, e-licensing services, digital marketing, e-commerce and more.

Human capital in ICT is a driving force for digital innovation, and a crucial factor in increasing the competitiveness of modern economies. There are no records in digital employment, but it is reasonable to assume that its greatest concentration is observed in the field of information and communication. According to Eurostat, in 2019, 3.9% of the total workforce was employed as ICT specialists in the EU Member States. The number of ICT specialists in the EU grew by 40.0 % from 2011 to 2019. The highest shares of employment are in Sweden – 7.0% and Finland – 6.8%. The indicators close to the average are in Germany 4.0%, the indicators below the average are in Poland, Bulgaria, Latvia – 3.1% and Greece – 2.1% [15].

Ukraine is also characterised by a concentration of digital employment in the field of information and communication, in particular in the following economic activities: software publishing (KVED (The National Classifier of Ukraine «Classification

of Types of Economic Activities» (KVED or NCEA), Ukrainian equivalent of NACE, Statistical classification of economic activities in the European Community) 58.2), telecommunications (KVED 61.0), computer programming, consultancy and related activities (KVED 62.0), information service activities (KVED 63.0). The total number of employees in 2019 in selected types of economic activity was 260,603 people, or 2.84% of the total employment, out of which 196,499 are private entrepreneurs (so-called natural person-entrepreneurs or FOPs), or 75.4% of the total number of FOPs [16].

Table 1 presents the change in the number of employees in these economic activities.

Table 1. Dynamics of Change in the Number of Employees in Selected Economic Activities in the Field of Information and Communication in Ukraine

Code and Title of Activity (KVED-2010)	Number of Persons Employed in Business Entities, persons		Including the Share of FOPs		Number of People Employed in the Sector as a Percentage of the Total Employment in the Country, %	
	2010	2019	2010	2019	2010	2019
58.2 Software publishing	9,769	6,283	51.9	61.3	0.089	0.069
61.0 Telecommunications	124,970	53,984	2.7	8.4	1.136	0.590
62.0 Computer programming, consultancy and related activities	44,792	195,354	47.1	78.5	0.407	2.136
63.0 Information service activities	29,043	58,966	37.5	58.8	0.264	0.645
Total / average for the selected economic activity	73,835	314,587	19.39	62.46	0.671	3.440
All businesses in the field of information and communication	284,485	370,166	17.9	55.0	2.586	4.048
Total / average the country	11,000,590	9,145,513	25.6	28.5	-	-

Source: compiled and calculated by authors on the basis of the data provided by the State Statistics Service of Ukraine [15].

These data give an opportunity to make the following conclusions.

First, the number of people employed in the field of information and communication is growing, in particular, over the past ten years, there was a 13-percentage point increase, with a simultaneous 17 percentage point reduction in the total employment in the national economy. Overall, this segment of the labor market is minor in absolute terms. Employment in the field of information and communication has been relatively stable to the cyclical nature of economic events over the past decade while reducing the total number of employees in Ukraine. This indicates the potential for growth for this segment of the national economy.

Second, the development of economic activities selected for our study is uneven. There was the largest increase in the number of employees for VED (Type of Economic Activity) 62.0 Computer Programming, Consultancy and Related Activities, and conversely, the number reduced by half for VED 58.2 Software Publishing and 61.0 Telecommunications.

The reduction of employment in the field of software publishing deserves a particular attention, as it is due to the focus of domestic IT companies on outsourcing services. According to the DOU survey, in 2020, among 11,559 IT professionals the majority of respondents worked in outsourcing (44.7%) and out staffing (11.7%) companies, while the corresponding share for grocery companies was 35.3%, and for start-ups – only 4.4%. [17].

Third, activities in the field of information and communication are twice higher than the share of self-employed persons (namely, FOPs). Among the selected activities, this indicator has the highest values in programming (78.1%) and the lowest values in telecommunications. Some self-employed people work under civil law contracts and perform a range of tasks for domestic IT companies while working on a full-time basis, whereas others are independent contractors (freelancers), who independently seek suitable jobs (orders) on platforms for freelancers.

We should note that in the framework of outsourcing, the vast majority of Ukrainian IT companies and independent IT freelancers fulfil orders for foreign customers, due to the structure of the waves of innovation in the national economy and the country's position in the global market. According to expert estimates, in the structure of Ukraine's economy, fifth

wave of innovation accounts for 4%, sixth wave accounts for about 0.1%. Conversely, in developed countries the share of the fifth wave of innovation ranges from 30% to 65%, while the sixth wave accounts for 5–7%. In case of Ukraine, in 2016, third and fourth waves of innovation have the largest shares (57.9% and 38% correspondingly) [18].

Given the increase in exports of raw materials of the third and fourth waves, Ukraine is following the trend of so-called «immiserating growth». Bhagwati (2014) [19] argues that one can see immiserating growth in a real income decrease, despite the increase in the total output of the economy. The growth of the share of enterprises implementing and using the technologies of the fifth and sixth waves of innovation in the structure of the national economy will increase the demand for digital employment within the country and ensure its innovative growth.

The technological gap between developed countries and the national economy is confirmed by the results of the analysis performed by Vishnevsky et al. (2020) in the monograph «Digitalization of Ukrainian economy: transformational potential», according to which the national economy belongs to «Cluster C (technologies clustered around the Second Industrial Revolution or Industry 2.0)» [5].

United Nations Industrial Development Organization (UNIDO) in the Industrial Development Report 2020 presented similar results. According to the report, among countries and economies by the level of engagement with ADP technologies applied to manufacturing Ukraine belongs to the group of latecomers as producers. In general, the report on the level of implementation and use of advanced digital production (ADP) divides designations into four groups: the frontrunners, the followers, the latecomers, and the laggards. The second and third groups of countries are divided into two subgroups: they are either producing or using ADP technologies to an extent captured by country statistics. The frontrunners include 10 economies: Germany, Japan, China, the Republic of Korea, the United States, the United Kingdom, Taiwan Province of China, the Netherlands, Switzerland, and France [9].

Other economies which are also engaging in the new technologies, though with much more modest intensity, so-called followers in this technology race, include Denmark, Norway, Austria, Finland, Poland, the Czech Republic, and others. Ukraine belongs to the group of countries that are latecomers and show very little activity in the global creation and use of these technologies. At the same time, according to Competitive Industrial Performance Ukraine ranks 67th among the 167 economies in the GIP Index ranking [9].

We define Ukraine's position in the global landscape of digital labor distribution by comparing it with that of the neighboring country, Poland, which emerged from the Socialist Camp, has similar preconditions for the formation and development of the economy, and, in the long run, it has a higher level of economic development. We would like to emphasize that Poland has the largest number of Ukrainian migrant workers and the largest number of Ukrainian students. This is precisely why we chose Poland for comparison (*Table 2*).

Table 2. Employment Indicators in the Field of Information and Communication and the Availability of Favourable Environment for Its Development						
Indices	Ukraine			Poland		
	2017	2018	2019	2017	2018	2019
Employed persons in the national economy, thousand persons	16,156.4	16,360.9	16,578.3	15,710.8	15,949.7	16,120.6
Employed persons in the Information and Communication, (I&C), thousand persons	303.19	331.66	370.17	366.5	381.6	395.7
Average monthly gross wage and salary in the national economy in I&C, euro	400.5	444.1	605.9	1,792.5	1,877.9	1,975.2
GTCI Ranking:	69	61	63	38	39	42
Enable	103	99	96	36	36	42
Attract	94	99	105	59	61	64
Grow	64	66	68	34	43	43
Retain	54	58	66	42	43	46
VT skills	66	44	45	22	29	35
GT skills	53	42	37	43	44	45

Source: compiled and calculated by authors on the basis of the data provided by the State Statistics Service of Ukraine and Statistics Poland [16; 20–24].

These data show a slight employment increase in the field of information and communication in Poland compared to Ukraine. At the same time, in the context of the digitalization of the economy, the borders between the countries are blurred, in particular with regard to global digital production. That is why significantly higher wages in Poland impose a substantial challenge on Ukraine's economy. This challenge is exacerbated by the low availability of a favorable environment for the development and retention of talent in Ukraine. In 2020, according to GTCI Ranking, Poland ranked 44th, while Ukraine ranked 66th with the lowest values according to two pillars of the Talent Competitiveness Input sub-index (Enable – Pillar 1 and Attract – Pillar 2). At the same time, in 2019 Ukraine is ahead of Poland, and in 2020 it has the same values according to Global Knowledge Skills pillar, which provides for the assessment of such sub-pillars as Higher-Level Skills and Talent Impact. In 2020, for Poland the value of Global Knowledge Skills pillar is 34.84%, including High-Level Skills (43.9%) and Talent Impact (25.77%), while Ukraine has Global Knowledge Skills at 34.83%, including Higher-Level Skills (50.36%) and Talent Impact (19.3%) [24]. These data indicate the presence of highly educated human potential in Ukraine, however, at the same time, they clearly demonstrate an unfavorable environment for growth and maintenance.

Ukraine is integrating into the global digital space, which is characterised by trends that determine the development and spread of digital employment. Let's outline the main factors that change the public space, the labour sphere and contribute to the spread of digital employment.

We should note that the first factor is the introduction of such a digital comfort as simplified access to the Internet into everyday life. The constant expansion of public access to the Internet is also an important trend. For instance, in the third quarter of 2020, 63.2% of the world's population had the opportunity to enjoy this digital comfort, and the growth of the Internet penetration rate over 20 years is 1.266 percentage points [25]. As for Ukraine, the characteristic indicators exceed the European average. As of June 30, 2019, the population that has access to the Internet in the country was 93.4%, while the European average was 87.7% [25].

We would like to emphasize that digital employment involves the employee doing the job with the ICT use and virtual collaboration, provided by Internet access. Access to the Internet and digital technologies allows digital employees to search for orders, or receive them, contact customers, and colleagues, transfer the completed order, and receive payment for provided services.

The second factor, which is no less important, is the emergence of another fundamentally new social value, the possibility of free immediate access to the service. This phenomenon is called the on-demand economy and became possible due to the development of real-time technologies, platforms, and mobile applications. On-demand economy reduces the time a consumer takes from ordering a product or service to meeting his/her needs for both physical and digital products.

The development of the on-demand economy segment transforms jobs, determines the demand for independent contractors, and reduces the need of the enterprises for full-time employees. In many cases, services involve a digital format, including consulting, translation, design, copywriting, business plan development, etc.

The third factor, which is closely related to the previous ones, is the development of technologies used in smartphones. Technological solutions for smartphones are developing rapidly due to significant investments. In particular, the new ones include biometric sensors, virtual and augmented reality, NFC technology, 3D visualization technologies along with increasing the output capacities of smartphones and chargers, and access to 5G.

Following the explanation of Azmuk (2020) [26] we define a digital workplace as a space with the ability to connect to the Internet, corporate and professional network resources, equipped with appropriate digital devices that correspond with the content and nature of digital work and are sufficient to ensure the effective operation of digital employees.

The fourth factor that is mandatory and determines the formation and development of digital employment is the digital skills of the workforce. Possessing digital skills is a component of a person's competitiveness in the labor market. They are especially relevant for freelancers, as a significant number of jobs have become digital and can be performed at home or in public spaces in some cases only with a smartphone. This implies the constant updating of digital skills.

According to the Global Competitiveness Report 2019, according to the digital skills among the active population, in 2019, Ukraine ranked 56th out of 141 countries with a score of 57.5. According to this sub-index in 2019 the highest scores belonged to Finland (80.5), Iceland (77.9), Sweden (77.8), the Netherlands (77.1), Singapore (76.4), Israel (75.0), Switzerland (74.4), Estonia (73.8), and the lowest scores belonged to Angola (24.1), Haiti (28.6), and Mozambique (29.1) [27]. We would like to emphasize that according to this sub-index, Ukraine is ahead of Poland, which occupies only 63rd position. This suggests that the active population of Ukraine has the appropriate digital skills and is therefore competitive in the global digital market.

We would like to highlight two aspects of this phenomenon for the domestic economy in the context of digitalization.

The first aspect is that the technological gap between the national economy and developed countries in the context of globalization and digitalization determines the position and role of Ukraine in the global digital market as a resource colony of a new digital type. In this case, intellectual human capital in digital form is a new resource.

Thanks to the development of digital technologies, the movement of human capital in digital format is becoming possible. This phenomenon is defined as digital labour migration. Digital labor migration occurs through the digital rather than the physical movement and has a number of features, namely: a carrier of human capital moves outside the place of his/her residence in order to perform a job; a carrier of human capital performs a job in a digital way; the employee's workplace is integrated into the virtual space; social and labor relations happen in cyberspace with the help of appropriate software; remuneration of the employee / contractor of labor services and payment of taxes are carried out digitally [26].

According to the 2019 Kearney Global Services Location Index (GSLI) in 2019 Ukraine entered the top 20 with the greatest potential for IT outsourcing among 50 countries. This measure has been based on metrics within four (4) major categories: financial attractiveness, people skills and availability, business environment, and digital resonance. We would like to note that since 2017, Ukraine has moved up four positions in the ranking. At the same time, the fact that deserves attention is that the leading countries in this ranking, particularly, India, China, Malaysia, Indonesia, and Vietnam have consistently been in top-5 for five years in a row [28]. This is due to the financial attractiveness of digital services in these countries, developed infrastructure, and the availability of human capital in the labor market.

Considering the developed countries, those that were in the top-20 included: the United States – 6th position, and the country has moved up 16 spots to the top 10 countries in the ranking since 2017, the United Kingdom – 8th position, which also has moved up 16 spots and Germany – 15th position, which moved up 2 spots [28]. It is necessary to emphasize that the developed countries that had the highest rankings were also leading according to this new digital resonance category, which incorporates metrics in the following areas: digital skills of the labor force; legal adaptability, meaning the extent to which the legal framework takes digital business models into account, including cybersecurity protections; the amount of corporate activity, defined as the amount of capital invested in start-ups and the number of deals by VCs in 2018; and digital outputs, including creative outputs, as well as knowledge and technology outputs. According to this category, Ukraine ranks only 33rd, along with Romania [28].

This position in the global space determines the second aspect that we want to pay attention to – the potential losses of Ukraine. Due to limited access to investment, only a few companies use advanced digital technologies, and the vast majority deal with outdated technologies. This leads to a lack of demand in the country for innovative employees with digital skills.

Another potential loss lies in the country's share in the global value chain. Ukraine actually finds itself outside its boundaries or receives a minimum percentage of value-added in the global chain, whereas the leaders in terms of technological development receive the lion's share in value-added.

Regarding Ukraine's position in the creation of digital products, the country has highly qualified IT professionals. In fact, IT companies are manufactories, which create the lowest share of value-added in the global dimension. Furthermore, their contribution is minimized by the fact that most domestic IT companies fulfill orders using outsourcing, which in this case should be equated to offshoring. It is worth mentioning that Ukrainian IT companies assign the vast majority of tasks to independent contractors (FOPs), and not to their employees. Ukraine's economy accounts for the least profitable part, the production of digital products with a minimum percentage of value-added.

In order to determine digital employment effectiveness and identify the level of influence of the factors on it we suggest a hypothesis consisting of the following three statements:

1. We assume that the largest number of employees within digital employment is concentrated in the field of net digital output production, such as the field of «Information and Communication».
2. For digital employment, an effectiveness indicator is the share of value-added in the aforementioned field.
3. In order to determine Ukraine's position in the global digital landscape, we use comparisons with countries that belong to different groups in terms of advanced digital production (ADP) technologies according to the UN Report we have previously mentioned.

We selected European member states for our comparison, in particular Germany, France, and the Netherlands as the frontrunners, Austria, Denmark, Norway, Poland, the Czech Republic, Italy, Finland, and Slovakia as the followers, Ukraine, Latvia, Estonia, and Greece as the latecomers [9].

Factors influencing the formation of high-performance digital employment include investment in research and development, skills in working with digital technologies, and staff costs.

The main factor of labor efficiency is the cost of research and development, as the creation of new techniques and technologies happens in this area. The effectiveness of this area determines the strength of the competitive position of national economies in the global space; it testifies to the level of manufacturability of national production and determines the demand for innovative digital human capital in the country of reference. Aiming to assess this factor, we used Eurostat data on gross domestic expenditure on R&D per capita (euro per inhabitant). With regard to Ukraine, we used the indicator of the cost of research and development, and its value in 2019 was 17,254.6 million UAH, or 560.4 thousand euros [29].

The level of qualification, which is determined by digital skills, remains an important factor in the efficiency of digital workers. It is advisable to use the indicators of the digital skills among the active population from the Global Competitiveness Index to determine the level of digital skills in the workforce.

The amount of wages is surely an indicator that measures working conditions and determines a favorable climate for the preservation and use of human capital in the country. On a global scale, wages gain an additional economic burden, particularly in developing countries. Since the digital work done by employees from these countries is more expensive for the customers from developed countries. The staff members or individual contributors from Ukraine can be a good example, as in 2020, a pay rate ranged from 77.64 UAH (2.52 euro) per hour in the 1st quarter to 88.71 UAH (2.88 euro based on the official average annual hryvnia to the euro exchange rate of the NBU) [30; 31]. For comparison, in 2019, the average pay rate in the EU-27 was 27.7 euros per hour [32].

Information and communication belong to the activities with the highest labor costs in Ukraine, as in 2020 the pay rate was 134.84 UAH (4.38 euro or 5.16 USD) per hour, and in the case of domestic developers working from Ukraine on an outsourced basis it ranged from 10 USD to 20 USD [30; 31; 33].

Table 3 summarises the data on the factors, which have a potential impact on employment productivity in the field of information and communication.

Table 3. The Efficiency of Digital Employment in Countries with Different Levels of Digital Production and Factors That Can Increase its Productivity, 2019

Country	Value Added in the ICT Sector (as a Percentage of Total National Value Added), %	Per Capita Domestic Research and Development (R&D) Spending, EUR	Digital Skills, scores	Average Pay Rate Per Hour, EUR
France	5.358	665.7	58.2	36.6
Germany	5.146	818	67.8	35.6
Denmark	4.705	1,282	73.6	44.7
Austria	3.810	897.4	63.0	34.7
Finland	6.012	1,274.1	80.5	34.0
Norway	4.533	999.9	71.6	50.2
Italy	3.730	325.6	52.9	28.8
Poland	4.311	55	54.5	10.7
Czech Republic	5.879	184.6	63.0	13.5
Estonia	7.596	147.8	73.8	13.4
Latvia	5.595	39.2	63.1	9.9
Greece	3.315	133.9	51.8	16.4
Ukraine	3.768	0.013	57.5	2.56

Source: compiled by the author on the basis of the data provided by [27–36].

These data indicate a small share of information and communication in creating value added within national economies. Ukraine has an outsider position in terms of per capita research and development (R&D) spending and wages. Ukraine's scanty spending on R&D shows a significant lag behind the countries of its group and forms the preconditions for increasing the gap in high-tech production. This determines the country's role of the resource colony in the global landscape.

Digital employment is an inevitable trend that determines the development of global and national economies. In terms of digital skills, Ukraine is ahead of Poland, Italy, and Greece, with a significant lag in pay rate. Wages are a determining factor influencing the formation of digital migration. Given the extremely low cost of labor, the country is forced to become a donor of human capital in digital form.

CONCLUSIONS

Ukraine has a strong potential for the development of the digital economy, the main value of which is human capital with an adequate level of professionalism and digital skills. The number of employees employed in the field of information and communication (ICT) in Ukraine is constantly growing. A distinctive feature of this sector is the predominance of individual entrepreneurs (FOPs) in the structure of employment. This demonstrates the considerable flexibility of this segment, due to the specifics of professional activities in this sector.

There is a technological gap between developed countries and the national economy and this fact determines the export-oriented nature of the IT industry in Ukraine. Services in this area are mainly implemented through outsourcing, which minimizes the contribution of domestic developers to the global value chain. In order to minimize digital export dependence, there is a need to elaborate and implement a development strategy, which provides for an increase in the share of fifth and sixth innovation waves in the structure of the economy.

A comparison of the digital employment indicators of Poland and Ukraine shows the weakness of the latter's position, in particular with regard to the level of wages and conditions for promoting talent development. At the same time, Ukraine has human capital, which enjoys required digital skills and high qualifications.

Ukraine has a vulnerable position in the global distribution of digital labor; it has human digital potential but does not have the opportunity to use it domestically due to technological backwardness. The vulnerability of the position is exacerbated by the accelerating trends of the economic digitalization, the blurring of borders between countries in terms of digital production, and hence the digital division of labor, as well as unfavorable conditions for the development and preservation of national human digital potential.

It will be extremely difficult (almost impossible) for Ukraine to use the available human digital potential without the integration and cooperation with other countries. Given the geopolitical circumstances, Ukraine has only one option, which is the integration into the European Union. The experience of Poland and the Baltic States confirms the effectiveness of the European path: after joining the EU, the average wage has risen significantly and unemployment has fallen. Particularly, for digital employment, the fact of accession is not the most important element. This sector is rather interested in the preliminary process of adopting regulations and standards of corporate activity to the requirements of the digital economy and their harmonization with EU member states, which will increase the competitiveness of Ukrainian digital products in the European market.

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ЦИФРОВА ЗАЙНЯТИСТЬ: МІСЦЕ УКРАЇНИ У ГЛОБАЛЬНОМУ РОЗПОДІЛІ ЦИФРОВОЇ ПРАЦІ

Досліджується формування і розвиток нової форми зайнятості – цифрової – та визначається її вплив на місце країни у глобальному економічному просторі. Загальна мета дослідження – перевірити тенденції цифрової зайнятості в Україні та оцінити її місце і роль у глобальному розподілі цифрової робочої сили. У літературі бракує досліджень про розрив між рівнем технологічного розвитку країни та використанням цифрової праці в національній економіці. Це особливо важливо для країн, які відстають технологічно, до яких належить і Україна.

Логіка і методологія дослідження включає такі етапи: 1) визначено види бізнесу, де зосереджена найбільша кількість цифрових робочих місць; 2) проаналізовано статистичні показники цифрової зайнятості в Україні за 10 років і виявлено тенденції її розвитку; 3) порівнюються дані про зайнятість, заробітну плату та сприятливість умов розвитку вітчизняних талантів для України і Польщі – референтної та сусідньої країни з вищим рівнем економічного розвитку; 4) виявлено фактори поширення цифрової зайнятості та визначено місце і роль України в цифровому світі.

Використано методи: аналізу і синтезу, абстрагування та узагальнення при верифікації цифрових тенденцій зайнятості; статистичні та аналітичні методи при вивченні стану і тенденцій цифрового сегмента національних ринків. База даних дослідження: офіційна статистика України і Польщі, аналітичні матеріали ЮНІДО, Світового економічного форуму, ОЕСР, Євростату.

Об'єктом дослідження є цифровий сегмент ринків праці України і Польщі, оскільки ці країни мають схожі передумови для економічного розвитку, географічно близькі. Водночас Польща має вищий рівень економічного розвитку і є привабливою країною для українських трудових мігрантів.

Представлено результати емпіричного аналізу, який показав, що технологічне відставання є головною передумовою

низького попиту на цифрову зайнятість в Україні. Це показує, що Україна, по суті, є ресурсною колонією в цифровому глобальному середовищі, яка постачає висококваліфікованих цифрових працівників. Експерти і практики можуть використовувати результати дослідження для розроблення стратегії розвитку економіки України в контексті цифровізації.

Ключові слова: хвилі інновацій, цифровізація, цифрова зайнятість, цифрові працівники, інформаційно-комунікаційні технології

JEL Класифікація: J21, J24, J31, F22, F66