Socio-Economic Dimension of Human Potential of World Countries in the Digital Space of the Labor Market

Olena O. Vasyl'yeva[1], Andrii V. Sokolov[2], Marharyta O. Lisnichenko[3], Olena Ye. Halan[4], Tamila V. Butenko[5]

[1,2,3,4]Department of Economics and Customs Affairs Zaporizhzhia Polytechnic National University

[5] Department of Economics and Business, Dmytro Motornyi Tavria State Agrotechnological University

https://doi.org/10.48161/qaj.v3n4a162

Abstract

The article examines the special socio-economic conditions of human potential, which forms and expands the flow of labor in the international digital labor market. The concept of the socio-economic dimension of human potential based on the unity of its components is presented. The hypothesis of effective use of human potential at all levels of its formation is justified by relevant HRM technologies that align the labor market situation with the rate of modernization of business, state policy, and social institutions, as well as the new nature of the digital economy's growth. It is also demonstrated that, in the context of the informational transformation of the labor market, the concentration, implementation, and effective socio-economic dimension of human potential form a consistent state policy, which is strengthened by the possibilities of territorial decentralization and is aimed at overcoming disparities in the use of human resources, reducing the gap between potential and existing social-economic level of development of the countries of the world. The authors also provide the sectoral structure of employment in Ukraine and the average annual rate of growth of the indicator level in the leading countries with a digital direction of labor market development, as well as comparative socio-economic measurement and forecasting of Germany's effective use of human potential, subject to the expansion of labor inflows and the improvement of the working capacity of active human resources.

Keywords: human potential; human resources; labor market; socio-economic relations; digitalization; HRM-technologies.

1. Introduction

The global transformation of socio-economic relations is increasingly becoming interdependent with the activation of the processes of transformation of the labor market into a central element of the world economic system, which optimizes the labor supply of the world economy, in the period of innovative digital technologies, taking into account the new model of the socio-economic type with new sources of balanced growth of human potential.

The socio-economic component of human potential in the conditions of digital transformation of the labor market should be considered as an effective factor in ensuring the economic stability of business entities in the countries of the world, provided that a modern model of spatial development is used, which takes into account the possibilities of generating social capital of business systems, social consciousness, and achieving social cohesion and trust, and therefore the formation of an environment for the effective use of internal resources of professional, intellectual and creative growth of economically active human resources, establishment of long-term productive social relationships between countries, improvement of social infrastructure, etc. The new digital segment of the labor market in the countries of the world creates a new form of labor migration - digital. That is, the global digital segment of the labor market is forming, which is accompanied by economic and social contradictions, institutionally increases the pressure on the internal state policy of any country in the

direction of balanced social security of the labor market with a digital economy, which, unfortunately, is not coordinated between the strategies for updating the macro-regulation policy and such inert social institutions such as the system of education, health care, state and local administration. This determines the progressive lag in some countries in the pace of development of digital technologies in the labor market and the intensity of modernization of economic models.

Theoretical and applied provisions of labor market concepts and employment theories are contained in fundamental research of A. Anisimov (2011), M. Anwar and M. Graham (2019), J. Atkinson (1985), G. Becker (2019), S. Beugelsdijk and T. Schaik (2004), O. Bilska (2016), O. Bilenko (2012), V. Brych and O. Kolodnytska (2015), H. Braverman (1998), J. Burrell and M. Fourcade (2021), T. Choi, J. Budny and N. Wank (2004), B. Craig, P. Pardey and J. Roseboom (1997), O. Hrishnova and N. Polyviana (2007), O. Hulevych (2015), M. Igbaria and J. Baroudi (1995), N. Trusova, R. Oleksenko, D. Yeremenko, S. Pasieka, O. Vasyl'yeva, I. Kolokolchykova, A. Konovalenko, I. Herasymenko, M. Semykina, O. Gumeniuk and A. Karpenko in their papers (Trusova et al., 2021; Vasyl'yeva & Karpenko, 2021; Trusova et al., 2022a; Trusova et al., 2022b). Technological changes in the labor market during the transformation of the employment institute, social-labor relations, and labor organization are studied S. Alter (2008), S. Amrute (2016) and S. Amrute (2019), J. Burston, N. Dyer-Witheford and A. Hearn (2010), J. Burston, N. Dyer-Witheford and A. Hearn (2010), A. Casilli (2017), M. Castells and P. Hall (1994), R. Dorschel (2022), B. Duffy and B. Schwartz (2017), M. Graham, I. Hjorth and V. Lehdonvirta (2017), U. Huws (2014). However, the absence of research on information transformation and digitization of the labor market in the modern theory of labor employment during the transition to the digital economy of the countries of the world determined the main idea and hypothesis of the study – this is the effective use of human potential at all levels of its formation (from macro-regulation to local development) based on relevant HRM-technologies that align and balance the labor market situation with the pace of modernization of business, state policy, social institutions and with the new nature of the growth of the digital economy.

2. Methods and materials

The concentration, implementation and effective socio-economic dimension of human potential, in the conditions of the informational transformation of the labor market, forms a consistent state policy, which is strengthened by the possibilities of territorial decentralization and is aimed at overcoming disparities in the use of human resources, reducing the gap between the potential and existing socio-economic level of development of the countries of the world (Anisimov, 2011).

Creating a digital environment of the labor market requires overcoming the main socio-economic challenges at the macroeconomic level, which include: the demographic situation (a significant discrepancy between high rates of natural population growth in developing countries and low rates of birth, death and natural population growth in developed countries (Burston et al, 2010); the quality of psycho physiological potential and insufficient possibilities of its recovery) (Craig et al., 1997; Castells, 2009); social rejection (inability of certain population groups to participate in the creation of added value and social life due to unemployment, lack of income, inadequate living conditions, insufficient education or professional skills, inability to form networks of social interaction) (Craiget al., 1997); problems of the labor market and international migration (increasing unemployment, unstable employment, declining quality of social services and increasing spatial movements of the workforce, problems of the aging workforce) (Trusova et al., 2022b); ensuring gender and personal equality (achieving gender parity in education, employment, government institutions, the problem of inclusiveness) (Churchill & Craig, 2019).

The concept of the socio-economic dimension of human potential is not alienated from the carriers of economic growth in the production function, which accumulates and digitizes information resources in time. It improves economic indicators, and its future utility can be converted and requires investment and digital technological maintenance (Graham et al., 2017). In view of this, social relations, common values, norms, relationships and other properties of economically active human resources on the international labor market, in the modern digital economy, are directed towards a new

format of employment, with the transformation of human potential into a method of interaction through artificial intelligence and cloud technologies. This requires time to form and ensure long-term values (formation of digitalized social capital) and maximization of future usefulness (formation of human potential) (Figure 1).
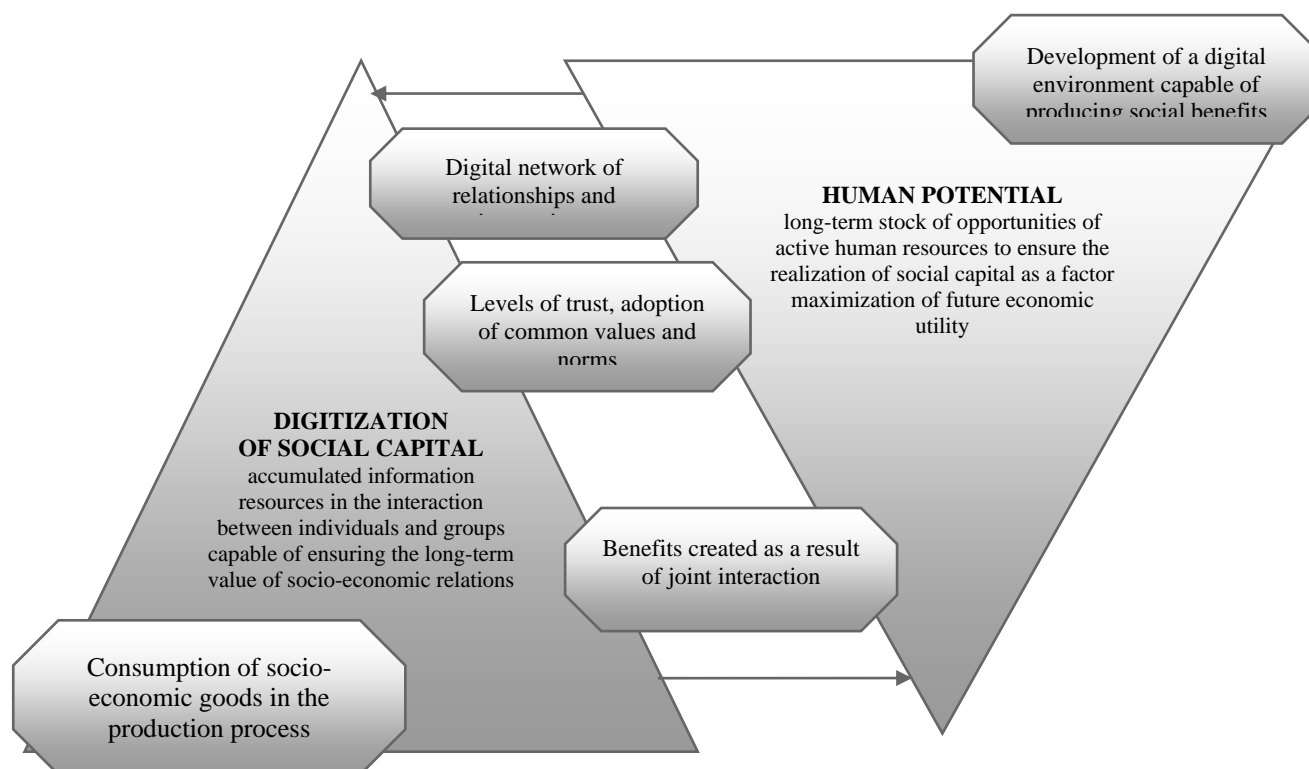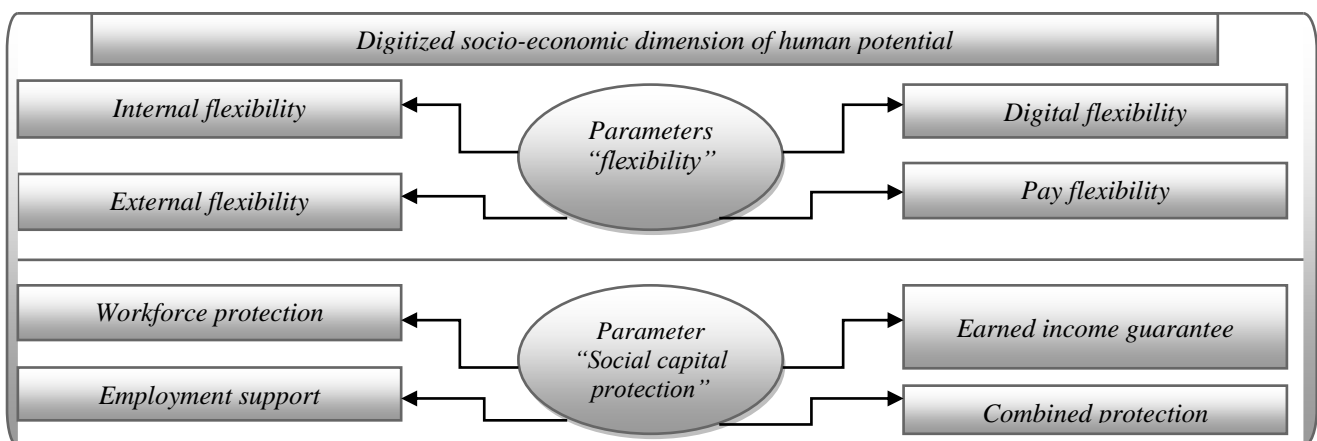

Figure 1. Concept of socio-economic dimension of human potential
Source: built by authors according to data (Hazarian, 2012; Hrishnova & Polyviana, 2007; Hulevych, 2015; Huws, 2014).

The economic component of the digitalization of social capital embodies the achievement of economic growth and comprehensive development of the economy, and at the same time obtaining the maximum growth of aggregate income with the optimal use of limited resources and payment systems. The social component is maximally focused on preserving the stability of the digital social system, developing active human resources, and ensuring social cohesion, freedom, justice, equal opportunities, and peace (Hanushek, 2013; Trusova et al., 2021). The digitized resource component of social capital (created by active human resources capable of bringing added value) allows considering human potential as an increase in the ability to realize a wide range of positive effects (increased income, improved quality of life, social cohesion and trust). Accordingly, the importance of human potential for economic development lies in its ability to create new value where a significant increase in economic growth and intensive use of resources is limited by the requirements of achieving sustainability (Hanushek, 2013; Trusova et al., 2022a). That is, the full use of human potential makes it possible to provide the need not only for current, but also for future economically active human resources due to the creation of an environment for the free realization of social capital, where networks of joint interaction are formed based on relationships of trust, dignity and respect (Vasyl'yeva & Karpenko, 2021). The synergistic effect of such digital networks facilitates the transfer of information resources and at the same time requires a change in approaches to the process of production and consumption, the creation of the most favorable conditions for the implementation of vital activities of the digital social system, ensuring the reproduction of active human resources as a productive force and a factor of economic growth of the economy (Alter, 2008).

The methodology of digitalization of the labor market on the basis of human potential involves determining the parameters of the flexicurity model, which depends on economic and social challenges and is based on a combination of various indicators (Chornodid, 2013). On the one hand, they shape the trend of changes in the digital field of the labor market, and on the other hand, they assess the level of efficiency in the use of the country's human potential, which ensures the interaction of economically active human resources in the international space (Gregg & Andrijasevic, 2019). From the standpoint of the optimization approach, the digital network of tools expands their capabilities through the orientation of the labor market to in-depth modeling of the socio-economic dimension of human potential according to the parameters of flexibility and social protection. The adaptability of the results of digitalization of the labor market according to the "flexibility" parameter depends on: external, internal and digital flexibility, as well as wage flexibility (Bukht & Heeks, 2017), which determines the transformation of the labor organization process, puts forward new requirements for the digital literacy of economically active human resources and their competitiveness. The socio-economic component of human potential is "social protection", within the framework of the (Brych & Borysiak, 2016; Bukht & Heeks, 2017) methodology, it provides: protection of jobs, support of employment, guarantee of payment of earned income, combined protection. At the same time, the "combined protection" component guarantees the minimization of the gap between the categories of economically active human resources, expands their access to the digitalized labor market, regardless of income level and social status. The socio-economic dimension of human potential in the conditions of information transformation and digitization of the labor market according to the parameters of flexibility and social protection is shown in Figure 2.
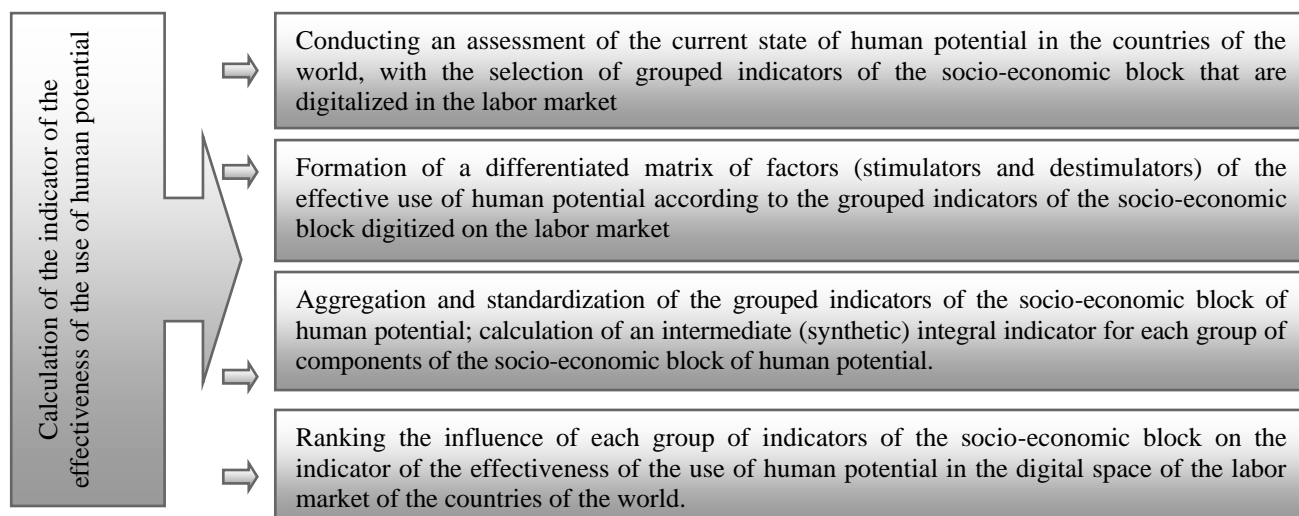

Figure 2. Socio-economic dimension of human potential in the conditions of information transformation and digitization of the labor market according to the parameters "flexibility" and "social capital protection"

Source: built by authors

The parameters "flexibility" and "social capital protection" in the digital space of the labor market in the presence of methodological tools for assessing human potential and in the conditions of the development of the digital economy of the countries of the world provide a social component that measures an integral index based on: first, the implementation of the current state assessment development of human potential, identification and grouping of social block factors (demographic, economic activity, educational and professional, creative, social infrastructure and growth of well-being, safety and comfort of work, gender equality); secondly, formation of the research matrix and differentiation of its features, aggregation and normalization, calculation of intermediate integral indicators for each group; thirdly, the ranking of the impact of each group of indicators on the integral value of the level of digitization of human potential, which in the complex provides a methodological basis for the information transformation of the socio-economic component and its regulation in the process of strengthening the trajectory of the development of the labor market on the basis of

maintaining a balance between the main areas of sustainability – economic area (growth), social area (fair distribution), (Figure. 3).

Figure 3. Stages of calculation of the indicator of effective use of human potential of the countries of the world in the digital space of the labor market

Source: built by authors according to data (Becker, 2019; Hanushek, 2013; Hrishnova & Polyviana, 2007).

In the conditions of information transformation and digitalization of the labor market, the influence of the component of the socio-economic dimension of human potential on the formation of a high level of added value of business entities in the country allows to differentiate the indicators of direct influence: quantitative and qualitative characteristics of the available human potential, possibilities of its preservation, rational use and development, social inclusiveness, interest of market subjects in economically active human resources (Beugelsdijk & Schaik, 2004; Bilska, 2016; Casilli, 2017; Castells & Hall, 1994). The indirect influence on the above-mentioned indicators is exerted by: the level of trust relations between business entities in the socio-economic environment (social capital and social infrastructure in the form of informal social ties, public activity, the degree of personal trust between individuals, evaluations of the activities of state institutions) (Beugelsdijk & Schaik, 2004; Bilska, 2016; Casilli, 2017; Castells & Hall, 1994).

For the socio-economic measurement of human potential in the digital space of the labor market, the method of stepwise multiple correlation with "inclusion" and "exclusion" is applied.

The general form of the correlation matrix is given by formula (1) (Chornodid, 2013; Craig et al., 1997):

$$r_{xy} = \frac{\sum\limits_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}, \qquad (1)$$

where, r_{xy} – is the correlation coefficient; x_i, y_i – current values of observed quantities; $\bar{x}$, $\bar{y}$ – are the average values of these quantities.

To solve the task of aggregation of indicators, the index method is used, on the basis of which the intermediate (synthetic) integral indicator (S_i) is calculated for each group of components of the socio-economic dimension of human potential in the digital space of the labor market (formula (2)) (Chornodid, 2013; Craig et al., 1997):

$$S_i = \sum_{j=1}^{m} n_{ij} \times \alpha_{ij} \, , \qquad\qquad (2)$$

where, m – is the number of indicators by group of components of the socio-economic dimension of the country's human potential; n_{ij} – is the normalized value of the *j-th* indicator of the *i-th* group of components of the socio-economic dimension of the country's human potential; α_{ij} – is the weight coefficient of the *j-th* indicator of the *i-th* group of components of the socio-economic dimension of human potential.

The initial indicators are converted from absolute to normalized with the determination of the degree of achievement of the optimal value of digitalization of sources in relation to the activation of human resources in the labor market, which are distributed according to standardized factors of influence (formula (3) – (4)) (Chornodid, 2013; Craig et al., 1997):

$$n_{ij(stimulants)} = \frac{T_{ij} - T_{ij(\min)}}{T_{ij(\max)} - T_{ij(\min)}} \, , \qquad\qquad (3)$$

$$n_{ij(destimulator)} = \frac{T_{ij(\max)} - T_{ij}}{T_{ij(\max)} - T_{ij(\min)}} \, , \qquad\qquad (4)$$

where, T_{ij} – is the value of the *j-th* indicator of the *i-th* group of components of the socio-economic dimension of the country's human potential; $T_{ij(\max)} - T_{ij(\min)}$ – respectively, the minimum and maximum value of the *j-th* indicator of the *i-th* group of components of the socio-economic dimension of the country's human potential in the interval [0; 1].

The next step is the ranking of intermediate (synthetic) indices for each group of components of the socio-economic dimension of human potential, which enables the calculation of the integral index (I_{SDHC}) according to formula (5) (Chornodid, 2013; Craig et al., 1997):

$$I_{SDHC} = \sum_{i=1}^{q} S_i \times \lambda_i \, , \qquad\qquad (5)$$

where, q – is the number of groups by components of the socio-economic dimension of the country's human potential; λ_i – is the influence of the *i-th* group of components of the socio-economic dimension of the country's human potential on the integral index.
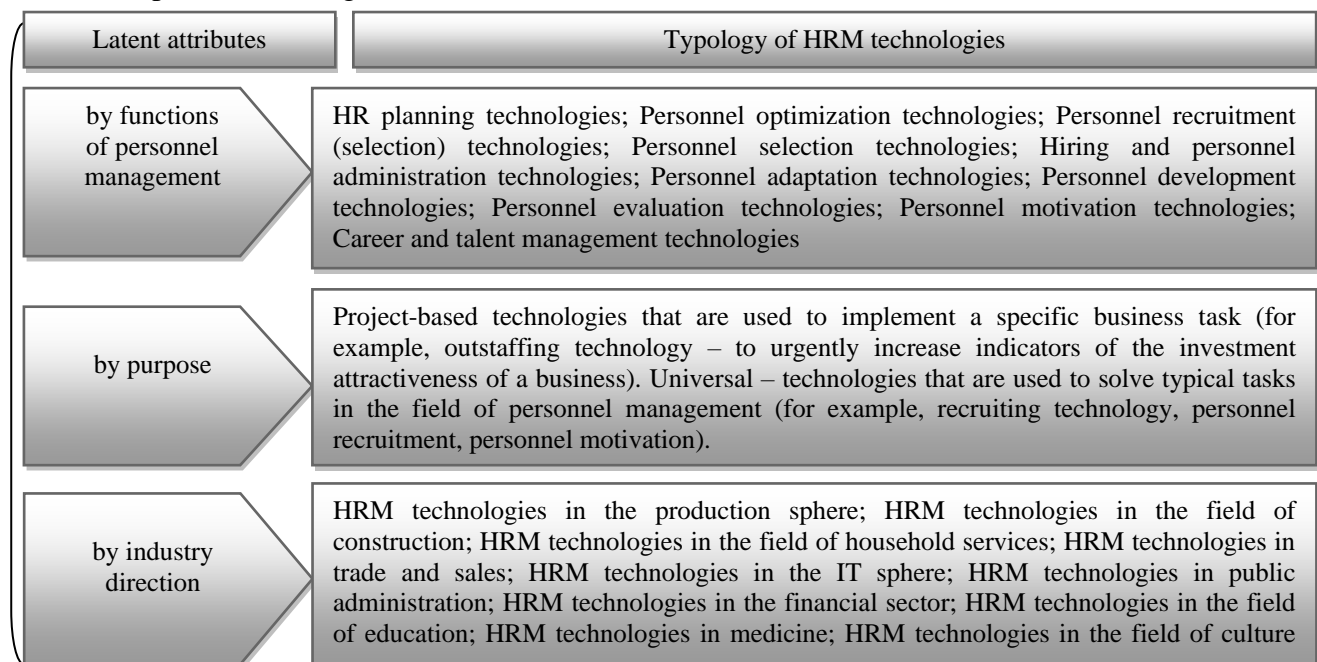
Digital transformation deepens the model of labor market development in order to fully use the possibilities of digital technologies and their impact on the activities of business entities. In the new economy, HRM technologies are capable of turning economically active human resources into the main factor of business competitiveness and adapting their competence to the international labor market in the face of rapid changes in the digital economy. At the same time, HRM technologies in the business environment require the preservation of the principles of an individual approach to the social expediency of universal human values in the labor market (Amrute, 2016; Avgerou et al.,1995; Bukht & Heeks, 2017).

The ambivalent change in the digitized field of the labor market due to the nature of the introduction of HRM technologies allows to increase their adaptability to changes in the general strategy of business entities, with a certain tendency to rethink their meaning (Amrute, 2016; Avgerou et al.,1995; Bukht & Heeks, 2017), as moderators of strategic changes in state policy and public

institutions regarding the formation of a new professional role – HR business partners. The development of communication of carriers of professional knowledge with the repurposing of expert groups into epistemological associations (Amrute, 2016; Avgerou et al.,1995; Bukht & Heeks, 2017), that accumulate information sources in human potential, ensure the personalization of HRM technologies for the individual needs of personnel administration of economically active human resources in personal virtual offices, for the formation of personnel certificates and personnel orders.

Accordingly, the implementation of mass operations and procedures of HRM technologies (searching and sorting of resumes by contextual filters, assessment of competences, conducting personnel surveys, providing access to corporate knowledge in menu mode, control of labor discipline, performance and efficiency management, data analysis, calculation of bonuses and compensations in automated software complexes or online) (Burston et al., 2010; Castells, 2009), allows digitization of personnel management infrastructure in the process of its selection, promotion of HRM technologies for the development of the HR brand of professional communication through social networks "LinkedIn", "Facebook", "Twitter" (Dorschel, 2022; Graham et al., 2017).

This makes it possible to implement cloud technologies, quickly transfer a large amount of information for the spread of labor relations and remote work. Latent attributes and typology of HRM technology in the "flexicurity" model of human potential based on the digitalization of the labor market are presented in Figure 4.

Latent attributes	Typology of HRM technologies
by functions of personnel management	HR planning technologies; Personnel optimization technologies; Personnel recruitment (selection) technologies; Personnel selection technologies; Hiring and personnel administration technologies; Personnel adaptation technologies; Personnel development technologies; Personnel evaluation technologies; Personnel motivation technologies; Career and talent management technologies
by purpose	Project-based technologies that are used to implement a specific business task (for example, outstaffing technology – to urgently increase indicators of the investment attractiveness of a business). Universal – technologies that are used to solve typical tasks in the field of personnel management (for example, recruiting technology, personnel recruitment, personnel motivation).
by industry direction	HRM technologies in the production sphere; HRM technologies in the field of construction; HRM technologies in the field of household services; HRM technologies in trade and sales; HRM technologies in the IT sphere; HRM technologies in public administration; HRM technologies in the financial sector; HRM technologies in the field of education; HRM technologies in medicine; HRM technologies in the field of culture

Figure 4. Latent attributes of HRM technologies in the "flexicurity" model of human potential based on the digitalization of the labor market
Source: built by authors according to data (Amrute, 2016; Avgerou et al., 1995; Bukht & Heeks, 2017; Burston et al., 2010; Dorschel, 2022; Graham et al., 2017).

In such conditions, there is a reorientation of HRM technologies to flexible virtual workplaces of flexible cross-functional teams, which restore and ensure the competitive advantages of social capital in the labor market with the accumulation of human potential, which demonstrates the controversial impact of socio-economic attributes and trends of the new digital economy on modern HRM technologies. HRM-technology represents the dualism of the means of "production" – the integration of human resources (personal characteristics and competences) into technical ones, which are strengthened by the development of artificial intelligence, with the prescription of software algorithms of human behavior and external manifestations of expected emotional reactions. Therefore, we rightly believe that HRM technology provides a return on investment in economically active human

resources, automating personnel administration and expanding the geography of the search for candidates for modeling the business environment (Graham et al., 2017).

3. Results

Carriers of the socio-economic dimension of human potential in connection with the rapid development of digital technologies constantly update the skills of economically active human resources, confirm their effectiveness, and business entities in the digital space of the labor market of the countries of the world provide a favorable environment for this. The digital economy transforms the organizational structure of human potential, as a new form of its socio-economic dimension involves flexibility and openness, with the involvement of project groups in the virtual space of the production process (Hazarian, 2012).

In the conditions of the digital economy, qualifications, experience, skills in the use of IT technologies are no longer enough, as they determine the individual's ability to accumulate his social capital. Accordingly, the competitiveness of economically active human resources is determined by the ability to produce innovations and create new knowledge in the production of goods and the provision of services, which contributes to a significant increase in labor productivity. Fig. 5 shows the changes in labor productivity of the countries of the world for 2010-2022.
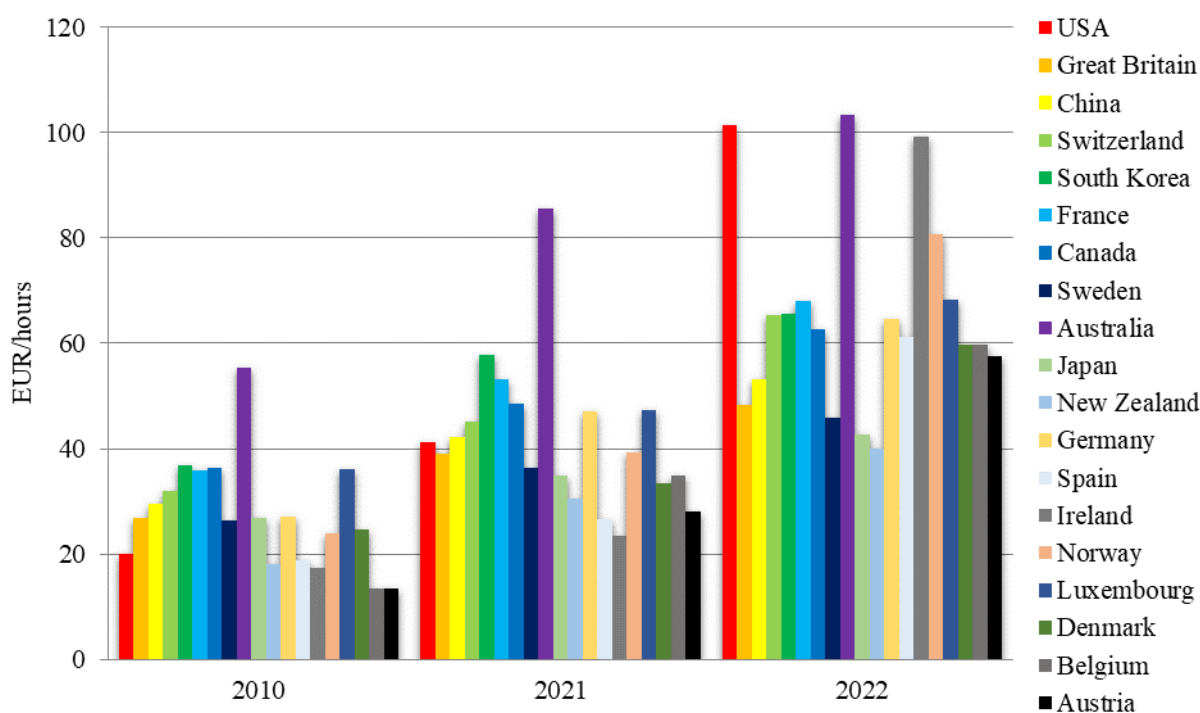
Figure 5. Labor productivity of economically active human resources by parity of competitiveness on the labor market of the world countries in 2010-2022, EUR/hour

Source: calculated by authors based on data (Demographic and social statistics, 2021; Shaping Europe's digital future, 2023; Digital Economy Report Pacific Edition, 2022; Global Human Capital Trends, 2023; Human potential development index, 2021).

Thus, in the countries of the world, the digital environment of the labor market is formed on the basis of a single digital space, interoperability (operational compatibility) and the same standards, ensures the safety of users of online transactions, develops scientific research in digital innovations, uses HRM technologies to solve social problems. In terms of the level of digitalization of the labor market, countries with a developed digital economy dominate: Australia (1st place), USA (2nd), Ireland (3rd), Norway (4th), Luxembourg (5th), France (6th), South Korea (7th), Switzerland (8th), Germany (9th), Germany (10th). However, the active development of digital HRM technology in

business unfortunately does not affect the level of employment of the population in the labor market (Global Human Capital Trends, 2023).

In 2010-2022, the employment level of the population in the studied countries practically did not change. At the same time, slight fluctuations of the indicator within 1.0-4.0 percentage points were observed. Thus, a decrease in the employment rate of the population to the number of economically active human resources (labor force) was recorded in Finland (2010 – 66.9%, 2021 – 66.2%, 2022 – 66.9%), Japan (2010 – 62.4%, 2021 – 60.5%, 2022 – 61.5%). Sweden (2010 – 70.9%, 2021 – 72.7%, 2022 – 73.1%), the Netherlands (2010 – 63.1%, 2021– 64.0%, 2022 – 64.3%), Great Britain (2010 – 62.7%, 2021 – 63.3%, 2022 – 63.3%), Luxembourg (2010 – 53.4%, 2021 – 59.3%, 2022 – 59.9%), South Korea (2010 – 61.2%, 2021 – 63.2%, 2022 – 63.1%), Switzerland (2010 – 67.4%, 2021 – 68.4%, 2022 – 68.5%) show a slight increase in the indicator. This indicates that the action of labor market factors has the opposite effect. On the one hand, the number of jobs is decreasing due to the replacement of human labor by artificial intelligence, and on the other hand, new jobs are appearing that require retraining of the labor force (Demographic and social statistics, 2021; Shaping Europe's digital future, 2023; Digital Economy Report Pacific Edition, 2022; Global Human Capital Trends, 2023; Human potential development index, 2021).

In accordance with the theory of three sectors (Three-Sector Theory), proposed A. Fisher, C. Clark and J. Fourasti, which was supplemented by A. Toffler (Theory of three waves), W. Rostow (Model of stages of economic development) and D. Bell (The Concept of a post-industrial society), the signs of the progress of the sectoral structure of employment are (Hazarian, 2012): the transfer of employment to the service sector from the first and second sectors (agriculture and industry) due to the increase in labor productivity on the basis of digitalization of work; the growth of the share of employees in the fields of digital technologies, the financial sector (quaternary sector) within the framework of the third and fourth sectors as a sign of the digital economy; growth of the share of the fifth sector (education, science, health care, knowledge-intensive types of professional activity) in the structure of the employed population, which is an indicator of the development of the knowledge economy.

In the sectoral structure of employment of economically active human resources of the countries of the world, Ukraine is distinguished by types of economic activity in the field of "Information and telecommunications", "Professional, scientific and technical activities", "Activities in the sphere of administrative and auxiliary services" (Figure 6).
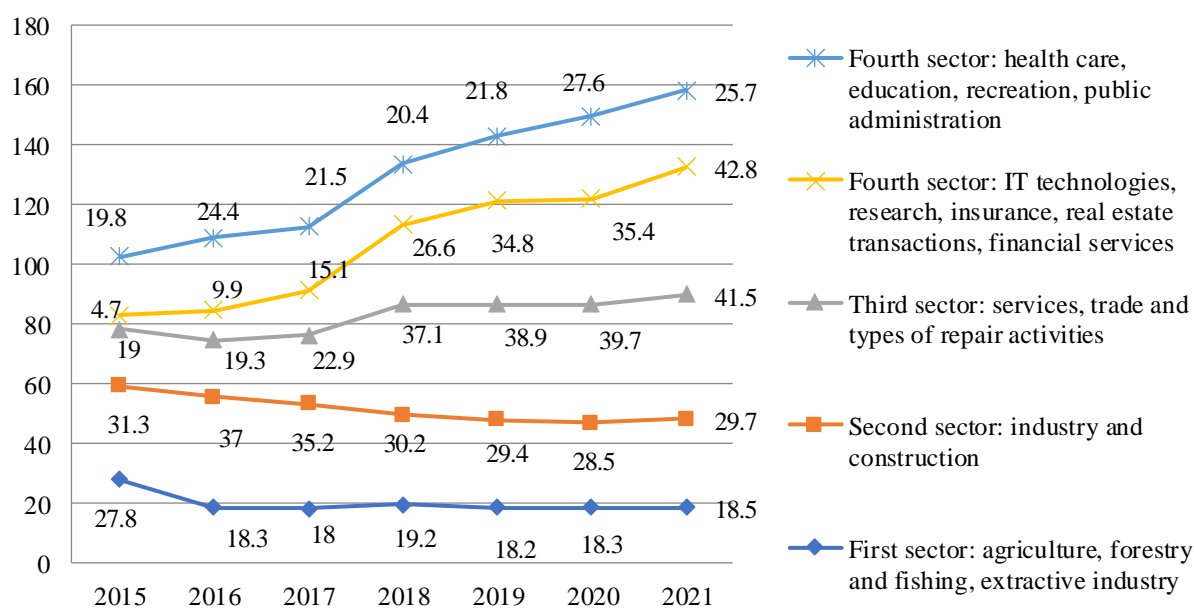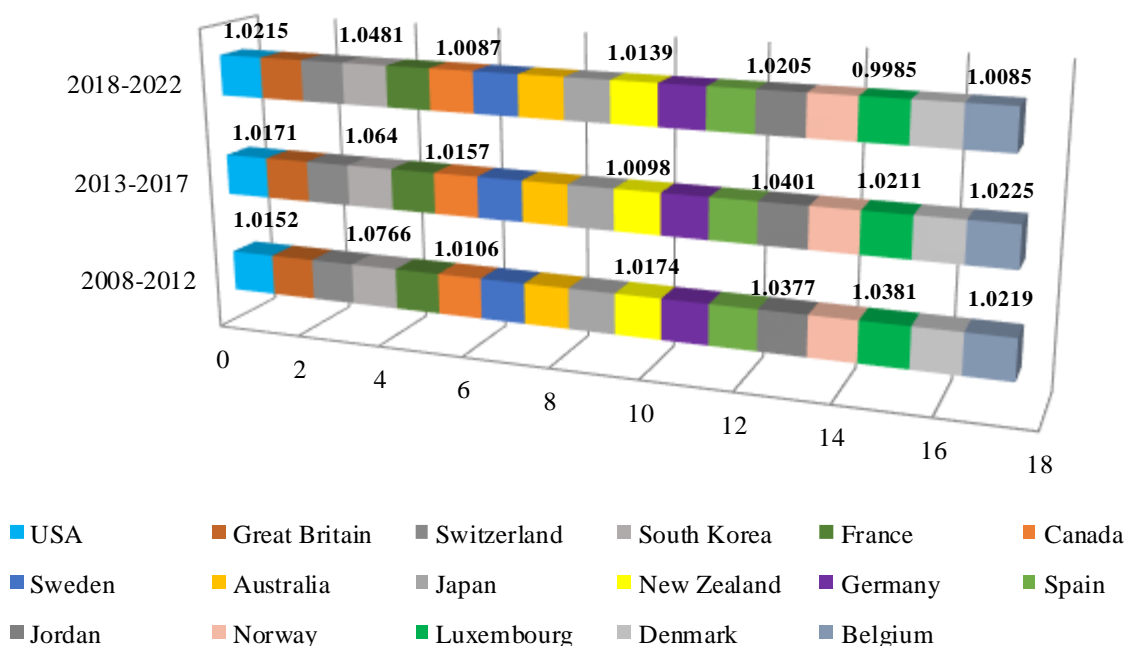

Figure 6. Dynamics of the sectoral structure of employment in Ukraine for 2012–2021

Source: calculated by authors based on data (Demographic and social statistics, 2021; Shaping Europe's digital future, 2023; Digital Economy Report Pacific Edition, 2022; State statistics service of Ukraine, 2020; Gender and age composition of the population, 2021; Global Human Capital Trends, 2023; Human potential development index, 2021).

Thus, a decrease in the share of the first sector of the employment structure from 27.8% in 2015 to 18.5% in 2021 and of the second sector – from 31.3% in 2015 to 29.7% in 2021, led to the expansion of the service sphere of the third sector (average annual growth rate is 14.3%) and an increase in the number of people employed in the IT sphere of the fourth sector of the economy (average annual growth rate is 48.8%). An asymmetric global trend in the development of the labor market is the tendency to preserve the share of the first sector in the sectoral structure of employment, which is connected with the actual results of the integration of Ukrainian agricultural production in the global market of agricultural products, in which Ukraine, with its natural and geographical advantages, took a leading position in 2021. Ukraine ranked fourth in the world in terms of corn exports, third - in barley exports, sixth – in wheat exports, 11th – in flour exports and 12th - in cereal exports (State statistics service of Ukraine, 2020; Gender and age composition of the population, 2021), exporting agricultural products sector in 190 countries of the world and taking the first place in the world in terms of the growth rate of export of agricultural products) (Global Human Capital Trends, 2023; Human potential development index, 2021). The share of the fifth sector (education, health care, public administration) in the sectoral structure of employment for 2015-2021 increased by almost 29.8%, but the absolute number of employees in it decreased by 17.7%. In general, the number of the employed population in all sectors of the economy decreased by a third in 7 years: from 24.7 million people in 2015 to 16.6 million people in 2021. The greatest reduction in economically active human resources was observed in the first sector (in the fields of forestry and fisheries, as well as the extractive industry, the number decreased by 3.2 times). In 2015-2021, the number of employees in the second sector decreased by 31.5%. In the third sector (industrial and household services, trade, repair activities) the number of active human resources increased by 8.7%, in the fourth sector – by 7.7 times.

Despite certain asymmetric trends in the sectoral structure of population employment, in Ukraine there was a transition to the development of the HRM-technology model as an indicator of structural shifts in the employment of economically active human resources. In order to compare the time limits of the development of the digital economy of Ukraine with the leading countries, the average annual growth rate of the employment level was analyzed to level the error of the exact value of the indicator (Figure 7).

Figure 7. Average annual rates of employment growth in leading countries with a digital direction of labor market development for 2008-2022
Source: calculated by authors based on data (Demographic and social statistics, 2021; Shaping Europe's digital future, 2023; Digital Economy Report Pacific Edition, 2022; State statistics service of Ukraine, 2020; Gender and age composition of the population, 2021; Global Human Capital Trends, 2023; Human potential development index, 2021).

Thus, for 2008-2022, there is a decrease in the growth rate of employment in Great Britain, South Korea, France, Canada, Sweden, Australia, Japan, Germany, Spain, Norway, Luxembourg, Denmark, and Belgium. This hypothetically contradicts the concept of the digital economy, since prioritizing the development of the field of digital technologies in the public policy of the countries of the world should create a favorable environment of social infrastructure and the introduction of investments in HRM technologies by economic sectors, forming real opportunities for the workforce to earn income in countries with high level of digital development of the labor market. However, the dynamic trend of digitization of the labor market indicates the absence of a direct relationship between IT-sector expenditures and labor productivity of economically active human resources, and, accordingly, the obtained profit of business entities (computer paradox) (Global Human Capital Trends, 2023; Human potential development index, 2021).

The peculiarity of the use of HRM technologies in social production is that the effect is primarily realized in increasing the quality of services, improving the service, broader consumer qualities, i.e., in more complete provision of social needs. This type of development is based on a continuous change in the structure of economic activity and its results. At the same time, the old development criteria cease to adequately reflect reality, and therefore, GDP growth in the digital economy is not a measure of the effectiveness of its development (Digital Economy Report Pacific Edition, 2022).

Thanks to HRM-technologies, there are qualitative changes in the socio-economic dimension of human potential through the emergence of a new formation of human resources, which make faster decisions regarding the processing of a significant mass of information, which are able to generate new knowledge and use it for the purpose of creating a new information product. A new model of work and employment is being formed – "Labor 4.0", which is considered as "a platform", as an institution that ensures the use of labor resources in the coordinates generated by the Fourth Industrial Revolution. Fundamental characteristics of "Labor 4.0" platform are fundamental shifts in the forms,

types of employment and socio-economic relations of human resources employed in the digital economy (Digital Economy Report Pacific Edition, 2022; Global Human Capital Trends, 2023).

Digitized HRM technologies transform the content and nature of work, namely: the level of intellectualization of work increases; the share of heavy, monotonous work and stereotyped operations decreases; the result of work increasingly depends on creativity, the ability to make non-standard decisions, navigate in significant information flows, the ability to produce innovations; creativity provides significant opportunities for self-realization. Accordingly, three components of human labor activity are distinguished: regulated work (α-work), innovative work (β-work) and spiritual work (γ-work) (Digital Economy Report Pacific Edition, 2022; Global Human Capital Trends, 2023; Ragnedda et al., 2020).

Innovative social capital, which provides human potential through innovative forms of employment of human resources in the labor market, is characterized by two interrelated trends: on the one hand, a change in the form of work determines the demand among active human resources for non-standard employment, since this form provides more freedom and opportunities for self-realization; on the other hand, modern business entities are actively looking for opportunities for flexibility and mobility, therefore they are interested in using flexible forms of employment, primarily remote and temporary ones (Ragnedda et al., 2020; Trusova et al., 2021). So, in 2022, the share of people employed in the IT sphere from the total number of people employed in the economy of Malta was 4.3%, Estonia – 4.2%; Ireland – 4.1%. Sweden, Luxembourg, Hungary, Finland – up to 4%. The total number of people employed in this sector in EU countries is 6.4 million people, of which: Germany – 12% (over 1.2 million people), Great Britain – 15.8% (1.1 million people), France – 12.9% (0.77 million people), Italy – 10% (0.62 million people), Spain – 7% (0.46 million people), (Figure 8).

This sector of the digital economy has high productivity, the average value of which in 2022 was 109 thousand EUR per person. Labor productivity from 2020 to 2022 increased by 18 percentage points (p.p.). The highest level of productivity was observed in the segment of communication and means of communication – 166 thousand EUR per person. Despite the small number of people employed in the IT sector, their share of the total number of people employed in R&D in EU countries is 19%. In 2022 303 thousand FTE (full-time equivalents) were allocated to scientific and research work carried out in the IT sphere of EU countries (Figure 8) (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).
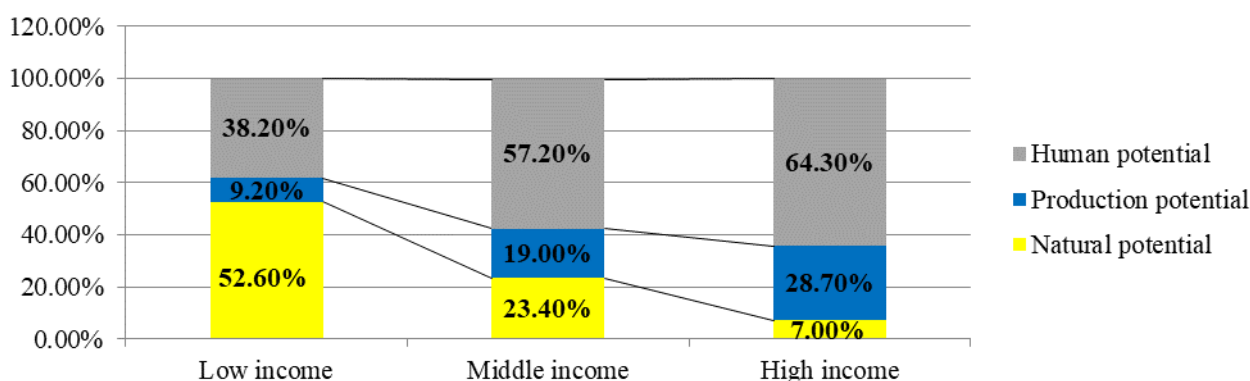

Figure 8. The structure of national wealth according to the efficiency of the use of human potential for the implementation of R&D in the IT sphere of the EU countries, 2022
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

In the structure of scientific and research works, IT services prevail – 191 thousand FTE, IT production – 46 thousand FTE, communication and means of communication – 28 thousand FTE. The largest share of personnel engaged in research and development in the IT sphere compared to the total

number of R&D personnel in Japan is 24%, in EU countries – 19%, in China – 16%. That is, every fifth employee engaged in scientific research in the countries of the world belongs to the IT sector, which confirms the process of transformation of the socio-economic component of human potential, which generates an innovative form of work (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022). Israel, Korea, Japan, Germany, and Denmark are the leaders among the countries of the world in terms of the level of knowledge-intensive economy (expenditure on research and development in HRM-technology, new formation of effective use of human potential). The largest number of patent applications filed by residents of the country belongs to Japan, Hong Kong, Singapore, Japan, the USA, and Korea. This is due to the state policy of promoting innovation. Among the countries considered in this study, only in Israel and the USA the number of registered patent applications from non-residents exceeds the value of a similar indicator from residents (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

In 2022, the ratio of the number of applications from residents to non-residents in Israel was 1.51 thousand pcs. up to 5.86 thousand pcs., in the USA – 285.1 thousand pcs. to 312.05 thousand pcs., in Singapore – 1.58 thousand pcs. to 20.27 thousand pcs., in Hong Kong – 0.314 thousand pcs. to 15.67 thousand pcs. In terms of the total number of submitted applications, Ukraine has a rather low level of the indicator – 3.97 thousand pcs., of which 2.11 thousand pcs. – residents (Figure 9).
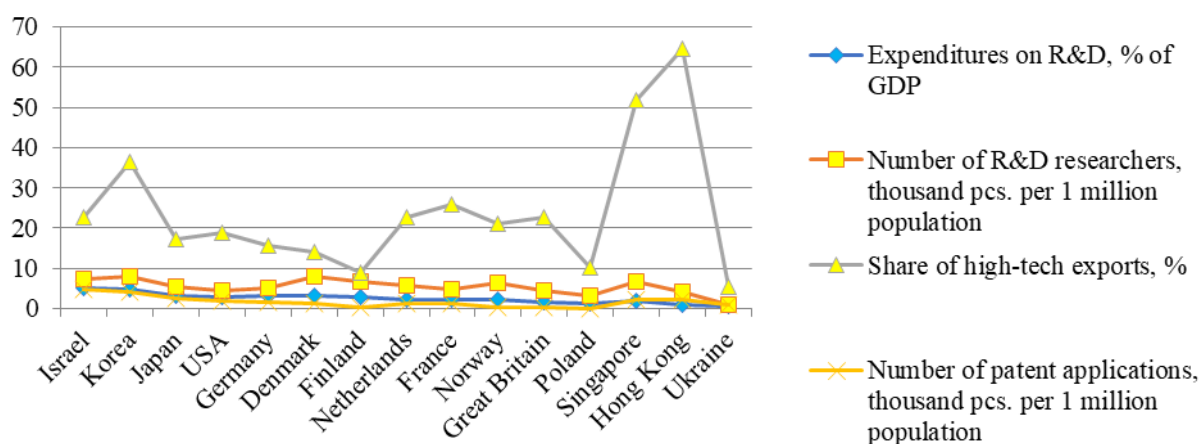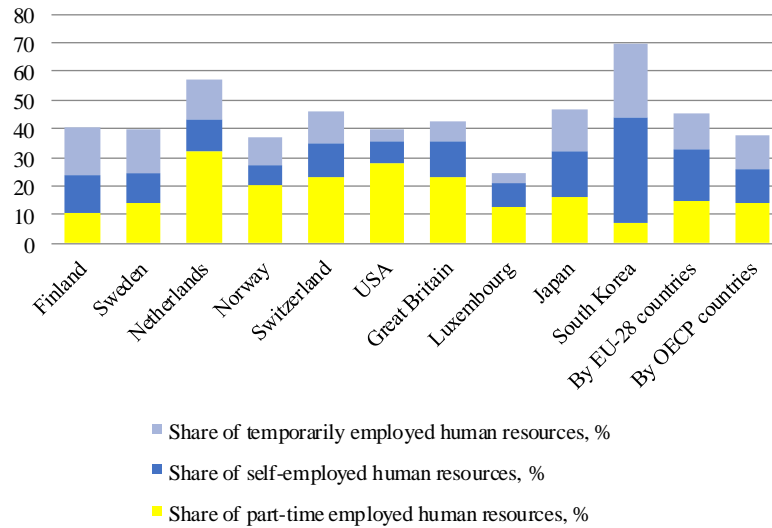

Figure 9. R&D indicators of the countries of the world in 2022
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

HRM-technologies affect all factors of increasing labor productivity, changing them. The introduction of digital technologies leads to the modernization of means of production (providing services), and most importantly, the introduction of innovative technologies, which reduces the need for employers in the number of personnel and at the same time creates new requirements for its quality characteristics. First of all, it concerns highly qualified personnel. In particular, such characteristics as creativity, the ability to solve complex tasks, and the ability to coordinate actions are in demand. The above leads to a change in socio-psychological factors, namely, an increase in the internal motivation of employees aimed at professional recognition, success, self-realization, etc. Digital technologies also change the organizational process – communications between labor market subjects are simplified, remote employment is used, and virtual cooperation is established.

4. Discussions
The digital economy affects the system of socio-economic relations, as it increases the level of intellectualization of the work of active human resources. This stimulates the widespread use of forms of non-standard employment. In developed countries, about 1/3 of the population uses non-standard forms of employment. The most common among them are temporary (under contracts), self-employment, part-time and remote employment. The demand for non-standard forms of employment in the countries of the world with developed HRM technologies on the labor market is presented in Figure 10 and Figure 11.

Figure 10. The share of active human resources in non-standard forms of employment in the leading countries with developed HRM technologies on the labor market in 2020, %

Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).
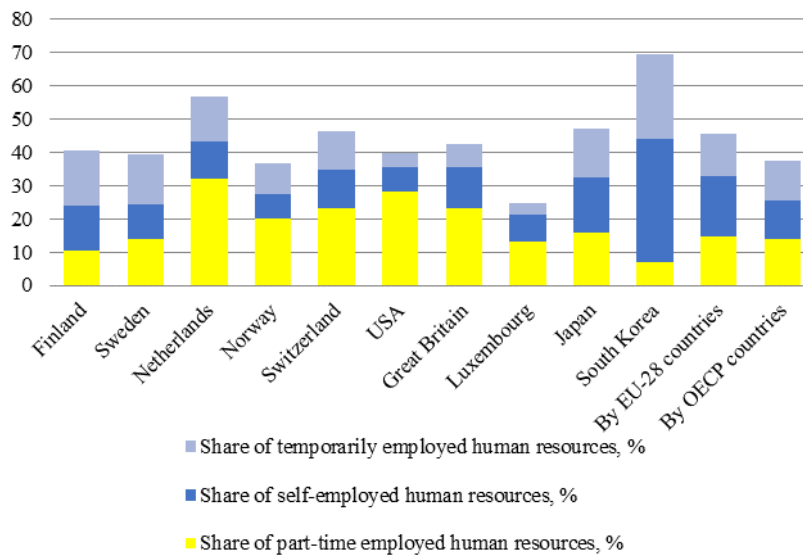

Figure 11. The share of active human resources in non-standard forms of employment in the leading countries with developed HRM technologies on the labor market in 2022, %
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

Thus, the absence of significant changes in the use of non-standard forms of employment for a significant period in the leading countries with a developed digital economy is explained by the fact that these non-standard forms of employment were presented on the labor market for a long time and became widespread during the structural shifts of information transformation before 2000. The structure of employment by economic sector in the leading countries is shown in Figure 12 and Figure 13.
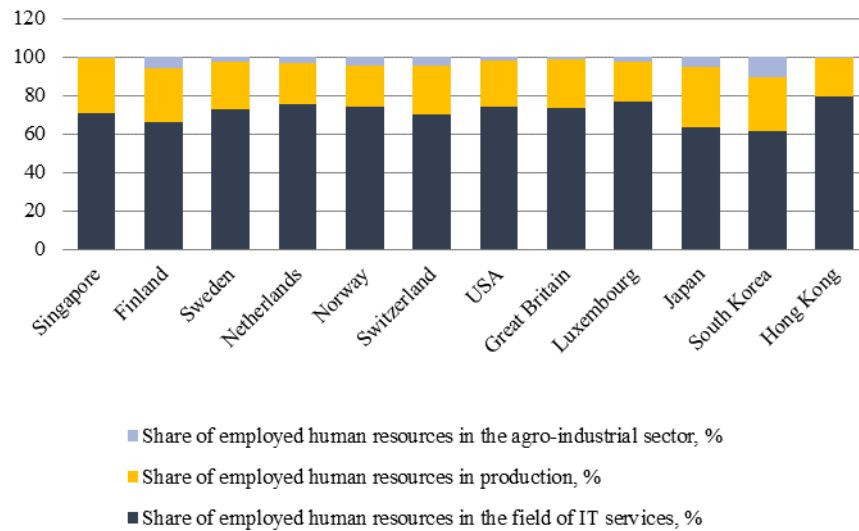
Figure 12. Structure of employment in leading countries with a developed digital labor market by economic sector in 2020, %
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).
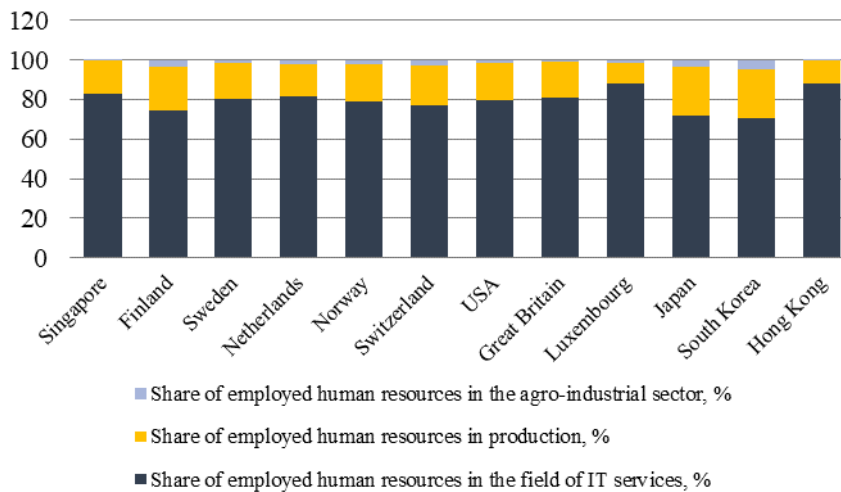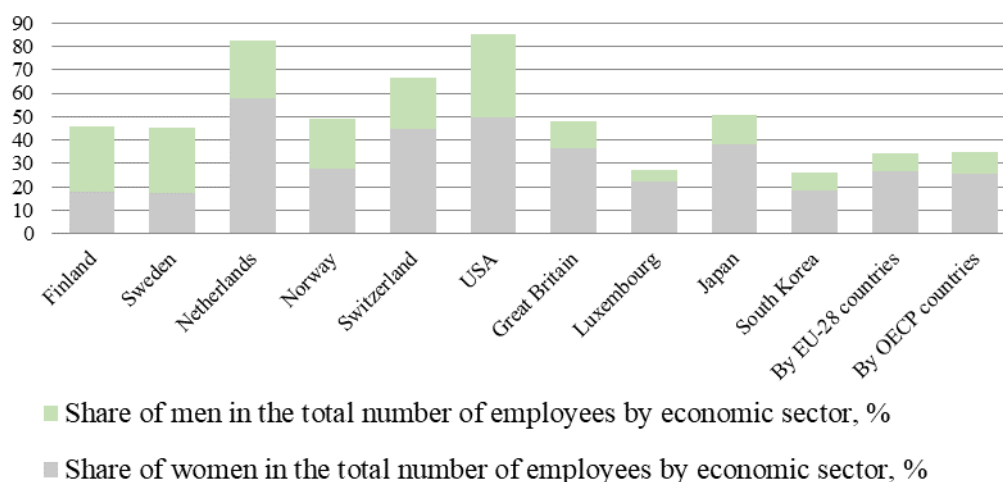

Figure 13. Structure of employment in leading countries with a developed digital labou market by economic sector in 2022, %
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

Thus, the digital labor market in the socio-economic dimension of human potential creates new jobs. In 2020, the largest share of employed human resources is in the field of IT services – from 70.5% in South Korea to 88.2% in Luxembourg; the smallest share in the agricultural sector – from 0.2 and 0.5% in Hong Kong and Singapore, to 4.7% in South Korea.

The adaptation of existing forms of non-standard employment to the needs of the new digital economy has a clearly expressed gender feature. The possibilities of a flexible work schedule are closely related to women's work, since this form allows combining employment with household management (Figure 14).

Figure 14. Structure of part-time employees by gender in leading countries with a developed digital labor market by economic sector in 2022, %
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

Thus, in the studied countries, in the gender structure of women's employment, the highest share of part-time work is in the Netherlands (58.0 %), Switzerland (44.6%) and Japan (38.3%). This makes it possible to combine the combined workload of women with a more flexible work schedule and provides a new adaptive segment of the workforce adapted to work remotely in the global digital labor market. The digital labor market puts forward new requirements for the educational level of economically active human resources, which is due to the use of complex HRM technologies with the creation of new remote digital workplaces. In particular, the share of the labor force with higher education in 2022 varies: in South Korea it is equal to 72.2%, in the USA – 73.2%, in Great Britain – 83.9%, in Sweden – 83.8% and 83.2% in Norway. In 2020-2022, all countries are characterized by a small share of the unemployed with a higher education – from 2.3 to 4.6% in the workforce with a corresponding level of education (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

Employment and unemployment of economically active human resources are closely interconnected and interdependent (Figure 15 and Figure 16). In 2022, a higher level of employment among persons with higher education is observed. Accordingly, the demand for workers with a lower level of education has decreased due to the introduction of digital technologies in the banking sector, tourism and trade (bank terminals, electronic banking, electronic payment systems, ticket booking and hotel reservation platforms, etc. have been introduced).
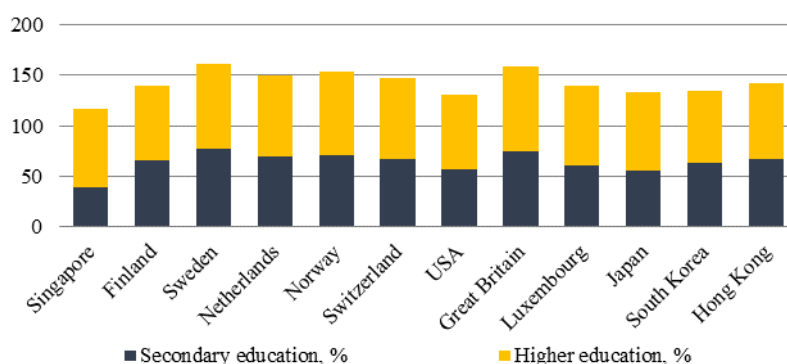
Figure 15. The share of employed human resources by the level of education to the total number of the workforce by the corresponding level of education in the countries of the world, 2022, %
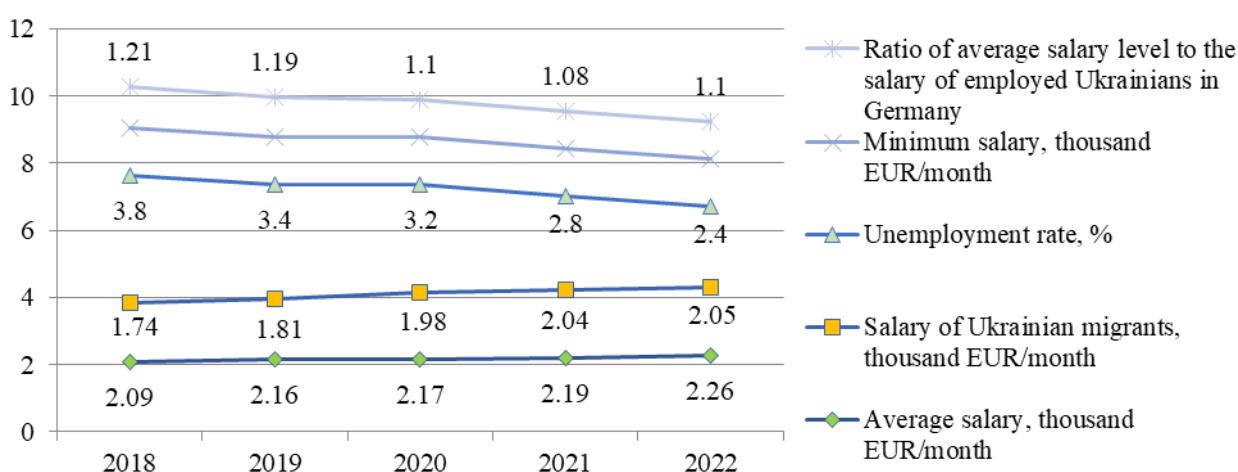
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).
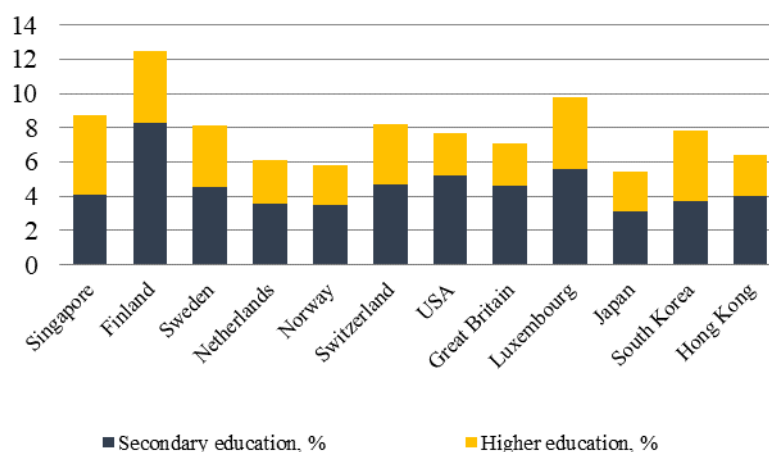
Figure 16. The share of unemployed by level of education to the total number of the workforce by the corresponding level of education in the countries of the world, 2022, %
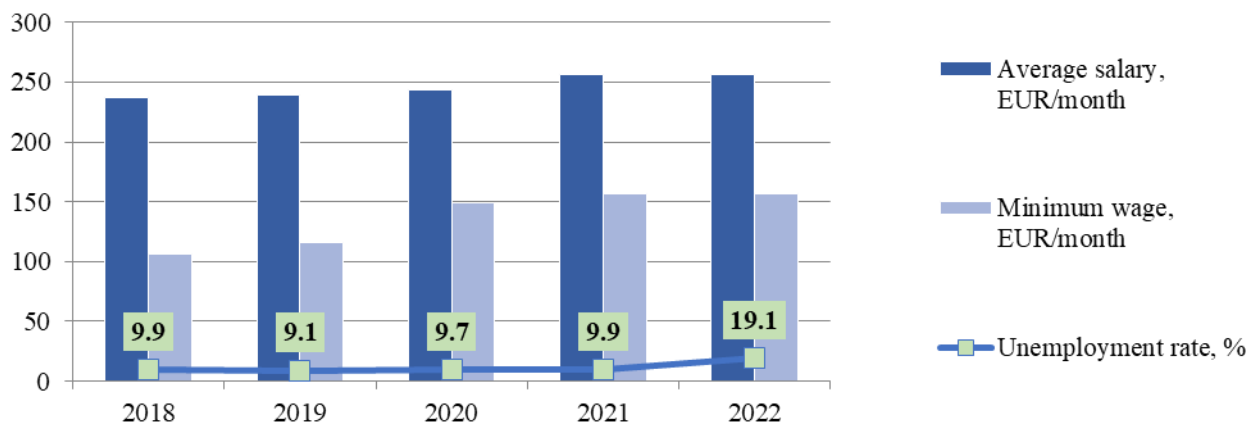Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

It should be noted that labor migration has a significant impact on the socio-economic dimension of human potential in the digital space of the labor market. After the beginning of the full-scale invasion of the Russian Federation on the territory of Ukraine, almost 20% of the Ukrainian population migrated to Germany, which ranks second (after Poland) in the list of the most desirable countries for labor migration (Brych & Borysiak, 2016). A characteristic feature of the German labor market is the constant growth of the need for economically active human resources. During 2018-2022, the number of vacancies in Germany increased by more than 35%, i.e. to 1.585 thousand persons (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022). The main factor in the effective use of human potential in Germany is the polarity of the wage level of employed Ukrainians, which is almost 8.0 times higher than this indicator in Ukraine (Figure 17 and Figure 18).

Figure 17. Comparative socio-economic measurement of human potential with the developed digital labor market of Germany for 2018-2022
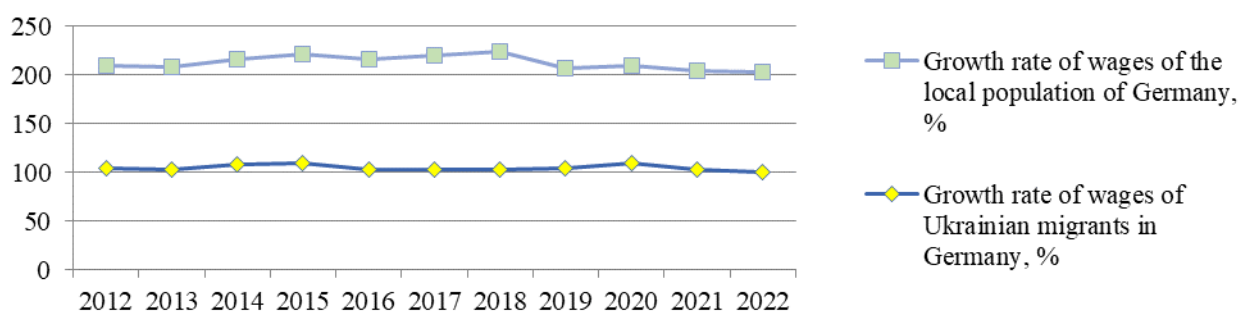Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al., 2020; World economic, 2022).

Figure 18. Comparative socio-economic measurement of human potential in the digital
space of the labor market of Ukraine for 2018-2022
Source: built by authors according to data (Global Human Capital Trends, 2023; Ragnedda et al.,
2020; World economic, 2022).

So, in 2018, a Ukrainian migrant in Germany received 1736 EUR, for his work, while in Ukraine the level of payment was only 236.8 EUR; in 2022 in Germany – 2053 EUR, with the average salary in Ukraine in 256.8 EUR. The crisis state of the labor market during the period of martial law in Ukraine led to a deterioration of the situation in the economy as a whole, a decrease in the purchasing power of the population, a significant level of inflation, instability of the financial and currency markets, increased competition in the labor market, the spread of shadow employment and migration of the population to countries of Europe from 3.0 million people in 2000 to 15.8 million people in 2022 (Trusova et al., 2022b; World economic, 2022). The average level of earnings of German Ukrainian migrants varies within 83-90% of the earnings of an ordinary German worker (Figure 19). That is, there is a tendency to equalize wage levels between migrants and local residents, which indicates the intellectualization of the work of Ukrainian migrants. Thus, the incomes of Ukrainian migrants increased to 18.3%, while among native residents – only by 8.4%. In general, the average level of material remuneration for work performed in Germany in 2022 is 8.0 times higher than in Ukraine (Figure 19).


Figure 19. Rates of wage growth among the local population and Ukrainian immigrants and migrants in Germany, 2012-2022, %
Source: built by authors according to data (Demographic and social statistics, 2021; State statistics service of Ukraine, 2020; Gender and age composition of the population, 2021; Global Human Capital Trends, 2023; World economic, 2022).

The dynamic change in the unemployment rate in both countries shows different trends. Thus, the level of unemployment due to martial law in Ukraine has increased 2.0 times in 2021-2022. In

Germany, against the background of a constant increase in the number of job vacancies in the IT sector, this indicator decreased by 14.3%, as it provides almost 4.8 million jobs in other EU countries. In the context of the digitization of the labor market and the acceleration of the flow of labor from Ukraine, a correlation analysis was conducted and the relationship between individual factors of the socio-economic dimension of the effectiveness of the use of human potential in Germany was determined (Figure 20).

Note. AIF – Arrival Intensity Factor; CIE – Coefficient of Intensity of Elimination; NcIMM – Net Coefficient of Intensity of Mechanical Movement; Nu/G – the number of Ukrainians per native German; CnFLFrp – the Coefficient of the Net Flow of the Labor Force of Resettled Persons.
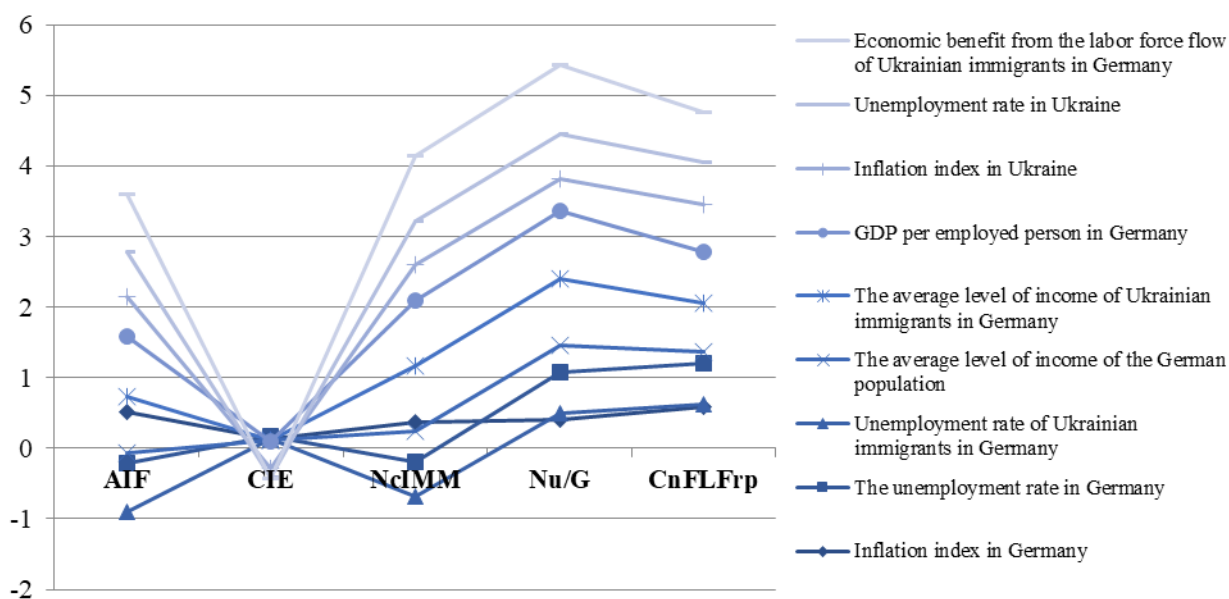

Figure 20. The relationship between the factors of the socio-economic dimension of the effectiveness of the use of human potential in the digital field of the German labor market through the movement of labor force from Ukraine in 2022
Source: built by authors

The labor force flow (LFF), like any systemic phenomenon, leads to certain consequences and effects, which are expressed in the form of economic, social, political advantages or losses for the recipient country (Germany) and the donor country (Ukraine). Large disparities in income levels under the condition of accelerated labor force flow (LFF) are one of the main economic reasons for the intensification of the human potential development process in Germany. In 2022, due to military actions in Ukraine, a forced outflow of labor was carried out to stabilize the amount of social capital in Germany. For this, investment resources were additionally directed to HRM technologies, which had a passive (consumer) demand for the use of labor force.

In 2022, Germany invested 6.84 billion EUR in the social capital of immigrants from Ukraine. This is equal to 17.7% of the country's total investments, which are involved in the labor force of other countries of the world (Figure 21). For comparison, in 2021 the cumulative volume of German investments in Ukrainian resettled persons amounted to 3.79 billion EUR. In 2021-2022, its value increased almost 2 times.
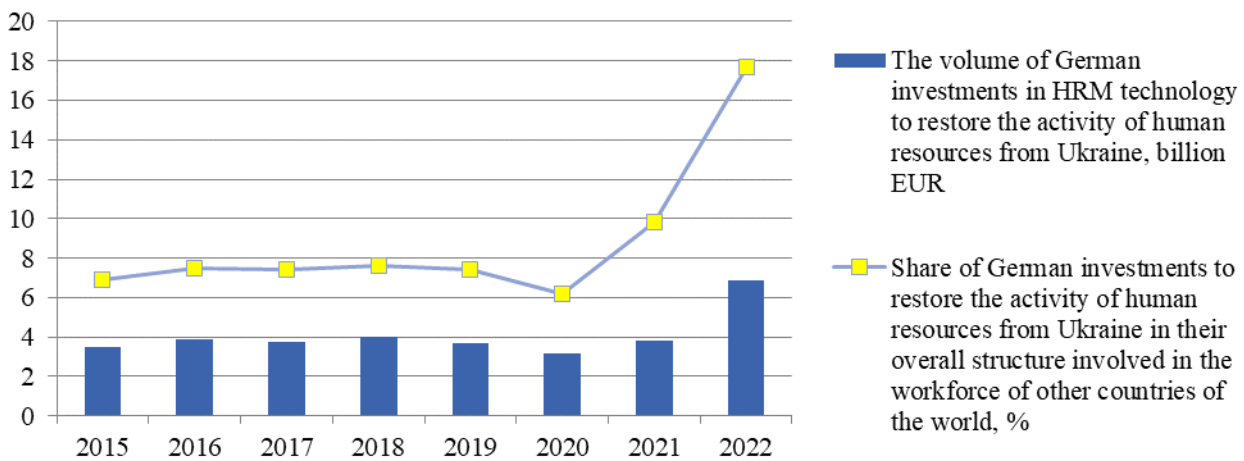
Figure 21. The share of Germany's investments to restore the activity of human resources
from Ukraine in their overall structure, involved in the workforce of other countries
of the world for 2015-2022, %
Source: built by authors according to data (Demographic and social statistics, 2021; State statistics
service of Ukraine, 2020; Gender and age composition of the population, 2021; Global Human Capital
Trends, 2023; World economic, 2022).

In this regard, the construction of a system of forecasts for the restoration of the human potential
of Germany by the economically active part of resettled Ukrainians, which, on the basis of the
formation of new social systems and networks, will allow to increase the impact on the digital
transformation of the labor market in a state where zero or negative natural population growth is
already observed. Based on the given description, we formulated a hypothesis based on the following:
the formation of the German vector of the development of the digital labor market activates Ukrainian
immigrants to unilaterally use the socio-economic component of human potential, which leads to an
expanded flow of labor force and improves the efficiency of active human resources from donor
country (Ukraine).

Since the nature of the labor force flow (LFF) is socio-economic in nature, the effect of its
influence forms the state policy on regulating labor productivity in the country. Therefore, in order to
determine the maximum possible benefit from the labor force flow (LFF), it is proposed to determine
the level of employment of displaced persons in economically active and working age (formula (6))
(Ragnedda et al., 2020).

$$GDP^{\max}_{(j)profit} = GDP(z)_{H(j)} \times Z^{ean}_{H(j)}, \qquad (6)$$

where, $GDP^{\max}_{(j)profit}$ – is the GDP of the recipient country in the absence of unemployment

among immigrants from the donor country in the economically active and working age in *j*-period;
$GDP(z)_{H(j)}$ – GDP per employed person in the recipient country in *j*-period.

It is proposed to determine the effectiveness of the work of resettles of the donor country in the
growth of the GDP of the recipient country on the basis of the index method. Accordingly, the index
of the economic efficiency of labor of displaced persons (IEELM) is calculated as the ratio of the
share of additional GDP created by displaced persons of the donor country in the total GDP of the
recipient country adjusted for the share of economically active human resources of the donor country
in the general structure of the working population of the recipient state (formula (7)) (Ragnedda et al.,
2020):

$$IEELM = \frac{GDP_{mdc}^{ad}}{GDP_{rc}} / \frac{N_{dc}^{ea(ab)m}}{N_{rc}^{ea(ab)wp}},$$ (7)

where, $IEELM$ – is the labor efficiency index of displaced persons; GDP_{mdc}^{ad} – the volume of additional GDP created by resettled persons of the donor country in *j*-period; GDP_{rc} – GDP volume of the recipient country in *j*-period; $N_{dc}^{ea(ab)m}$ – the number of economically active and able-bodied persons-immigrants from the donor country in *j*-period; $N_{rc}^{ea(ab)wp}$ – is the number of economically active and able-bodied population of the recipient country in *j*-period.

The value of the index, which is close to 0, indicates the presence of significant reserves for increasing the efficiency of the use of human potential. Values that are close to 1 indicate an increase in the labor efficiency of immigrants from the donor country and an approach to the general level of the recipient country.

Based on the method of least squares, the possibility of interaction between the dependent variables of the socio-economic dimension of human potential in the country (Ragnedda et al., 2020) is taken into account, which is confirmed by the coefficient of multiple correlation which is equal to 0.91.

$$TI_{AIF} = Q_0 + Q_1 GIR_{dc} - Q_2 GAW_{dc} - Q_3 GUR_G,$$ (8)

where, TI_{AIF} – is the growth rate of the coefficient of intensity of the arrival of immigrants to Germany, %; GIR_{dc} – rate of growth of the inflation rate in the donor country, %; GAW_{dc} – growth rate of average wages in the donor country, %; GUR_G – growth rate of the unemployment rate in Germany, %.

$$\begin{aligned} TI_{AIF} &= 1.891 + 0.349 GIR_{dc} + 0.115 GAW_{dc} - 0.198 GUR_G \\ adj.R^2 &= 0.976 \\ DW &= 2.16 \end{aligned}$$ (9)

The influence of each factor of the socio-economic dimension of human potential in the variation of the movement of the flow of labor from the donor country (Ukraine) was calculated using elasticity coefficients, which with an increase of 1% in the growth rate of the inflation rate in Ukraine (GIR_{dc}) and unchanged values of other factors, predict an increase in the intensity of the arrival of Ukrainian immigrants to Germany by 2.24%. A decrease in the average level of wages in Ukraine (GAW_{dc}) and unemployment in Germany (GUR_G) by 1% will lead to an acceleration of the flow of labor to the recipient country (Germany) of economically active human resources by 2.36%. In general, the effective sign (TI_{AIF}) will increase by 4.6%.

On the basis of the built economic and mathematical model (9), the probable options for the formation of the German digital labor market expanded according to labor flows, which improve the working capacity of active human resources from the donor country (Ukraine) in the recipient country (Figure 22) in the short-term (until 2024) and medium-term periods (until 2026).
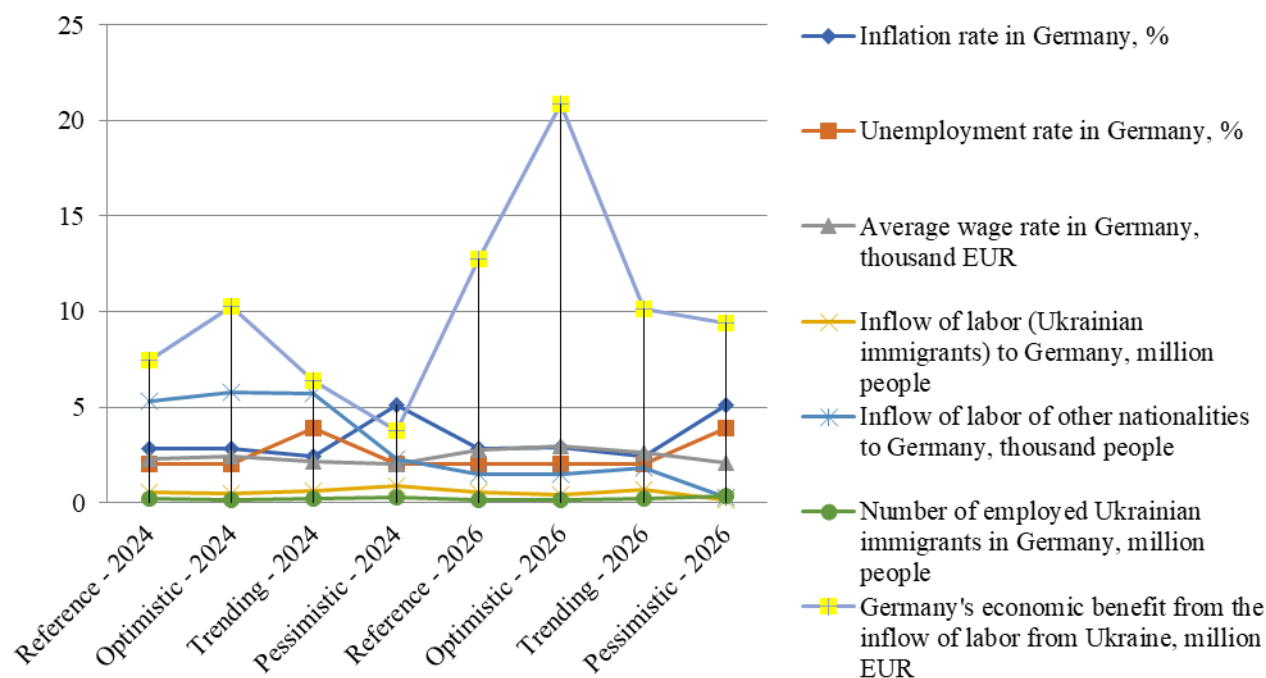
Figure 22. Predictive indicators of the effective use of human potential based on the expanded inflow of labor to improve the efficiency of active human resources from the donor country (Ukraine) to the recipient country (Germany) in 2024 and 2026

Source: calculated by authors

The reference scenario of the short-term forecast assumes the preservation of the existing trends in the development of the digital labor market of socio-economic relations in Germany (decrease in the unemployment rate from 2.4% in 2024 to 2% in 2026, preservation of the trend towards an increase in the level of payment of labor, provided that the outflow of labor is reduced) and a significant improvement in the level of socialization of economically active human resources from Ukraine (an increase in the average wage in the recipient country by 16.8% in 2024 and 43.9% in 2026 from the level of 2022 p.). The positive dynamics of the indicators will make it possible to improve the indicator of the effectiveness of the use of human potential by 2026, which is a lever of influence on the flow of labor and the process of development of the digital labor market.

5. Conclusions

Thus, the prognostic model of digitization of the labor market reveals the general prospects of the labor force flow for further activation of human resources and increase of labor productivity of the countries of the world. The potential labor force creates opportunities for the economic and social development of society and at the same time creates certain threats associated with the inactive life position of individuals who are determined to consume public goods without making appropriate labor efforts. They do not participate in the production of public goods, but participate in their distribution, which leads to an increase in the burden on pension and other social funds, while at the same time not observing their social contribution to the sphere of production of public goods. It is a positive fact that these categories of persons, in contrast to persons who are not interested in work, can become more active over time and produce the results of work through the digital network. The transfer of persons from the composition of the potential labor force to the actual one is possible under the conditions of a balanced state policy on the labor market, which involves, along with other measures, the development of tools for the digitization of the work of economically active human resources and their stimulation to expand socio-economic relations outside the country.

Therefore, the effective use of human potential is modeled due to the structure of the labor flow in the international digital employment system, which is characterized by significant gaps in wages

between workers in different countries. The regulation of legislative norms regarding the flow of labor in the international digital system should provide the reduction of formal obstacles for immigrants from outside the EU countries, among which should be:

creation of favorable conditions for the possibility of employment of representatives of labor professions and persons with secondary education (today the labor market of many EU countries is focused on highly qualified specialists in the IT sphere.);

getting a job in any profession without specifying sectors of the economy;

cancellation of the procedure of verification of an applicant for a position applied for by a citizen of the recipient country or another country in the world;

the opportunity to look for a job in the digital system of professions for six months, provided that there are financial resources for living (about 5,000 EUR) and an appropriate level of knowledge of the English (German) language.

The new laws must fulfill two main goals: to promote the labor migration of the population to EU countries and the world, creating conditions for the transformation of the "rules of the game" regarding the formation of social capital in the labor market of other countries.

References

Alter, S. (2008). Defining information systems as work systems: implications for the IS field. *European Journal of Information Systems*, *17*(5), 448–469.

Amrute, S. (2016). *Encoding race, encoding class: Indian IT workers in Berlin*. Duke Uni-versity Press.

Amrute, S. (2019). Of techno-ethics and techno-affects. *Feminist Review*, *123*(1), 56–73.

Anisimov, A. Ie. (2011). Determinants of the formation of the innovative component of the socio-economic development of the state and its regions. *Bulletin of the Donetsk National University. Series B: Economics and Law*, *1*, 184–187.

Anwar, M., & Graham, M. (2019). Hidden transcripts of the gig economy: Labor agency and the new art of resistance among African gig workers. *Environment and Planning A: Economy and Space*, *52*(7), 1–23.

Atkinson, J. (1985). Flexibility, uncertainty and manpower management. *Institute of Manpower Studies, 89*. URL: https://www.employmentstudies.co.uk/system/files/resources/files/89.pdf

Avgerou, C., Cornford, T., & Poulymenakou, A. (1995). The challenge of BPR to the information systems profession. *New Technology Work Employ*, *10*(2), 132–141.

Becker, G. S. (2019). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.

Beugelsdijk, S., & Schaik, T. (2004). Social capital and growth in European regions: an empirical test. *European Journal of Political Economy*, *21*(2), 301–324.

Bilska, O. V. (2016). Human potential and human capital: essence, transformation, life cycle. *Black Sea Economic Studies*, *7*, 26–32.

Bilenko, O. (2012). Mentality as an institutional factor in the development of human capital. *Institutional Vector of Economic Development*, *5*(2), 26–34.

Brych, V. Ia., & Kolodnytska, O. Z. (2015). Human resources as a factor of ensuring the competitiveness of the enterprise. *Innovative economy*, *4*, 72–76.

Brych, V., v Borysiak, O. (2016). Impact of depressed labor markets on enterprise personnel management. *Socio-economic development of regions in the context of international integration*, *21*(10), 60–65.

Burston, J., Dyer-Witheford, N., & Hearn, A. (2010). Digital labor: Workers, authors, citizens. *Special issue, ephemera: theory and politics in organization*, *10*(3/4), 214-221.

Braverman, H. (1998). *Labor and monopoly capital: The degradation of work in the twentieth century*. New York University Press.

Bukht, R., & Heeks, R. (2017). Defining, conceptualising and measuring the digital economy. *Development Informatics Working Paper,* (68), 1–24.

Burrell, J., & Fourcade, M. (2021). The society of algorithms. *Annual Review of Sociology*, *47*, 213–237.

Burston, J., Dyer-Witheford, N., & Hearn, A. (2010). Digital labor: Workers, authors, citi-zens. *Special Issue, Ephemera: Theory and Politics in Organization*, *10*(3/4), 214–221.

Casilli, A. A. (2017) Digital labor studies go global: Toward a digital decolonial turn. *International Journal of Communication*, *11*, 3934–3954.

Burston, J., Dyer-Witheford, N., & Hearn, A. (2010). The rise of the network society: The information age. *Economy, society, and culture, 1*.

Castells, M., & Hall, P. (1994). *Technopoles of the world: The making of twenty-first-century industrial complexes*. Routledge.

Choi, T., Budny, J., & Wank, N. (2004). Intellectual property management: A knowledge supply chain perspective. *Business Horizons, 47*(1), 37–44.

Chornodid, I. S. (2013). Methodology of analysis of social competitiveness of the country. *Business Inform*, 8, 225–231.

Churchill, B., & Craig, L. (2019) Gender in the gig economy: Men and women using digital platforms to secure work in Australia. *Journal of Sociology*, 55(4), 741–761.

Craig, B., Pardey, P., & Roseboom, J. (1997). International Productivity Patterns: Accounting for Input Quality, Infrastructure, and Research. *American Journal of Agricultural Economics, 79*(4), 1064–1076.

Demographic and social statistics. (2021). Retrieved from: https://www.ukrstat.gov.ua/operativ/menu/menu_u/rp.htm

Shaping Europe's digital future (2023, April 18). RETRIEVED FROM: https://digital-strategy.ec.europa.eu/en.

Digital Economy Report Pacific Edition. (2022). Retrieved from: https://unctad.org/system/files/official-document/dtlecdc2022d4_en.pdf.

Dorschel, R. (2022). Reconsidering digital labor: Bringing tech workers into the debate. *New Technology Work Employ*, 37(2), 288-307.

Duffy, B.E., Schwartz, B. (2017). Digital "women's work?": Job recruitment ads and the feminization of social media employment. *New Media & Society*, 20(8), 2972–2989.

State statistics service of Ukraine (2020). Retrieved from: https://ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/11/Yearbook_2020_e.pdf

Gender and age composition of the population. (2021). Retrieved from: https://index.minfin.com.ua/ua/reference/people/

Global Human Capital Trends. (2023). Retrieved from: https://www2.deloitte.com/us/en/insights/focus/human-capital-trends.html

Graham, M., Hjorth, I., & Lehdonvirta, V. (2017). Digital labor and development: impacts of global digital labor platforms and the gig economy on worker livelihoods. *Transfer: European Review of Labor and Research*, 23(2), 135–162.

Gregg, M., & Andrijasevic, R. (2019). Virtually absent: the gendered histories and economies of digital labor. *Feminist Review*, 123(1), 1–7.

Hanushek, E. A. (2013). Economic growth in developing countries: The role of human capital. *Economics of Education Review*, 37, 204-212.

Hazarian, S. V. (2012). Technologies for the development of human potential as a new scientific and educational discipline. *Theory and practice of public administration*, 3(38), 11–20.

Hrishnova, O., & Polyviana, N. (2007). Human capital management in the context of the implementation of the innovative strategy of the enterprise. *Ukraine: aspects of work*, 5, 37–41.

Hulevych, O. Iu. (2015). Labor mentality as an institutional indicator of socio-economic development of society. *Scientific Bulletin of the National Academy of Statistics, Accounting and Auditing*, 1, 35–41.

Human potential development index (2021). Retrieved from: https://dzi.gov.ua/press-centre/news/ukrayina-pidnyalasya-na-14-pozytsij-v-indeksi-lyudskogo-rozvytku/

Huws, U. (2014) *Labor in the global digital economy: Ehe cybertariat comes of age*. Monthly Review Press.

Igbaria, M., & Baroudi, J. J. (1995). The impact of job performance evaluations on career advancement prospects: an examination of gender differences in the IS workplace. *Mis Quarterly*, 19(1), 107–123.

Project of the Recovery Plan of Ukraine (2022). Retrieved from: https://www.minregion.gov.ua/napryamki-diyalnosti/international-cooperation/spivpraczya-z-mizhnarodnymy-finansovymy-organizacziyamy/yevropejskyj-investyczijnyj-bank/programa-z-vidnovlennya-ukrayiny/

Ragnedda, M., Ruiu, M. L., & Addeo, F. (2020). Measuring digital capital: An empirical investigation. *New Media and Society*, 22(5), 793–816.

Trusova, N. V., Oleksenko, R. I., Kalchenko, S. V., Yeremenko, D. V., Pasieka, S. R., & Moroz, S. A. (2021). Managing the intellectual potential in the business-network of innovative digital technologies. *Estudios de Economia Aplicada*, 39(5), 1-15.

Trusova, N., Vasyl'yeva, O., Kolokolchykova, I., Konovalenko, A., & Herasymenko, I. (2022a). Marketing Support of Corporate Social Responsibility of Agri-Food Enterprises. *Scientific Horizons*, 25(7), 101-114.

Trusova, N. V., Semykina, M. V., & Gumeniuk, O. S. (2022b). Labor force transit in the migration system: changes and reproduction of social-labor relations. *Acta Geographica Universitatis Comenianae*, 66(2), 203-232.

Vasyl'yeva, & O., Karpenko, A. (2021). The Intellectual Component of Labor Potential as a Factor of Sustainable Development of the Agricultural Sector. In *Proceedings of the 4th International Scientific Congress Society of Ambient Intelligence*. EDP Sciences. https://doi.org/10.1051/shsconf/202110005012.

World economic. (2022). Retrieved from: file:///C:/Users/%D0%9D%D0%BE%D1%83%D1%82%D0%B1%D1%83%D0%BA/Downloads/text.pdf