



**Global Economic Development:
Context of Russian-Ukrainian War**

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**HUMAN CAPITAL RECOVERY
IN UKRAINE IN THE POST-WAR PERIOD
USING THE ADVANTAGES OF DIGITALIZATION**

Abstract

The article presents the authors' original classification of the factors that influence the creation and development of human capital. The suggested classification combines the factors of internal and external human capital environment into pairs and identifies global vectors that guide their development. The analysis results are used as the basis for the systematization of gains and losses of Ukraine's human capital that allows the authors to determine the potential opportunities and threats for its recovery. The systems approach is employed to identify the factors of human capital formation, development and preservation using

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the results of SWOT-analysis. Consequently, the authors develop a conceptual framework for building a strategy of the post-war recovery of human capital in Ukraine taking into account the advantages of digitalization. The authors identify three major dimensions within which they propose to implement the main strategic directions of human capital recovery in Ukraine during the post-war period and specify the features of each strategic direction in the context of suggested dimensions.

Key Words:

human capital; human capital investment; strategy of human capital recovery; post-war recovery; digitalization.

JEL: J18, J24, O15, N44.

2 figures, 2 tables, 32 references.

Problem Statement and Literature Review

The competitiveness of a country is determined by the level of human capital development, its qualitative and quantitative characteristics, as well as by the availability of favourable conditions for the formation, development and utilization of human capital in the country. Human capital is the main contributory factor to the well-being of a society, although it requires long-term, massive investment. Investing in human capital occurs through improvements in the quality of nutrition and healthcare services, provision of quality education, creation of decent jobs, vocational training, acquisition of new professions, as well as professional, scientific and educational mobility.

Ukraine stands out in comparison with other countries as one having highly educated and highly skilled human capital. The Russian war of aggression on Ukraine caused significant human losses and rendered the balanced reproduction of human capital impossible. Ukraine is losing human resources due to

forced migration and deportations, war deaths and injuries of the militants and civilians. Human losses are accompanied by the deepening gender, age, educational, and professional gaps. Direct losses of human capital are multiplied by the complications of investing in population's health and education, as well as underutilization of its innovative and creative potential.

At the same time, human capital is a powerful resource for military resistance and post-war reconstruction of the country. It is human capital which has to support economic and technological growth based on digitalization of business and production processes, as well as cultural, moral and democratic values of the society. Hence, there arises an urgent need to work out a strategy for the formation, development and recovery of human capital during the post-war period.

The fundamental works «Investment in Human Capital and Personal Income Distribution» (Mincer, 1958), «Capital Formation by Education» (Schultz, 1960), «Investment in Human Capital» (Schultz, 1961), «Investment in Human Capital: A Theoretical Analysis» (Becker, 1962) have become the point of departure for a new direction in economic theory – the human capital theory. The founders of this theory proposed the new conceptual approach based on the economic feasibility of investing in an individual as a bearer of human capital. Under human capital investments, they counted expenditures for healthcare, on-the-job training, education system, and adult learning (Schultz, 1961). A significant achievement of the human capital theory was the division of human capital into general and specific human capital (Becker, 1962). General human capital is formed through acquisition of formal education and realized through assimilation of universally applicable knowledge and skills, whereas specific capital is formed through learning and acquisition of a narrow set of specialized skills.

The structuring of human capital into general and specific human capital laid the foundation for a modern approach to human capital research based on hard and soft skills. There are a number of studies that show how soft skills affect incomes of their owners and substantiate the feasibility of implementing a state policy on education for their development (Dixon et al., 2010; Heckman & Kautz, 2012; Deming, 2017).

The development of digital technologies sets new requirements for human capital and induces the demand for digital skills of employees. The contribution by Flores, Xu & Lu (2020) identifies this new type of employee interactions and competencies that are required by Industry 4.0. The work by Vereycken, Ramioul, Desiere & Bal (2021) studies the practices of aligning digital technologies with personnel-related issues, in particular human resources management.

The works by Ukrainian scientists focus on the research of human capital and changes in work under conditions of digitalization. The monograph by Kolot & Herasymenko (2021) presents the authors' view of the concept of work and employment under conditions of digital transformation of the society. The mono-

graph written by the group of authors from the Institute of Industrial Economics of the National Academy of Sciences of Ukraine (2022) highlights the impact of digitalization on the social-labour sphere.

The full-fledged Russian invasion has induced a shift of focus in the works of Ukrainian human capital researchers. New articles by Antoniuk (2022a, 2022b), Heyets, Blyzniuk & Nykyforuk (2022), Shamileva & Khandii (2022) are dedicated to losses of human capital, decreased labour resource security, and prospective directions for post-war recovery. A related study by Dulska (2022) is focused on the determination of gaps in digital and infrastructural skills and the search for ways to minimize them.

The Russian-Ukrainian war is still taking place, as do the accompanying losses of human capital, which makes it necessary to find ways for its recovery and to provide substantiation for the strategy of formation, development and reproduction of human capital in the post-war period.

The aim of this article is to evaluate the possibilities for human capital recovery in Ukraine in the post-war period on the basis of digitalization and conceptual, organizational and managerial support.

Methodology

In the process of research, the authors used such general methods of scientific cognition as logic, comparison, generalization, and systematization. The systems approach was used to determine the factors of human capital development and to combine them into pairs based on the content attribute. The systematization of human capital gains and losses caused by the Russian-Ukrainian war, as well as potential opportunities and threats for human capital recovery, was carried out with the help of the SWOT analysis matrix. Proceeding from the results of performed analysis, the authors determined the strategic directions for human capital recovery.

Research Results

From the standpoint of systems approach, human capital is a dynamic system, the components of which are transformed under the influence of many factors. At the core of this system is the human capital itself with its inherent characteristics – the internal and external factors that affect its formation and development. The focus of this study is made on the factors that create favourable condi-

tions for the formation, development and preservation of human capital in the country.

The crucial point of this study is to determine the vectors for the development of human capital by studying the factors that contribute to its capitalization. This requires that human capital development factors be grouped by the type of environment in which they originate (internal, external). The **internal factors (qualities) of human capital** are defined by the authors as a set of personal characteristics that represent inborn and developed qualities of separate individuals. Every bearer of human capital has unique traits that are comprised of both the qualities that were inherited and the qualities that were developed and acquired through education, work, life experience, style of living, etc.

The proposed classification is peculiar in that it combines the factors into cross-cutting pairs based on their content attributes, that is, depending on whether these are internal or external factors. It would be feasible to divide the external factors, depending on the level of their impact, into factors of direct impact (macro-environment) and factors of indirect impact (global environment). **External factors of direct impact** create either favourable or unfavourable environment for the formation, development, utilization and retention of human capital inside the country. Direct impact factors are formed by public policies in respective areas.

The qualitative characteristics of human capital find their continuation in the direct-impact factors of external environment, thus, they need to be combined into pairs: «self-identity – cultural environment of the country, historical heritage», «skills – national system of education», «talent – competition in the national labour market», «internal motivation – quality of working life», «health – system of healthcare and medical insurance»; «network interaction – digital transformation of society». The reference directions in the development of mentioned pairs are represented by global factors that can have positive or negative vectors (Table 1).

External factors of indirect impact fall beyond the reach of macro-environment-level institutions, serving as guides and reference directions in forming our understanding of the determinant trends in global development. Global trends can form positive or negative vectors in the development of human capital.

The identified paired factor combinations enable us to understand deeper the substantive aspects of the formation, development and preservation of the country's human capital, whereas global factors determine the trends in their development.

Table 1

The factors of formation, development and preservation of human capital

Internal characteristics (factors)	External factors	
	Macro-environment	Global environment
Self-identity	Cultural environment of the country, cultural heritage	Multiculturalism Strengthening of the national identity «Economic narratives»
Skills	National education system	Global education system
Talent	Competition in the national labour market	Competition in the global labour market
Internal motivation	Quality of the working life	Humanization of the social and labour sphere
Health	National system of health-care and medical insurance	Innovative medical technologies, pandemics, military aggression
Network interactions	Digitalization of society and national economy	Global digital technologies

The pair of factors 'self-identity – cultural environment, historical heritage' is extremely important for enhancement of the nation's cultural code, its dignity and self-consciousness, consolidation of the civil society, development of democracy, and improvement of social health. The country's cultural environment determines the contents of the strategy of development of the society, its ethical and moral values. These factors shape the effective interactions between members of the society, bring into alignment the credibility of the state and social trust, ensure that social contract is drawn up and maintained. Such a combination of factors (pairs) contributes to formation of a decent political elite strengthened by social energy of the conscious citizens of the society.

The significance of cultural influence on the economy was studied in the work by Shiller (2020), in which he explains the connection between the changes in asset prices and the economic narratives. Narratives change the economic behaviour of market players. Any unit of information can become a narrative. In the digital space, dissemination of information reaches a significant scale and becomes an inseparable part of the socio-economic policy of the state.

On the global scale, this pair is defined by two opposite vectors of development: One vector is directed towards formation of the multicultural environment, a process facilitated by digital technologies through social multicultural

networks; the other vector is directed towards strengthening of the national identity via resistance to external threats. The combination of these trends is assured by glocalization, which contributes to penetration of global tendencies into the regional and local levels, while simultaneously preserving and enhancing the local peculiarities.

The combined pair of factors «*skills – national system of education*» lays the foundation for the formation and development of human capital and its innovative features. Traditionally, skills have been divided into hard skills and soft skills. Hard skills include strictly professional competencies, whereas soft skills include the abilities of persuasion and establishing connections, leadership qualities, personality development, critical thinking, the ability of meeting deadlines, etc. Digitalization of economy creates the demand for fundamentally new skills that can be defined as 'smart skills'. *Smart skills* include the advanced professional digital skills, the ability to create new technologies and new digital products, the ability to interact with 'smart' digital technologies, such as, for example, artificial intelligence, the ability to master the new architecture of socio-labour relations based on application of digital instruments.

The demand for soft skills increases the mobility of the labour force, whereas the demand for smart skills forms a request for digital migration both at the national level and globally. Digital skills enabled some part of internally displaced persons and forced migrants to keep their jobs during wartime and to maintain employment through the use of digital technologies.

Education is the initial stage of investing in human capital. At this stage, individuals accumulate rapidly their stock of human capital with the help of education, which later leads to increased labour productivity. The main factor that affects the formation and development of human capital is the system of high school education because it has a long-lasting effect on its quality (Hanushek, 2013). The subsequent formation of all kinds of skills takes place in the system of vocational training and higher education and is further supported by life-long learning.

In this case, the external vector is represented by the available global digital education environment. Digital education platforms have simplified the access to knowledge and provided a broad range of educational courses for anyone who is interested in learning.

The next pair of factors '*talent – competition in the national labour market*' is tightly connected with the previous pair. *Talent* is the highest level of expression of human capabilities. Talent, similar to other capabilities, can be developed by an individual throughout his or her entire life if there is a favourable environment for doing so. Favourable conditions for capability development are created by the high school, vocational and higher education, family values and socio-cultural environment. Under the conditions of modern economy, a new, digital

environment is formed, which contributes to the development and realization of digital capabilities and talents.

Talent gives advantages to bearers of human capital in their *competition* for better working conditions. Due to spread of digital technologies, competition in the labour market intensifies, leading to creation of a digital segment for talent competition. The global trend here is towards forming and developing the digital segment of the global labour market, where competition for the best talent, on the one hand, and for the best working conditions, on the other hand, is taking place. Ukrainian specialists that have advanced digital skills are participants in this global segment of the labour market.

Internal motivation is based on the significance that an individual assigns to her work and her opportunities for success should the task be performed properly. Changes in internal human capital factors are largely defined by the processes that take place in the external environment. External motivation is created under the influence of economic, social, educational, cultural, and other factors, which form an adequate *quality of the working life*.

The substantive characteristics of the quality of working life include the possibility of full employment and its stability; absence of discrimination and pressure in work; decent and fair labour remuneration; safe working conditions; decent duration of work time; employment in line with the educational and professional qualification level; prospects for career growth and self-realization; availability of innovative and creative components in the work process; social dialogue; social protection, provision of social guarantees, etc. (Novikova et al., 2021). It would be reasonable to supplement the above list with yet another extremely important component – *digital workplace security*. This component is preconditioned, *first of all*, by the digitalization of business and production processes, whereby the pace of technology development exceeds the speed of safety measures implementation, primarily at the micro-level. *Second*, the Russian-Ukrainian war has aggravated the issue of digital security caused by hacker attacks on critical infrastructure and information resources of ministries and government departments.

The global trend that guides this pair of factors is the humanization of work, a concept which acquired new substance in connection with the digitalization of production processes and spread of the remote work which is carried out with the help of digital technologies.

Human health is another important factor in the formation and development of human capital, whereas the pair of factors «*health – national system of healthcare and medical insurance*» provides for effective realization of all other paired combinations. Health enables the bearer of human capital to perform his work productively; it depends on a set of genetic, physiological, cultural, social, economic, and other factors. Having satisfactory health is one of the preconditions that allow individuals to realize their talents, skills and capabilities.

National healthcare and medical insurance system creates favourable conditions for higher longevity, lower death rates and provision of medical services to population. The system of medical insurance enables the provision of medical services. National healthcare and medical insurance systems create favourable conditions for either simple or expanded schemes of the reproduction of population.

For this pair, the positive global vector is the development of medical technologies and pharmaceutical industry. The negative vectors are pandemics and wars. Based on the data of *Human Development Report 2021/2022* (UNDP, 2022), more than 90% of countries experienced a decrease in the Human Development Index in 2020-2021 due to destructive impact of the COVID-19 pandemic.

A special significance under the conditions of digital transformations is assigned to the pair «*network interactions – digitalization of society and economy*». Social networks have widened their channels and created new communication platforms, «erased» territorial borders, diversified and accelerated the interaction process. This produced an impact on the system of interactions among major players in the sphere of employment, where digital technologies have given rise to a new type of relationships between the participants of the work process, changing the essential understanding of the workplace and the principles of its organization. Technologies made it possible for employees to interact within digital workspaces, having transformed the social-labour relations into the digital format.

In the global space, the development of digital technologies leads, on the one hand, to technological breakthroughs, while on the other hand, it gives rise to increasing cyber-threats, spreading of disinformation, illegal use of data (including personal data), manipulations, etc. «For people who are online, every aspect of their lives becomes commodifiable data, raising worrying questions about who has access to what information, especially sensitive personal information, and how it is being used» (UNDP, 2022).

Direct external factors create favourable conditions for development through strategies, policies, programmes and their implementation plans aimed at improving the country's internal human capital factors. The suggested pairs allow to identify gaps and to develop a complex systems approach to formation of the strategy of human capital recovery in the post-war period. Indirect external factors give an understanding of the global trends and vectors that should be taken into account when forming national strategies of human capital recovery in Ukraine in the post-war period. The developed classification of factors is an instrument for determining the priorities, directions and measures of human capital development during the post-war period.

Having examined the publications of Ukrainian scientists about the destructive impact of the Russian war of aggression upon the quantitative and qualitative indicators of human capital (Antoniuk, 2022a; 2022b), (Shamileva & Khandii, 2022), (Vasylytsiv et al., 2022), foreign articles (Kondylis, 2010; Justino,

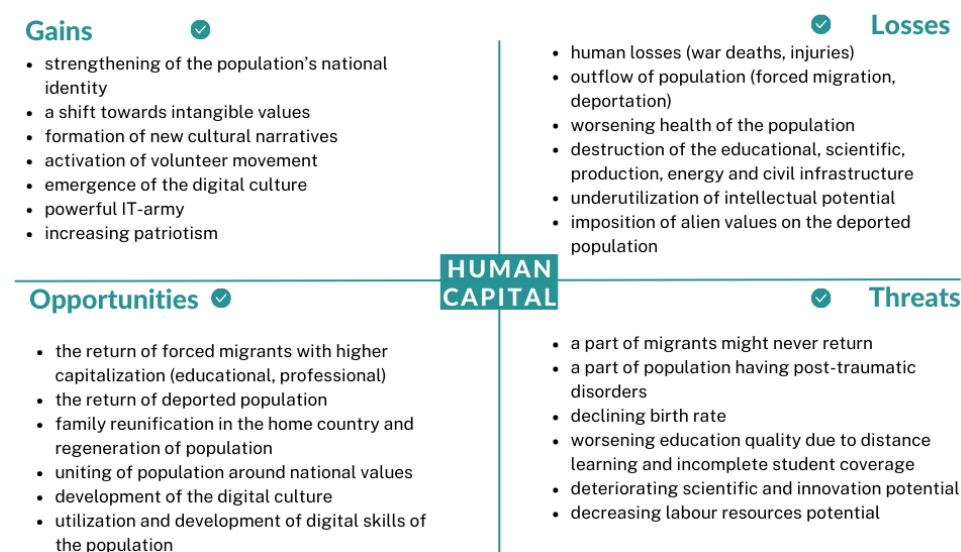
2011; Swee, 2015) and the authors' earlier publications (Zaloznova & Azmuk, 2022; Azmuk, 2022), we systematized the human capital losses and gains of Ukraine over the wartime period.

The *major losses* of human capital include primarily human losses due to war deaths, injuries and disabilities of militants and civilians, outflow of population abroad through migration and deportations; loss of population's health and its significant worsening; destruction of educational, scientific, medical, production, residential, energy infrastructure; dangerous environmental situations, etc.

The *major gains* are represented today by such social processes as strengthening of the national identity of population, increasing patriotism, intensification of the volunteering activity, emergence and expansion of new digital volunteering in the form of a powerful IT-army, the emergence of digital culture, spread of digital employment, and enhancement of digital security of the population. The analysis of gains and losses gives us grounds to search for the potential opportunities for human capital recovery and ways to mitigate the potential risks. The systematization of losses, gains, threats and opportunities was performed with the help of the SWOT-analysis matrix (Figure 1).

Figure 1

Systematization of the gains, losses, potential opportunities, and threats for human capital development



The *potential opportunities* include the formation of the community united by national values; capitalization on education of young high school and university students through acquisition of education abroad; capitalization of labour through acquisition of new professional experience; formation of digital culture; volunteering.

The *potential threats* include the non-return of some part of migrants; post-traumatic disorders in a part of population; a decrease in birth rate; a decrease in education level; a decrease in the scientific and innovation potential; an increase in labour-resource insecurity.

The systematization of potential opportunities and threats is a convenient instrument for developing the strategic directions of human capital recovery.

Ukraine has significant reserves for human capital recovery. Currently, Ukraine has adopted the *Strategy of Human Development*, which was supposed to be implemented by 2025. This strategy sets four strategic goals, the achievement of which is aimed at improving the demographic situation, performing the education reform, ensuring citizen equality, developing the culture, and improving the level of well-being and social providing of population, etc. (Decree of the President, 2021). At the same time, the implementation of this strategy is impossible during the period under martial law and it is also irrelevant to the tasks of post-war recovery.

The strategy of post-war human capital recovery, as a component of the updated *Strategy of Human Development*, should be based on new realities so that to minimize as much as possible the destructive impact of war on human capital by using the instruments of digital transformation of the society. The goals of the recovery strategy should encompass three tightly interconnected dimensions aimed at creating favourable environment for the formation, development and preservation of human capital in Ukraine.

The first dimension deals with bringing the Ukrainian citizens back to their Homeland. The second dimension involves building an efficient system of formation, development and preservation of human capital in the country based on the intensive type of human capital reproduction, which entails improvements in its qualitative characteristics, such as health, education, professional skills, quality of the working life, etc. The third dimension is narrower in specialization and focused on enhancing the labour resource security of the country.

The strategic directions for the preservation, recovery and development of human capital in Ukraine are structured within the framework of three dimensions based on external factors of human capital development and oriented towards investing in quality characteristics (internal factors). The structure of the strategy of formation, development and preservation of human capital based on this principle is shown in Figure 2.

The specification of strategic development directions in accordance with the factors of human capital formation, development and preservation is shown in Table 2.

Figure 2

The structure of the strategy of human capital preservation and recovery in Ukraine

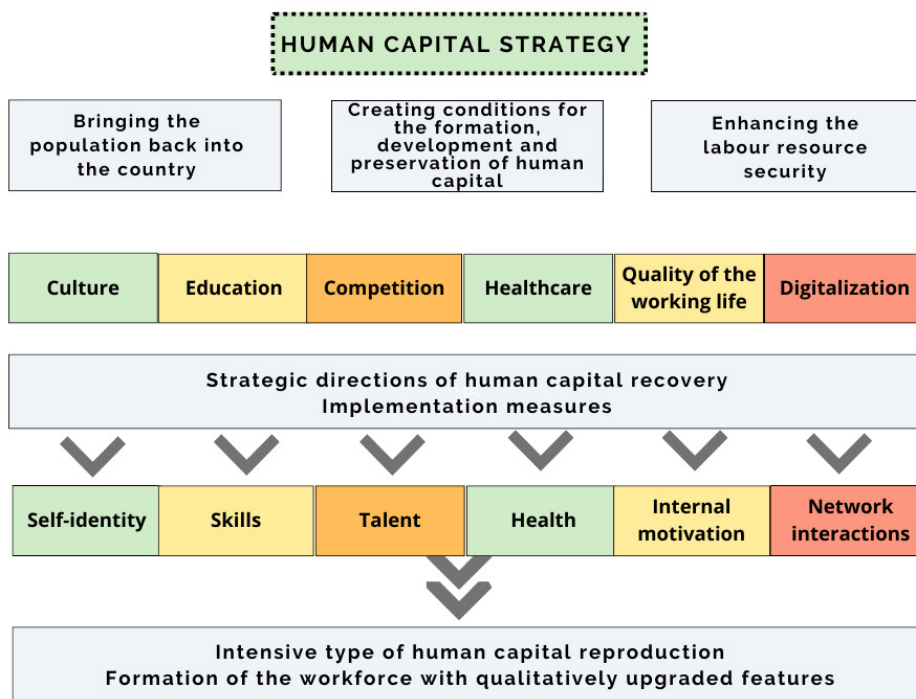


Table 2

Strategic directions of the formation, development and preservation of human capital in the post-war period

Strategic directions	Bringing the human capital back	Creating conditions for human capital recovery	Strengthening the labour resource security
Self-identity – Cultural environment			
Enhancing and disseminating national cultural narratives	+	+	
Forming the foundations for development of the moral economy	+	+	+

Strategic directions	Bringing the human capital back	Creating conditions for human capital recovery	Strengthening the labour resource security
Developing the digital culture and forming its cyber-security component		+	+
Skills – National system of education			
Reforming the system of education		+	+
Reconstructing the damaged and upgrading the existing education infrastructure	+		
Educational programmes for individuals who return back to Homeland	+		
Developing advanced digital skills for high school and university students		+	
Up-skilling and re-skilling, taking into account technological modernization of enterprises		+	+
Talent – Competition in the labour market			
Supporting the development of innovations			+
Supporting the science and scientific research			+
Developing the innovative infrastructure			+
Internal motivation – Quality of the working life (QWL)			
Building of 'smart cities'	+	+	
Technological upgrading of enterprises		+	+
Stimulating business and self-employment		+	+
Ensuring the decent work conditions			+
Health – National system of healthcare			
Finalizing the medical reform		+	+
Programmes of psychological support	+	+	
Reconstructing the damaged and upgrading the existing medical infrastructure	+	+	+
Medical insurance		+	+

Strategic directions	Bringing the human capital back	Creating conditions for human capital recovery	Strengthening the labour resource security
Programmes for stimulation of child birth		+	
Network interactions – Digitalization of society and national economy			
Reconstructing the digital infrastructure on de-occupied territories	+		
Developing digital infrastructure		+	+
Programmes for digitalization of the interactions between the citizens and the authorities, as well as between economic entities and authorities		+	+
Digitalization of the labour sphere, developing remote, digital, platform-based employment		+	+
Digitalization of services for the population		+	+

The main strategic directions of the state policy *within the first dimension* should be the following:

1. *Enhancing the national culture* through formation of narratives and their dissemination through education system, media and digital medium. The measures in this area should be directed towards strengthening of the national code and patriotism, forming the feelings of belonging to a powerful, motivated and just nation. Building the foundations for the human-centred national economy – *the moral economy* – should be an important direction in this area.

«Culture, morals, ethics should be in the epicentre of the new economy and network society» (Kolot & Herasymenko, 2022). Ukraine has all the reasons to become a world leader in forming the national economy based on the principles of the moral economy.

2. Reconstructing the housing and civil infrastructure based on fundamentally new approaches. Such reconstruction should entail not so much the replacement of broken window glasses, as the *development* of 'smart cities'. Such cities are characterized by the availability of intellectual life support systems, human-centred construction and engagement of citizens in city management. Resi-

dential complexes should be built with a focus on the needs of individuals, rather than owners of construction companies.

3. The programmes *for stimulating business development and self-employment* are the main condition for the formation of favourable environment in the country, into which it would be worthwhile to return. These programmes should be comprehensive in nature. They should stipulate for a system of support mechanisms, including financial (tax privileges, credit programs, investment projects), regulatory (simplified regulative and administrative rules for business), educational (teaching best practices in business), and digital (forming an integrated digital infrastructure) support schemes, which would be provided through creation of favourable environment for the creation of private businesses and de-shadowing of private enterprises. A policy of entrepreneurship support would contribute to the creation of new jobs, development of self-employment and growth in tax collections.

The formation of favourable business environment should provide incentives for the creation of *jobs with decent working conditions*, which would induce improvements in the quality of the working life. This is the approach that would create conditions for the return of human capital back into the home country, though some part of migrants will find decent jobs abroad.

4. *Rebuilding the damaged and modernizing the existing educational infrastructure*. Introducing special *education projects and study programmes for different population groups*, in particular high school children, youth and adults. The programmes should be aimed at removing the gaps in high school programmes for the children of school age, students of vocational and higher education with special terms of enrolment, as well as programmes for re-skilling or up-skilling for adults. The introduction of such programmes should create favourable environment for investments in education.

5. Developing and implementing the *psychological support programmes targeted at family reunification* would be an important addition to the above-mentioned measures. Divided families are the mark of this war: Women with children are abroad, while men remain in Ukraine. Each family member is acquiring her own experience, learning to face challenges by herself, learning to live separately. Family members, who moved abroad, will be partially assimilated in other cultural and social environments. These circumstances create a potential for breach of families, which can aggravate under the conditions of an economic crisis. This is why it is necessary to develop and implement the programs of psychological rehabilitation for family reunification at the state level.

6. *Reconstructing digital infrastructure on the de-occupied territories* is another direction for stimulating the return of Ukrainian citizens back to Ukraine. This would allow the people to be included in the national digital space, to obtain administrative services and to study. Digital infrastructure is an important element of providing the decent quality of life.

The measures within the first dimension should be supplemented with the measures that should be implemented within **the second dimension**, whereby the following strategic directions should be specified:

1. Introducing a state programme for the formation and development of *digital culture* should become one important direction in Ukraine. Such a programme should stipulate for the formation of foundations, principles, values of national digital culture, the mechanisms of its implementation among people of all age groups, and the respective sources of financing. The introduction of respective courses, disciplines and modules in educational establishments should become an element of such a programme. Another important element should be the introduction of *educational programmes in cyber-security and cyber-hygiene* for all age groups. Digital culture should become an inseparable part of the country's moral economy.

2. *Reforming the system of general secondary education*, which should be based on creating a favourable environment for the development of *talents* in the country, strengthening the technical component of the education process, ensuring equal study conditions in urban and rural areas, using the world's best practices of organizing and digitizing the educational establishments. This time period should be marked by the introduction of *programmes for the development of digital skills* into the education process.

Reducing the number of higher educational establishments and forming the powerful, well-equipped university centres that would be integrated into business environment instead. The state policy in this sphere should be directed towards forging a favourable educational and scientific environment for international and external investments. Expanding the science and research projects and experience exchange programmes, up-skilling of the scientific and pedagogical staff of national higher educational establishments in foreign universities. The reform of education should ensure the formation and development of human capital at an adequate educational and qualifications level by providing equal access to all levels of quality education for the participants of the education process.

3. *Finalising the healthcare system reform* taking into account an increased load on healthcare due to lack of medical specialists and the worsened health of the population. *Reconstructing the damaged medical infrastructure* and technological upgrading of the existing infrastructure. Introducing obligatory *medical insurance programmes* for population. An important element in the healthcare system should become the *post-traumatic rehabilitation programmes* for the people who suffered physical and psychological traumas during the war time.

4. Introducing *the programmes of birth rate stimulation* through implementation of preferential housing programs, financial support for families with children, student loans, tax privileges for families with children, etc. The programmes

should be based on the comprehensive approach and stipulate for substantial privileges for families with children in all areas of human life.

An important component of human capital recovery should become the **third dimension – strengthening the labour resource security**. In view of the country's long-term tendency towards natural decrease in population and workforce aging, which is intensified by the destruction of population during wartime, the post-war recovery should be based on the **intensive** type of workforce reproduction. This entails that the focus be placed on the development of qualitative characteristics of the workforce, such as education, professional qualifications, up-to-date skills, motivation, and capability to produce innovations. In order to introduce such an approach, it is necessary to perform the technological upgrading of industry, which should result in the appearance of new jobs with decent working conditions.

The main strategic directions should include technological industry upgrading, strengthening of the science system, stimulation of innovations, development of innovative and digital infrastructures, and digitalization of business, industry, infrastructure and business-government interactions.

1. *Technological upgrading* involves introducing changes in the approaches to national industrial policy. The main focus should be placed on the development of innovative enterprises, which not only use, but also produce new technologies for production of goods and services, management and logistics. Such enterprises should become the platforms for generation of innovations. High-quality human capital should become the driving force of technological upgrading.

The development of technology-intensive enterprises is only possible on the conditions that the state policy for support and development of innovations is effective and that grant projects are involved. The implementation of this direction will build foundations for creating decent jobs and become the main incentive for the return of Ukrainian citizens back to their home country. Technological industry upgrading is not possible without strengthening of the economy's scientific component.

Strengthening of the science component should be based on the increased volumes of financing, enhanced business-to-science and science-to-business interactions and implementation of the cross-cutting comprehensive approach to providing support and incentives for the development of science, industry and innovations.

A comprehensive approach to stimulating the development of science, industry and innovations should include the following components: Integrating science into the post-war reconstruction of all branches of the economy; focusing the scientific research on innovations; developing the *innovative infrastructure* (techno-parks, accelerators, local centres for science and technology develop-

ment, etc.); and disseminating the scientific research commercialization experience.

Providing public targeted support for science will ensure the development of innovative human capital and create conditions for its retention inside the country, as well as for attraction of specialists from abroad.

2. Technological upgrading of enterprises requires the workforce to have qualitatively new skills, including *smart skills*. This need should be satisfied by means of *up-skilling and re-skilling* of the workforce. Emphasis should be placed on the programmes for the development of advanced digital skills within professional areas, as well as smart skills development programmes.

3. *The programmes of digital interaction* that involve the digitalization of public governance, *development of digital infrastructure*, stimulation of digital transformations in business, and providing of support for scientific research in these areas will create conditions for digital transformation, simplification of access to services and increased quality of well-being of the population.

Practical Applications

This study was performed as part of the scientific research project entitled «The formation of the balanced socio-labour development under the conditions of digital transformations» (State registration number 0121U114674) carried out by the Institute of Industrial Economics, National Academy of Sciences of Ukraine. The presented results constitute part of the scientific report entitled «Preservation, development and recovery of human capital under the war and post-war conditions using the advantages of digitalization: Conceptual approaches and possibilities for implementation», which was sent to the respective target audience – the state bodies of executive power at the national level that are responsible for dealing with the above-mentioned problems.

Conclusions

Human capital is the main source behind the development of the country's economy in the post-war period. In order for this function to be fulfilled, we propose a conceptual model of the post-war human capital recovery in Ukraine, which is based on combinations of factors of different origin – internal factors, which represent qualitative characteristics, and external factors, which are of two kinds: (1) direct-impact external factors, which represent different parameters of the macro-environment; and (2) indirect-impact external factors, which represent

different parameters of the global environment. The internal factors were combined into pairs with factors of the macro-environment; and for each paired combination, the potential development vectors were identified in the global environment. The resulting groups serve as an effective instrument for developing the strategy of human capital formation, development and preservation under the conditions of post-war recovery.

The systematization of gains and losses of human capital under wartime conditions allows determining the threats and opportunities for its post-war recovery. Based on the suggested systematization, we developed a conceptual approach to strategizing the post-war recovery of human capital in Ukraine. The developed strategy is aimed at minimization of human capital losses, strengthening of its qualitative characteristics and creation of favourable conditions for its recovery, preservation and development.

The goals of this strategy should encompass three dimensions and be in accordance with human capital factors: the first dimension deals with bringing the citizens back into the home country; the second dimension is the one which forms an efficient system of recovery, preservation and development of human capital; the third dimension is concerned with raising the labour resource potential of the country. The Strategy of Human Development should be implemented at the national level, it should become an inseparable part of the Roadmap for Ukraine's recovery from destructive consequences of war, and it should acknowledge the leading role of human capital in these processes.

References

- Azmuk, N. A. (2022). The transformation of the labor market in the conditions of war: Challenges and strategies for labor force renewal [in Ukrainian]. *Herald of the Economic Sciences of Ukraine*, 1(42), 171-179. [https://doi.org/10.37405/1729-7206.2022.1\(42\).171-179](https://doi.org/10.37405/1729-7206.2022.1(42).171-179)
- Antoniuk, V. P. (2022a). Problems of the formation of human capital of Ukraine in the education system and its risks in the realities of war [in Ukrainian]. *Herald of the Economic Sciences of Ukraine*, 1(42), 161-170. [https://doi.org/10.37405/1729-7206.2022.1\(42\).161-170](https://doi.org/10.37405/1729-7206.2022.1(42).161-170)
- Antoniuk, V. P. (2022b). Risks and losses of human capital as a result of war [in Ukrainian]. *Economic Herald of the Donbass*, 1(67), 110-116. [https://doi.org/10.12958/1817-3772-2022-1\(67\)-110-116](https://doi.org/10.12958/1817-3772-2022-1(67)-110-116)
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5, Part 2), 9-49. <https://www.jstor.org/stable/1829103>

- Decree of the President of Ukraine No.225/2021 as of June 2, 2021. On decision of National Security and Defense Council of Ukraine dated May 14, 2021, «On Strategy of Human Development» [in Ukrainian]. <https://www.president.gov.ua/documents/2252021-39073>
- Dixon, J., Belnap, C., Albrecht, C., & Lee, K. (2010). The importance of soft skills. *Corporate Finance Review*, 14(6), 35-38.
- Deming, D. J. (2017). The value of soft skills in the labor market. *NBER Reporter*, 4, 7-11. <https://www.nber.org/reporter/2017number4/value-soft-skills-labor-market>
- Dulska, I. (2022). Ways to bridge digital infrastructure and skills gaps in Ukraine [in Ukrainian]. *Economy of Ukraine*, 7, 43-66. <https://doi.org/10.15407/economyukr.2022.07.043>
- Flores, E., Xu, X., & Lu, Y. (2020). Human capital 4.0: A workforce competence typology for Industry 4.0. *Journal of Manufacturing Technology Management*, 31(4), 687-703. <https://doi.org/10.1108/JMTM-08-2019-0309>
- Hanushek, E. A. (2013). Economic growth in developing countries: The role of human capital. *Economics of Education Review*, 37, 204-212. <https://hanushek.stanford.edu/sites/default/files/publications/Hanushek%202013%20EER%2037.pdf>
- Heckman, J. J., & Kautz, T. (2012). Hard evidence on soft skills. *Labour economics*, 19(4), 451-464. <https://doi.org/10.1016/j.labeco.2012.05.014>
- Heyets, V., Blyzniuk, V., & Nykyforuk, O. (2022). Topical aspects of social quality policy in the post-conflict economy of Ukraine [in Ukrainian]. *Economy of Ukraine*, 6, 03-22. <https://doi.org/10.15407/economyukr.2022.06.003>
- Novikova, F. O., Zaloznova, O. I., Amosha, O. I., Khandii, O. O., Azmuk, N. A., Ostafiychuk, Ya. V., Shamileva, L. L., Pankova, O. V., Novak, I. M., Shastun, A. D., Kasperovych, O. Yu., Ishchenko, O. V., Krasulina, Ya. Ye., Amelicheva, L. P., & Kompaniyets, V. V. (2022). *Transformation of social-labour sphere under the conditions of digitalization of the economy* (ed. O. Novikova) [in Ukrainian]. Institute of Industrial Economics of the National Academy of Sciences of Ukraine. https://iie.org.ua/wp-content/uploads/application/pdf/da_mono_2022-pdf-na-sajt_compressed.pdf
- Justino, P. (2011). Violent conflict and human capital accumulation. *IDS Working Papers*, 2011(379), 1-17. https://doi.org/10.1111/j.2040-0209.2011.00379_2.x
- Kolot, A. M., & Herasymenko, O. O. (2022). To the philosophy of moral economy: Conceptology of anthropocentrism (part I) [in Ukrainian]. *Demography and Social Economy*, 3(49), 65-88. <https://doi.org/10.15407/dse2022.03.065>
- Kolot, A. M., & Herasymenko, O. O. (2021). *Work XXI: Philosophy of changes, challenges, vectors of development* [in Ukrainian]. KNEU named after Vadym Hetman.

- Kondylis, F. (2010). Conflict displacement and labour market outcomes in post-war Bosnia and Herzegovina. *Journal of Development Economics*, 93(2), 235–248. <https://hicn.org/wp-content/uploads/sites/10/2012/06/wp45.pdf>
- Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of political economy*, 66(4), 281-302. <https://doi.org/10.1108/JMTM-08-2019-0309>
- Novikova, O., Shamileva, L., & Khandii, O. (2021). Quality of working life in view of digitalization of the economy: Assessment and development trends. *Journal of European Economy*, 20(3), 387-408. <https://doi.org/10.35774/jee2021.03.395>
- Schultz, T. W. (1960). Capital formation by education. *Journal of political economy*, 68(6), 571-583. <https://doi.org/10.1086/258393>
- Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1-17. <https://www.jstor.org/stable/1818907>
- Shamileva, L., & Khandii, O. (2022). The main trends and consequences of deepening imbalances in the labor sphere during the first six months of martial law in the country [in Ukrainian]. *Herald of the Economic Sciences of Ukraine*, 1(42), 180-187. [https://doi.org/10.37405/1729-7206.2022.1\(42\).180-187](https://doi.org/10.37405/1729-7206.2022.1(42).180-187)
- Shiller, R. J. (2020). *Narrative economics: How stories go viral and drive major economic events*. Princeton University Press.
- Swee, E. L. (2015). On war intensity and schooling attainment: The case of Bosnia and Herzegovina. *European Journal of Political Economy*, 40, 158-172.
- UNDP. (2022). *Human development report 2021-22*. United Nations. https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22pdf_1.pdf
- Vasylytsiv, T. G., Mulaska, O. P., Lupak, R. L., & Bidak, V. Ya. (2022). Preservation of Ukraine's human capital in conditions of war (factor of social vulnerability of the population): Statement of the problem [in Ukrainian]. *Herald of Lviv University of Trade and Economics. Economic Sciences*, 67, 43-48. <https://doi.org/10.36477/2522-1205-2022-67-06>
- Vereycken, Y., Ramioul, M., Desiere, S. & Bal, M. (2021). Human resource practices accompanying industry 4.0 in European manufacturing industry. *Journal of Manufacturing Technology Management*, 32(5), 1016-1036. <https://doi.org/10.1108/JMTM-08-2020-0331>
- Zaloznova, Yu., & Azmuk, N. (2022). Human capital of Ukraine in the conditions of war: Losses and Gains [in Ukrainian]. *Economy and Society*, 38. <https://doi.org/10.32782/2524-0072/2022-38-59>

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