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Human Capital's Impact on Economic Growth in Wartime Conditions

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Abstract

State financing of human capital at the macro level is explored by analysing the dynamics of critical social budget expenditures from 2014 to 2023. The article investigates the essence of the concept of "human capital", structures its components, and presents them in a multi-level analysis based on the principle of comparative aggregation. Sources of additional foreign funding and their volumes and dynamics since 2013 are also identified. The structure and problems of human capital at the micro level are examined, revealing dependencies between existing tasks and the factors that caused them. At the individual level of human capital, the qualities of personnel that hold significant value for employers are established. The Human Capital Index, Human Development Index, and Global Innovation Index are used to analyse the state of human capital in Ukraine and other countries. A regional analysis of wages, one of the key factors influencing the sufficiency and quality of human capital, is conducted, identifying regions with the highest and lowest wage levels and the balance of wages within each region.

Keywords: *human capital, socio-economic policy, social protection, state budget expenditures, international financing*

Introduction

Key indicators of a country's success and development include prospects, innovation, productivity, and the standard of living. Many external and internal factors influence the high levels of these indicators; however, human capital remains one of the most significant.

The military actions ongoing in Ukraine since 2014 have led not only to negative quantitative changes in the distribution of human capital in the country but also to structural shifts in professional, age, gender, and other dimensions. A significant portion of the quantitative loss of human capital caused by military actions is related to forced migration, deportation, injury, or death. Meanwhile, structural changes occur due to factors such as an increase in the share of women in the structure of human capital in Ukraine, internal migration, and educational and professional reorientation. According to Radchenko et al. (2023), an effective policy regarding access to information for the population and business entities is a fundamental element of effective management of human capital distribution during wartime, which can address issues of population migration and labour shortages.

The labour market shortage of qualified personnel has emerged, stimulating demand for the workforce. However, it has also increased its cost, creating a new burden on business entities. Despite the existing problems, Ukraine has been and remains one of the countries distinguished by highly educated and highly skilled human capital.

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Analysis of Research and Publications

The evolutionary development of the direction of human capital investment efficiency began in the 1960s and 1970s with contributions from Becker (1962), Schultz (1964), and Spence (1974). Akerlof and Stiglitz (1969) studied the impact of wages on human capital indicators. The influence of scientific and technological innovations was explored in the works of the renowned Ukrainian scholars Kuznets (1973) and Lucas (1988). Significant contributions to the development of this scientific direction were made by prominent global scholars such as Coleman (1988), Crawford (1991), and Stroombergen et al. (2002).

Contemporary scientific research on the nature of human capital, its practical utilisation, and investment approaches is presented in the works of domestic scholars (Benko, 2020; Ilyina, 2021; Londar, 2021; Moisiiakha, 2022; Pryimak et al., 2022; Shumska, 2022; Sokolova & Dyuzhev, 2022; Sydorov, 2022; Zaloznova & Azmuk, 2022; Pryimak et al., 2023; Zaplitna & Kukushka, 2023; Duha, 2024). Fonarova (2017) identifies three levels of human capital. The personal level encompasses the knowledge and skills an individual acquires through education and the enhancement of their qualifications. The microeconomic level refers to the collective qualifications and abilities of all employees within an enterprise and the enterprise's achievements in effective labour organisation and personnel training. The macroeconomic level involves investment in education, professional training and retraining, health improvement, and employment processes at the national level, including investments from the business sector.

Pylypenko and Shvets (2023) considers human capital primarily at the personal level, emphasising the dependence of its value on investments in education, healthcare, professional training, as well as the level of experience and motivation of the workforce.

Khavrova and Kozhukhova (2021) note that human capital consists of intellectual resources (expressed in knowledge, skills, and experience), intellectual activity (the ability to perform logical analysis and justify intuitive decisions), intellectual capital (the organisational and structural framework of personnel), and intellectual potential (the qualifications and creative abilities of the workforce).

Human capital is also considered a factor in enhancing a company's competitiveness. The model for evaluating human capital effectiveness developed by Plaksiuk et al. (2023) considers internal and external factors influencing personnel management within the overall business strategy. Implementing this model results in reduced staff turnover, increased employee motivation, knowledge sharing, improved company image, and strengthened competitive positions, among other things.

The dynamism of human capital, as a critical factor in the flexibility of personnel management, was studied by Arsawan et al. (2024). According to Alekseieva et al. (2023), supporting human capital within businesses during wartime is a necessary prerequisite for the effective functioning of enterprises.

Despite the extensive research on the concept of “human capital”, its role in profitable business operations, and its place in the effective development of the economy, these aspects remain underexplored in the context of a European country in wartime during the 21st century.

Research aim. To establish the role and place of human capital in developing a country's economy during wartime. To study the dynamics of the structure of human capital in Ukraine during wartime and compare it with similar indicators from the pre-war period.

Research Methods

The scientific and methodological framework of the research is based on the fundamental principles of modern economic theory, methods of comparative analysis, the structuring of complex economic categories, and their subsequent aggregation according to various grouping criteria. The analytical part of the research is built on methods of horizontal and vertical data analysis, grouping, and methods for assessing the quality of indicators.

Research Results

Modern theoretical research provides numerous definitions of "human capital", which are very similar in content. Thus, contemporary science understands human capital as a combination of knowledge, skills, competencies, health status, and social protection that influence a person's productive potential and can be capitalised upon in implementing a company's business strategy.

Researchers identify internal and external factors influencing human capital. Novikova et al. (2022) define internal factors of human capital as self-identity, skills and competencies, talent and intuition, motivation, health status, and communication and interaction abilities. External factors influencing human capital are divided into microeconomic factors (company culture, technological and technical support, social benefits, support for personal development programs) and macroeconomic factors (economic and social policy in the country, counterparties, competition, market conditions, regulatory systems). Thus, the characteristics of human capital at the individual level are shaped by microeconomic and macroeconomic factors. In turn, human capital at both the microeconomic level (enterprise and team level) and the macroeconomic level (national labour market) is formed based on the characteristics of the individual level (Table 1).

Table 1. Multi-level Human Capital Structure

Individual level	Microeconomic level	Macroeconomic level
Self-identity	Social and psychological climate in the company in terms of racial and gender equality	Level of national culture, support for the culture of national minorities
Competences	Level of training and qualification of staff	Education and professional competence of the population
Potential	Team cohesion and effectiveness	Intellectual development of the population
Motivation	Working atmosphere in the team	The general mood of the population
Health condition	Level of staff performance	Life expectancy and quality of life
Sociability	Networking in the team	Trade unions and professional organisations, specialised communities

Source: compiled by the author

At the individual level, the main components of human capital include self-identity, competencies, potential (talent), motivation, health status, and communication skills. Accordingly, these components are applied to the company's workforce (personnel) and the country's population when considering human capital at the microeconomic and macroeconomic levels.

At the macroeconomic level, human capital is crucial for GDP growth and requires continuous investment from the state and businesses. The main areas where investments in human capital are made at the state level include culture, education, innovation, demography, healthcare, welfare, and the labour market (Figure 1). On the primary Y-axis, the absolute values of state budget expenditures across different investment areas are represented (line graph). In contrast, on the secondary Y-axis, the relative values of these expenditures are displayed (bar chart).

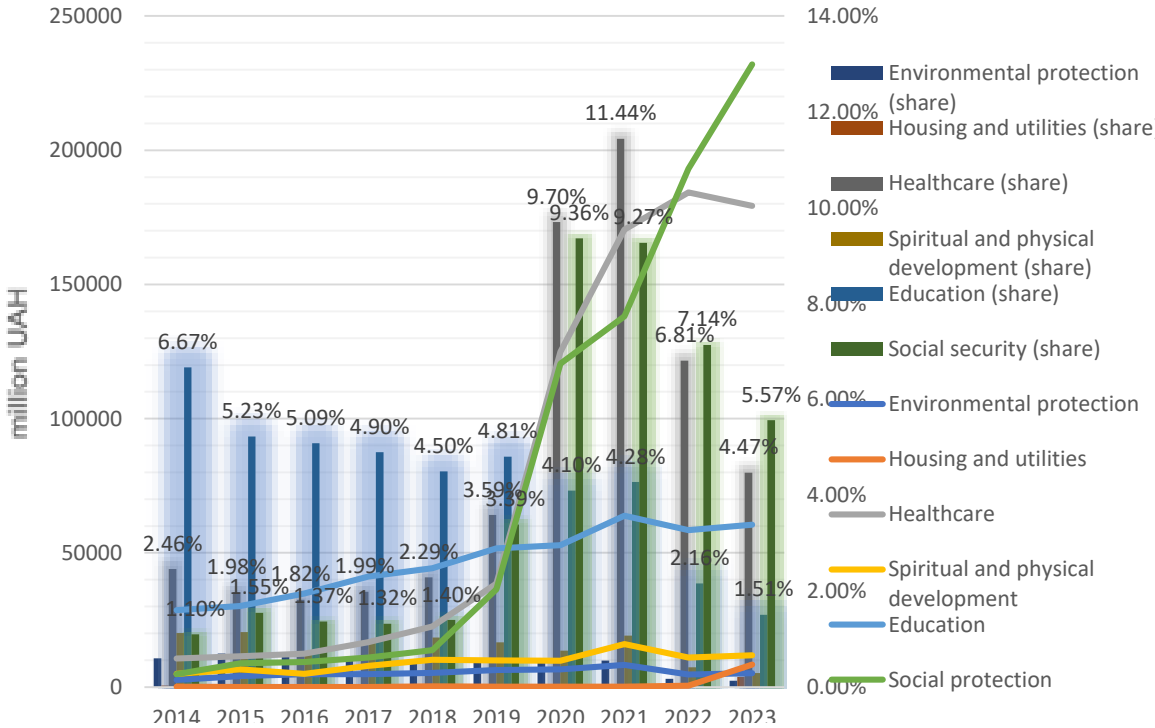

Figure 1. State budget expenditures on human capital financing in 2014-2023

Source: compiled by the author based on the Ministry of Finance of Ukraine (2024)

Therefore, from Figure 1, education was the primary direction of state budget expenditures allocated for financing human capital from 2014 to 2019. The situation changed starting in 2019; during this period, the structure of Ukraine's state budget expenditures was reformatted due to the necessity of increasing the share of expenditures on healthcare and social security, driven by the COVID-19 pandemic. Thus, the share of healthcare expenditures from 2020 to 2021 increased from 3.59% in 2019 to 11.44% in 2021. In absolute terms, healthcare expenditures increased from 38.5 billion UAH to 170.5 billion UAH, more than 5.5 times. The dynamics of the share of education expenditures from 2014 to 2021 gradually decreased from 6.67% to 4.27%,

while the absolute values showed a trend of constant gradual growth. Thus, the volume of education financing from 2014 increased from 26.7 billion UAH to 63.9 billion UAH, almost three times. Considering the devaluation rates of the national currency from 7.99 UAH to 27.8 UAH per US dollar (3.5 times), it can be concluded that the actual volume of education financing during this period remained unchanged. The decrease in the share of education expenditures in the state budget structure occurred due to the relative increase in the budget size itself. With the start of the full-scale invasion of Ukraine in 2022, the structure of Ukraine's state budget was reoriented towards a significant increase in defence expenditures. This, along with the transition to online learning in most educational institutions in the eastern regions of Ukraine, led to a reduction in the share of education expenditures to 2.16% in 2022 and 1.51% in 2023, almost halving. At the same time, the actual absolute financing of education remained at the previous level, which can be explained by the devaluation of the national currency by 1.5 times from 2022 to 2023.

Starting from 2019, there has been a significant increase in social budget expenditures (excluding social pension provision) from 3.39% to 9.27% in 2021, driven by the pandemic. Social protection expenditures increased from 36.4 billion UAH in 2019 to 138.1 billion UAH in 2021, almost 4.5 times. During 2022-2023, the share of social protection expenditures decreased from 9.27% to 5.57%. However, the absolute volume of financing increased from 138.1 billion UAH to 231.9 billion UAH (1.8 times), which, considering the devaluation of the national currency, indicates the constancy of the actual level of social protection financing and the reduction in the share of corresponding expenses in the structure of state expenditures indicates an increase in the absolute size of total state expenditures during this period (primarily due to increased defence and law enforcement spending).

From 2014 to 2021, the levels of funding for culture (spiritual and physical development), environmental protection, and housing and communal services remained nearly unchanged (Figure 2). However, starting in 2022, the funding for culture and the environment decreased by almost half. Conversely, from 2022 to 2023, there was a sharp increase in funding for housing and communal services (by 20 times), which can be explained by the necessity to restore infrastructure in areas affected by the destruction caused by Russian aggression and related military actions.

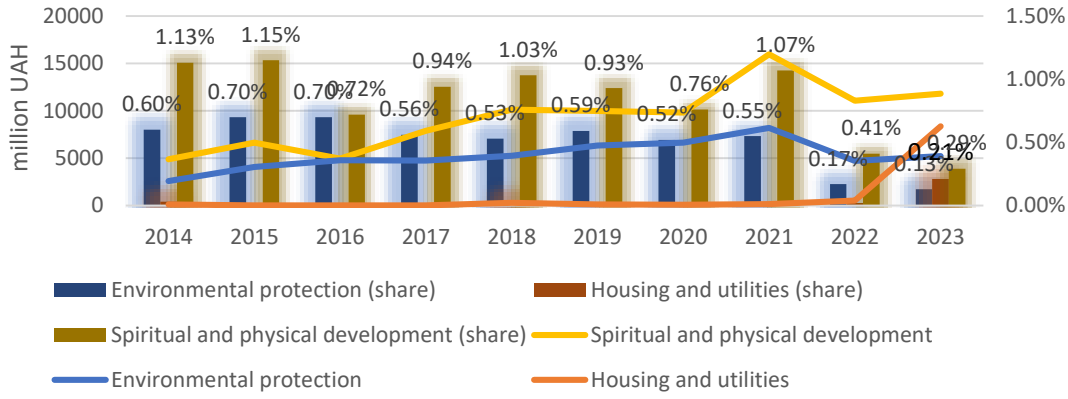

Figure 2. Dynamics of state budget expenditures by selected areas in 2014-2023

Source: compiled by the author based on the Ministry of Finance of Ukraine (2024)

The financing of human capital in Ukraine is not solely carried out through state budget funds but also with the involvement of international organisations and funds (Agafonova, 2020). Throughout all the years of independence, international partners and organisations have invested in Ukraine's socio-economic development projects. However, a significant increase in international human capital financing has been observed only since 2013 (Figure 3).

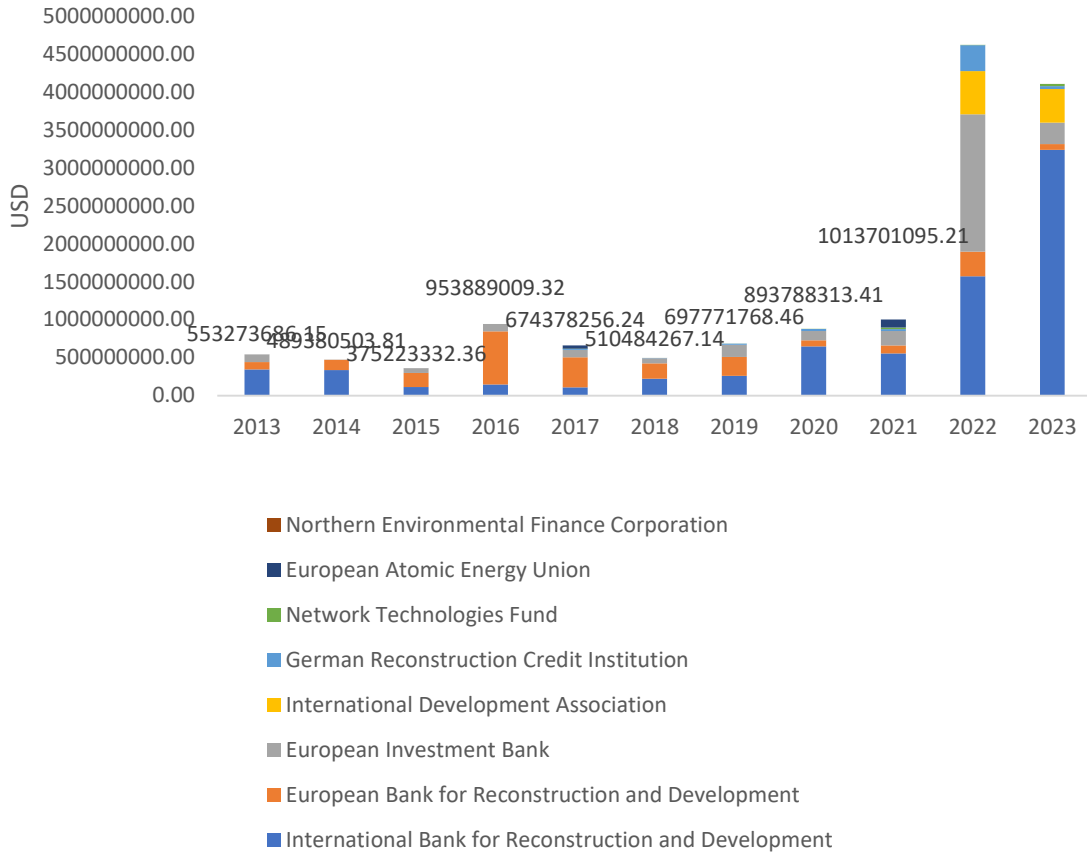

Figure 3. Dynamics of Human Capital Financing in Ukraine by International Financial Institutions in 2013-2023

Source: IFIs Projects (2024)

Therefore, the main external investors in human capital in Ukraine from 2013 to 2023 include the International Bank for Reconstruction and Development, the European Bank for Reconstruction and Development, and the European Investment Bank. It is worth noting that these organisations have increased their funding fourfold since the onset of hostilities on Ukrainian territory. Additionally, one of the critical external investors since 2022 has been the International Development Association, whose share of external investments amounted to 12.29% in 2022 and 9.16% in 2023.

Investment in human capital from domestic businesses during 2022–2023 occurred on a smaller scale, related to limited access to financial resources. However, despite martial law and its unfavourable business conditions, national companies and enterprises also view human capital as a foundation for rebuilding business in the future. Today, businesses in Ukraine face several challenges related to population migration, a lack of a sufficient labour force, and a significant wage increase, which leads to further difficulties for entrepreneurship (Belinska & Sharaienko, 2021; Razumkov Centre, 2024). Nevertheless, attention should be paid to a specific correlation between a company's average wage level and human capital adequacy (Figure 4).

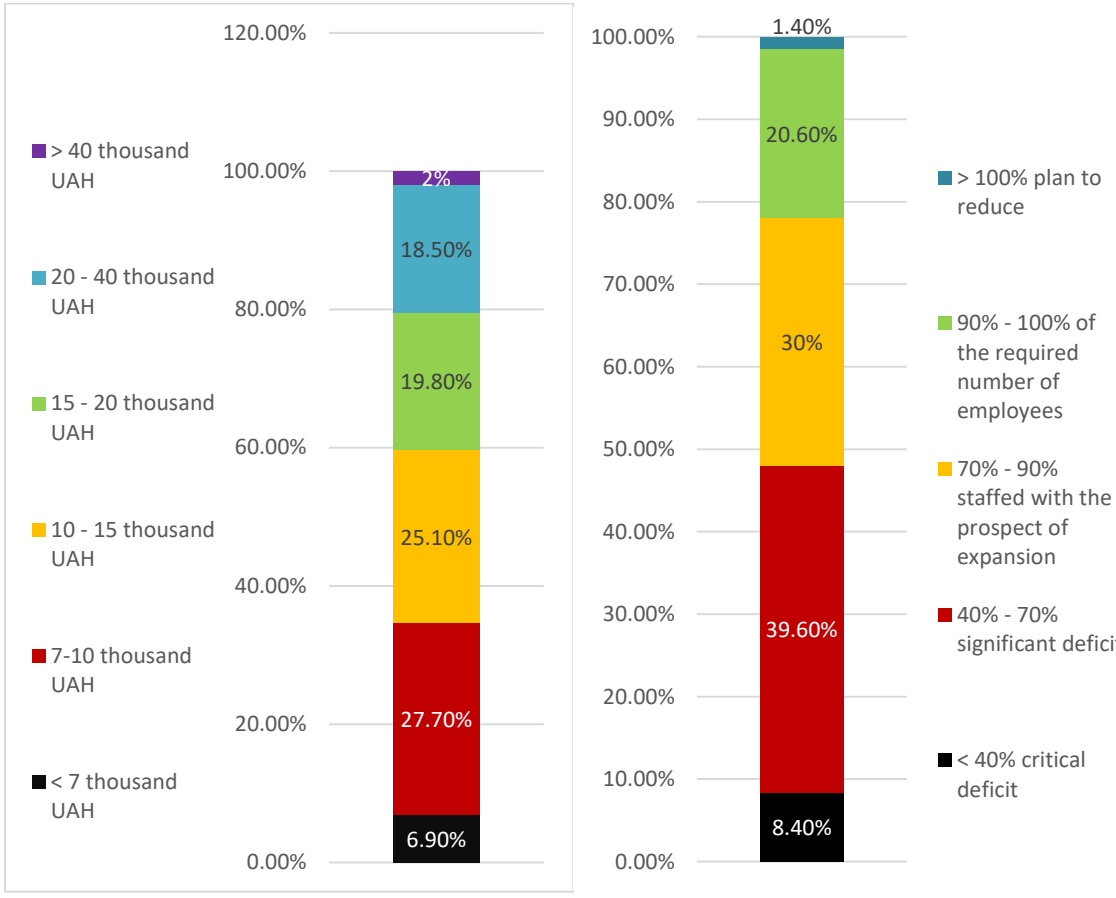

Figure 4. Structure of human capital deficit and wage structure as of 2023

Source: compiled by the author based on United Nations (2024)

It is evident that there is a clear correlation – companies with an average salary level below 15,000 UAH tend to experience a staffing shortage exceeding 50%. Considering that staffing shortages may not only occur due to salary levels, it is essential to examine the structure of the staffing deficit by the area of personnel engagement. In 2023, the highest staffing shortage was observed in manual labour professions – 50.6%, followed by technologists and specialists in the production sector – 36.9%. The lowest shortage among office workers, managers, and analysts was 28.8%. This distribution can be explained by the fact that office professionals can work remotely, so their relocation had less impact on the staffing deficit than production specialists' relocation.

Given that only 5% of companies, as of 2023, are prepared to increase the average salary of their employees by more than 30%, there is little prospect of addressing the staffing deficit shortly.

The challenging situation with human capital in Ukraine is further exacerbated by a high level of uncertainty among the population and ongoing mobilisation processes (Figure 5).

Figure 5 indicates a high percentage (over 40%) of companies employing workers with IDP (Internally Displaced Person) status and a reduction in personnel numbers in more than 50% of companies due to mobilisation measures. This reflects growing issues related to staffing shortages in the labour market, leading to a decrease in professional staff training, an increase in age distribution, and a higher proportion of women in the workforce.

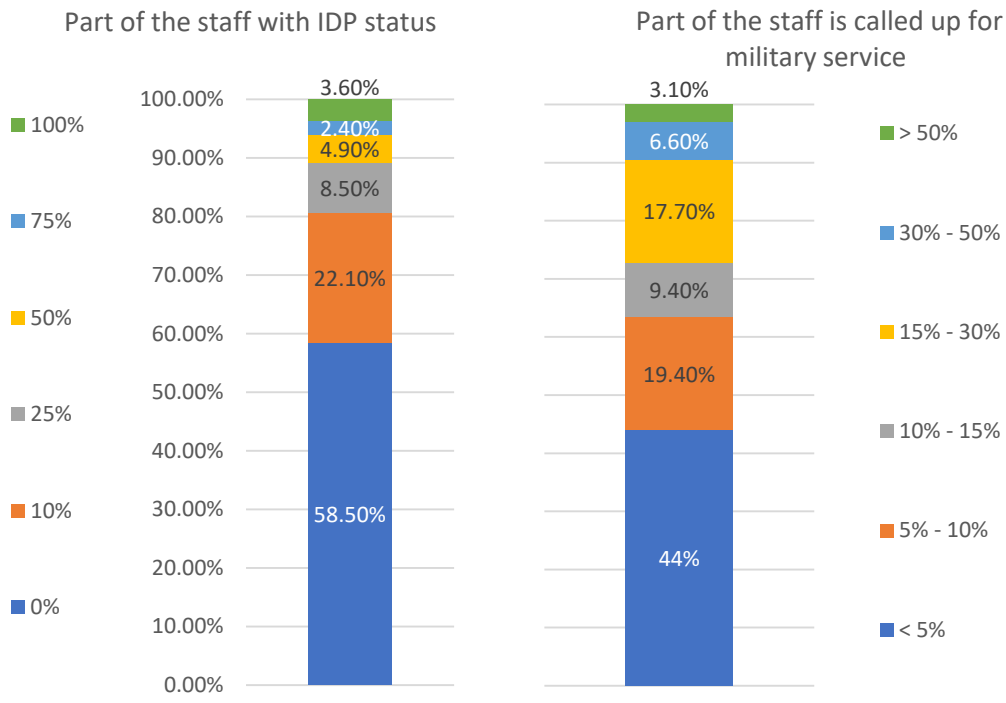

Figure 5. Structure of human capital of enterprises by idp status and mobilised status as of 2023

Source: compiled by the author based on United Nations (2024)

The regional distribution of salaries as of 2023 (Figure 6) shows that the largest share of salaries in all regions of Ukraine falls within 7,000 to 15,000 UAH.

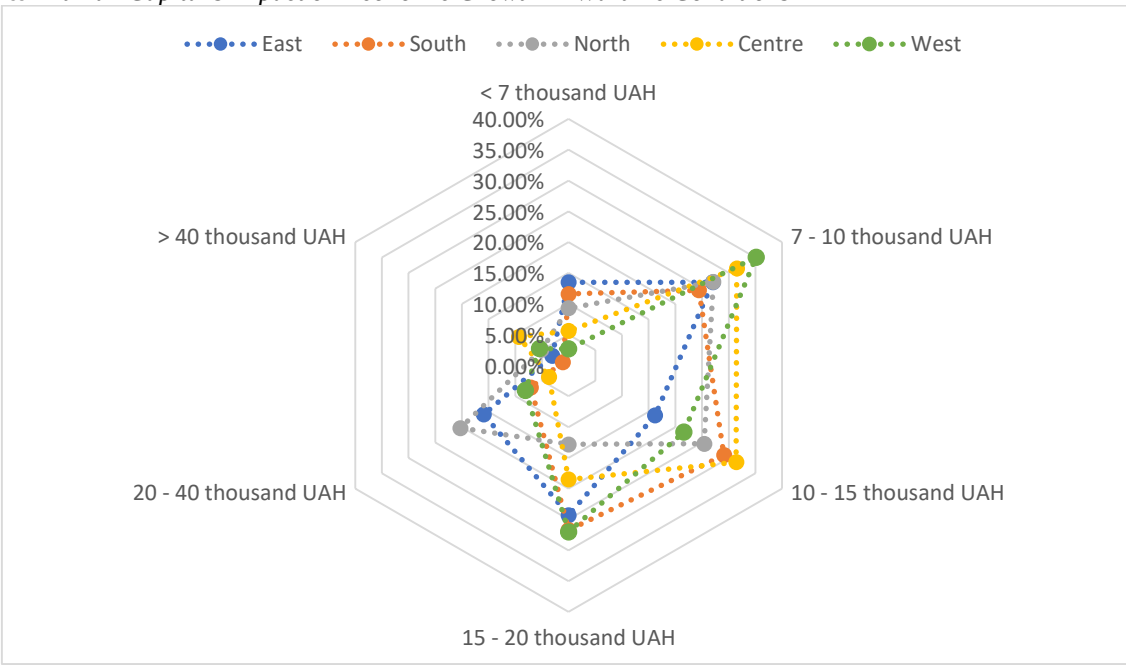

Figure 6. Distribution of wages by region and size as of 2023

Source: compiled by the author based on United Nations (2024)

The most uneven distribution is observed in the western and eastern regions of the country. The southern region has the most balanced structure regarding the sizes of average salaries received. The eastern and northern regions of the country have the largest share of salaries exceeding 20,000 UAH. This can be explained by the presence of Kyiv in the northern region and the large number of small relocated enterprises from eastern Ukraine that are still registered at their old addresses and pay taxes there. It is also worth noting that insufficient wage levels inevitably lead to an increase in crime rates. The rise in criminal activity in the country is a negative factor affecting the value of human capital (Kolos et al., 2023).

When considering the qualitative characteristics of human capital, attention should be paid to the essential criteria for employers. In his study, Sudakov (2024) presents the results regarding the coverage of criteria for assessing potential employees that are important for enterprises (Table 2).

Table 2. Coverage of personnel selection criteria

Criterion	Coverage
Responsibility	55,1%
Attentiveness	48,0%
Work in a team	27,6%
Stress resistance	22,8%
Experience working with clients	18,7%
Specific technical skills	17,3%
Ability to learn	15,8%

Criterion	Coverage
Soft skills	14,1%
Knowledge of the state language	13,3%
Communication skills	12,6%

Source: Sudakov (2024)

Thus, the most valued qualities for enterprise employees are responsibility, attentiveness, teamwork, and stress resilience. This indicates an increased need for businesses to form cohesive and robust teams capable of responsibly fulfilling their duties, especially given the adverse wartime conditions affecting economic activities. The overall evaluative level of a country's human capital can be determined using relevant indices as indicators of human capital dynamics. Globally recognised human capital indicators include the Human Capital Index (HCI), the Human Development Index (HDI), and the Global Innovation Index (GII) (Zinchenko & Samoylenko, 2020).

The HCI is calculated based on the probability of a person reaching an age necessary for human capital formation, expected years of schooling, and the population's health status. The HDI characterises average life expectancy, education levels, and material well-being. The GII is calculated to determine the value of human capital, the level of business development, the application of innovative technologies, and more. Table 3 provides a comparative analysis of human capital indices over different years (Table 3).

Based on the data in Table 3, in 2020, Ukraine ranked 15th in the HCI index, indicating a high level of development according to World Bank Group (2020) criteria. According to United Nations data (2021), in 2021, Ukraine ranked 86th in the HDI index and belonged to the group of countries with a high level of development (the first 69 countries belong to the group of countries with a very high level of development).

Table 3. Human capital indices

HCI			HDI			GII	
Rank	**Country**	**Score (2020)**	**Rank**	**Country**	**Score (2022)**	**Rank (2023)**	**Country**
1	Singapore	0,88	1	Switzerland	0,967	1	Switzerland
3	Japan	0,8	5	Sweden	0,952	2	Sweden
3	Canada	0,8	7	Germany	0,95	3	United States
5	United Kingdom	0,78	9	Singapore	0,949	4	United Kingdom
6	France	0,76	15	United Kingdom	0,94	5	Singapore
7	Germany	0,75	18	Canada	0,935	8	Germany
7	Poland	0,75	20	United States	0,927	12	China
8	Italy	0,73	24	Japan	0,92	13	Japan
8	Spain	0,73	27	Spain	0,911	15	Canada
10	United States	0,7	30	Italy	0,906	26	Italy

HCI			HDI			GII	
Rank	**Country**	**Score (2020)**	**Rank**	**Country**	**Score (2022)**	**Rank (2023)**	**Country**
13	China	0,65	36	Poland	0,881	29	Spain
13	Turkey	0,65	45	Turkey	0,855	39	Turkey
15	Ukraine	0,63	48	Argentina	0,849	41	Poland
15	Kazakhstan	0,63	60	Georgia	0,814	55	Ukraine
17	Argentina	0,6	67	Kazakhstan	0,802	65	Georgia
19	Moldova	0,58	75	China	0,788	81	Kazakhstan
20	Georgia	0,57	100	Ukraine	0,734	89	Azerbaijan

Source: compiled by the author based on the United Nations (2024), World Bank Group (2020), World Intellectual Property Organization (2023)

However, with the onset of hostilities in 2022, the HDI dropped from 0.762 points to 0.734, and Ukraine's overall global ranking fell from 86th to 100th position. As of 2023, Ukraine ranks 55th in the GII index. The dynamics of Ukraine's GII index and that of specific countries worldwide during the period from 2013 to 2023 are presented in Figure 7.

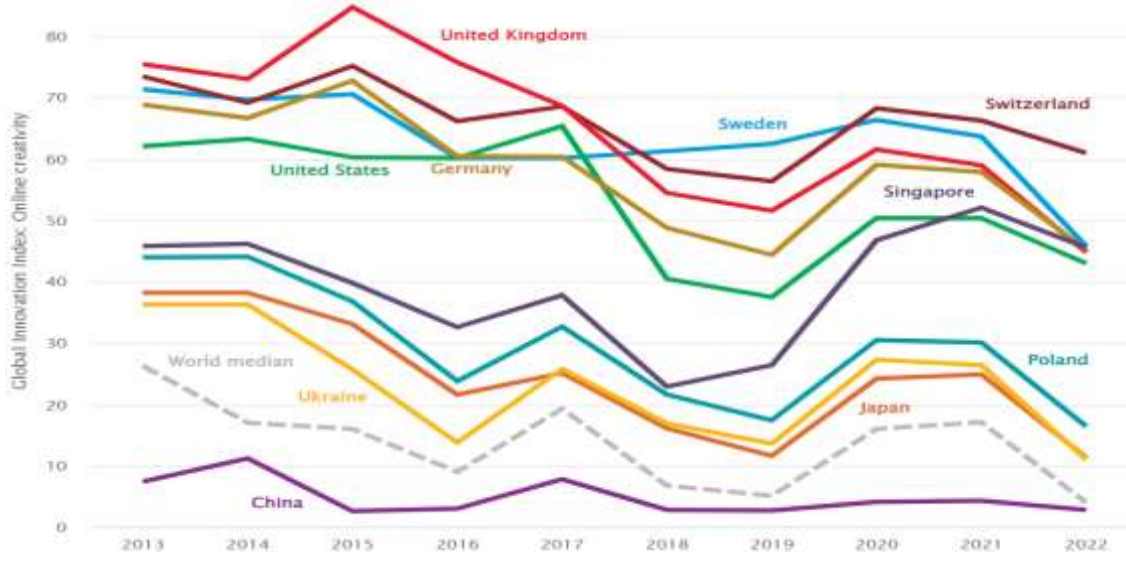

Figure 7. Dynamics of the GII Index by country in 2013-2022

Source: compiled by the author based on the Online Creativity toolkit provided by the World Bank Group (2024)

The dynamics of the GII index for Ukraine indicate that from 2013 to 2023, the country's level of innovation potential, as evaluated by the World Bank Group (2024), is above the global average (Figure 7). This indicator is on par with countries like Japan and Poland regarding absolute terms (Score). Assessing the overall trends and dynamics of the index for Ukraine, it can be concluded that it closely correlates with global processes, as evidenced by the

synchronised changes in the GII values for Ukraine with those for Switzerland, Germany, the United States, Singapore, Poland, and Japan. It is worth noting that the dynamics of the GII index for China are below the average level and do not align with the central dynamics of the index for all other countries represented in Figure 7. This discrepancy is because the World Bank Group, in its research and calculations, separates China from Hong Kong, the latter being the locomotive of innovation for China.

Discussion

Research into human capital's essence, place, and role began to gain momentum in the 1960s and remains relevant today. Human capital is defined as a set of knowledge, skills, experience, health, living conditions, cultural level, and security level of the population, and it is predominantly considered at the individual, micro-, and macro-levels.

At the macro level, the value of human capital is primarily influenced by overall investments. In Ukraine, the principal investments in human capital come from social budget expenditures and external sources. The hostilities that began in 2022 brought significant changes to the budget structure—the share of expenditures on social protection and healthcare decreased by half. However, in absolute terms, spending on social protection increased by more than fivefold. Analysing the dynamics of public spending on education during 2022–2023, a reduction in the share of the state budget by almost half can be observed, but the absolute volume of financing remained almost unchanged, which, considering the rate of national currency depreciation, indicates an actual reduction in the level of funding. As a result of intensified hostilities, expenditures on environmental protection and culture were almost halved, while spending on housing and communal services increased significantly (by 20 times) due to the need to restore damaged infrastructure. During 2022–2023, the volume of foreign investment in social and economic programs supporting human capital increased by 4.5 times. The main investors are the International Bank for Reconstruction and Development, the European Bank for Reconstruction and Development, the European Investment Bank, and the International Development Association.

Considering human capital at the micro-level during 2022–2023, attention should be paid to the level of shortage of qualified personnel, the level of staff availability in enterprises, and the level of wages. By 2023, up to 50% of enterprises faced significant staffing shortages; however, companies with an average wage of more than 10,000 UAH had significantly fewer such problems. It should be noted that more than 40% of enterprises have employees with IDP (Internally Displaced Persons) status, and more than 50% faced the problem of military mobilisation of necessary personnel. To address the staffing issue, enterprises in the northern and eastern regions partially adhere to a policy of maintaining a high wage level. Thus, these regions have the largest share of wages in the 20–40 thousand UAH range. However, for the northern region, this can be explained by the presence of Kyiv (with the highest wage level in the country); for the eastern region, this phenomenon is due to the need to overcome an acute shortage of personnel. It should be noted that the wage structure in the eastern region is the most unbalanced, and the wage gap is very large. Thus, the share of wages at the level of up to 7 thousand UAH in the eastern region is the highest in the country—13.5%, while the wage level of more than 20 thousand UAH is 19%, and it is the second largest in the country (after the northern region).

The assessment of human capital at the individual level indicates that enterprises need personnel with qualities such as responsibility, teamwork, and stress resistance due to the need to form a

cohesive team in wartime conditions. The overall potential of Ukraine's human capital, as indicated by index assessments from international organisations, shows that Ukraine belongs to countries with a high level of human capital development despite hostilities on its territory. Based on the research on the dynamics of the innovativeness of Ukrainian human capital, the creative potential of the Ukrainian people is on par with that of the Polish and Japanese peoples (Antoniuk, 2021).

Conclusion

Today, Ukraine faces numerous challenges related to the formation and maintenance of human capital, many of which are caused by the ongoing hostilities within the country. These challenges include population migration, personnel shortages, high corruption and legislative opacity levels, and reduced education, healthcare, and culture funding. All these factors have undoubtedly led to a decline in the value and quality of human capital in Ukraine during 2022–2023, resulting in lower international rankings regarding human capital development. However, balanced state policies in social protection and international financial support allow Ukrainian human capital to remain competitive, highly innovative, promising, and capable of maintaining an adequate level of national economic development, despite the wartime conditions. The issue of personnel shortages is partially addressed through the implementation of state socio-economic programmes for retraining personnel, their relocation during wartime, and financial support. However, Ukraine still faces many challenges in state policy and human resource support, with many issues remaining relevant and unresolved.

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