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FINANCIAL AND ECONOMIC ASPECTS OF LOSS HUMAN CAPITAL AND COMBATING THIS CHALLENGE OF UKRAINIAN HIGHER EDUCATION

Abstract. The loss of human capital is a significant projected loss for the country's economy. Higher education must analyze the challenges, maintain the quality of human capital at the level necessary for the functioning of the economy, and train professionals in a permanent crisis. The multi-vector nature of the crisis leads to a negative multiplier effect of the influence of external and internal factors on the level of human capital of the country in all institutional categories, so these challenges are emerging given their systemic nature. This primarily applies to the institute of higher education. The formation of a relevant response to the challenges of loss of human capital is not only a guarantee of the proper functioning of higher education, but also guarantees the success of its functioning for economic transformation in the country. The analytical study revealed economic losses from external migration of highly qualified personnel, reduction of the country's economic potential from the outflow of specialists. The narrowing of the base of high-quality reproduction of qualified personnel, the factor of disproportion in the financing of higher education and the reproduction of highly qualified personnel from budgetary sources and the growth of the share of self-financing were revealed. The analysis proved the inconsistency of the quality of the staff to the number of employees of higher education in the regions and the disproportion of the teaching staff with academic ranks. A study of the number of graduate students indicates that the disparity in quality will increase as there is a tendency to lose scientific schools in the regions. Weaknesses of higher education have been identified. To reduce the negative impact of this factor on the quality of human capital and, indirectly, on the country's economy, there is the urgent need to optimize public funding of human capital; to create regional funds for financing higher education, formascientific schools in the regions to eliminate regional disparities in training. Proposals for a policy of investing in human capital at all qualification levels have been developed, taking into account the effectiveness of such investments and also to stabilize the socio-economic situation in the country. The directions of forming the answer of higher school to the challenges of the economic crisis of the country are offered.

Keywords: higher education, human capital, economic losses, integrated indicators, analytical research.

JEL Classification I25, J24, J62, J82

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ФІНАНСОВІ ТА ЕКОНОМІЧНІ АСПЕКТИ ВТРАТИ ЛЮДСЬКОГО КАПІТАЛУ ТА ПРОТИДІЯ ЦЬОМУ ВИКЛИКУ УКРАЇНСЬКОЇ ВИЩОЇ ШКОЛИ

Анотація. Втрати людського капіталу — це значні прогнозовані втрати для економіки країни. Вища школа повинна аналізувати виклики, підтримувати якість людського капіталу на рівні, необхідному для функціонування економіки, готувати фахівців в умовах перманентної кризи. Багатовекторність кризи призводить до негативного мультиплікативного ефекту впливів зовнішніх і внутрішніх чинників на рівень людського капіталу країни за всіма інституціональними категоріями, тому ці виклики є емерджентними з огляду на їхній системний характер. Передусім це стосується інституту вищої школи. Формування релевантної відповіді на виклики втрати людського капіталу є не тільки запорукою належного функціонування вищої школи, а й гарантують успішність її функціонування для економічних перетворень у країні. Проведеним аналітичним дослідженням виявлено економічні втрати від зовнішньої міграції висококваліфікованих кадрів, зниження економічного потенціалу країни від відпливу спеціалістів. Виявлено звуження бази якісного відтворення кваліфікованих кадрів, фактор диспропорції у фінансуванні вищої освіти і відтворення кадрів вищої кваліфікації з бюджетних джерел і зростання частки самофінансування. Аналізом доведено невідповідність якості кадрового складу кількості працівників вищої школи в регіонах і диспропорцію викладацького складу з науковими званнями. Дослідження кількості аспірантів вказує, що диспропорція за якістю буде посилюватися, оскільки наявна тенденція втрати наукових шкіл у регіонах. Виявлено слабкі сторони вищої освіти. Для зменшення негативного впливу цього фактору на якість людського капіталу і опосередковано на економіку країни вказано на нагальну потребу

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оптимізації державного фінансування людського капіталу; створення регіональних фондів фінансування вищої освіти, формування наукових шкіл у регіонах для усунення регіональних диспропорцій у підготовці кадрів. Розроблено пропозиції щодо політики інвестування в людський капітал на всіх кваліфікаційних щаблях з огляду на ефективність таких інвестицій і для стабілізації соціально-економічного становища у країні. Запропоновано напрями формування відповіді вищої школи на виклики кризи економіці країни.

Ключові слова: вища освіта, людський капітал, економічні втрати, інтегровані показники, аналітичне дослідження.

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Introduction. Today, the challenges of the crisis have affected all aspects of life in Ukraine — military aggression, the crisis of public administration, economic and social spheres. The multi-vector nature of the crisis leads to the formation of a negative multiplier effect of the influences of external and internal factors on the level of human capital of Ukraine [1; 2]. This is evidenced by the dynamics of integrated socio-economic indicators. For example, the human development index in Ukraine is 0.63, which corresponds to the second group and with the tendency for deterioration.

The decline in the quality of human capital leads to negative consequences, primarily for the country's economy [1; 2] and, accordingly, living standards. Thus, the gross domestic product per employee in Ukraine is the lowest among neighboring countries and tends to decrease [2].

Even with the autonomy of the Ukrainian labor market in a pandemic for highly skilled human resources, incentives for labor migration are formed and this leads to a deepening of the causes of changes in the structure of labor resources in all spheres, reducing their quality and, consequently, multiplies the deterioration of human capital quality.

The market for highly intelligent labor now does not always require mandatory physical crossing of the border by the employee because it provides the opportunity to work remotely. Modern branches of science, telecommunications, digital and information technologies have been taking advantage of this opportunity for a long time. Now this trend has been significantly extended by the increase in the share of remote jobs among the total number of employees in all spheres of activity of developed countries, in particular, in higher education.

This creates some incentive for covert migration of high-quality component of Ukrainian labor resources with minimal negative trends in the domestic labor market because it does not require significant efforts to overcome regulatory, quarantine and other restrictions, does not change the usual life of the employee, which, in turn, leads to trends of reducing the quality of human capital in the country. These trends are primarily characteristic of the most active and creative part of young people. Thus, the introduction of distance learning in higher education institutions (HEIs) of developed countries exacerbates the threatening trend of youth outflow, which becomes a challenge to the existence of part of the HEIs of Ukraine [1; 2].

These trends form new challenges for the higher school of Ukraine to reproduce its own human resources, human resources of the economy and the wider task, the reproduction of the quality of human capital, which is the key to further development of the country.

The study of these trends required the use of data from statistical services of Ukraine and the involvement of the mathematical apparatus of statistical analysis.

Analysis of research and problem statement. Ukrainian and foreign scientists study the changes in human capital in various aspects of this process. In particular, Sakhnenko [3] conducted a comparative analysis of approaches to the reproduction and reinvestment of human capital in different countries, and provided recommendations for the development of the knowledge economy. Lothys [4] singled out the deterrents and incentives for investing in higher education. Nitsenko [5] analyzed the impact of education on the development of human capital, pointing out the impact of this on «the development of new technologies, the introduction of new equipment, increasing communication opportunities that change the structure of production». Svyrydenko in his monograph [6] analyzes in detail the challenges for higher education in the context of globalization.

Apalkova and Lyzunova [7] studied the relationship between the level of education of the population and the level of its well-being. Savenkova and Svyrydenko [8] sees the outflow of intelligence as the main challenge of higher school. Smirnova and Simakov [9], Vasylieva and Rybka [10] study how to prevent this process. Machek [11] sees the main challenge for Ukrainian higher education in the predominant desire of students to study abroad. Tkachenko [12] details this by studying the perception of the EU by Ukrainian students and the need to adjust Ukraine's policy in the sphere of youth migration. This is more widely analyzed in the work of Shashkova et al. [13]. The issue of student youth migration worries not only Ukrainian scientists. Rudenko et al. [14] researches the problems of students in the new country and points out that moving for study creates a specialist's mobility in choosing a country for employment. Rudenko et al studied the change in the quality of human capital under the influence of the latest learning technologies in the Chinese experience [15]. The experience of Spain was studied by Marciniak [16], that of Germany — by Bond [17]. The impact of new technologies on improving the quality of human capital and the role of higher education in this issue was studied by Bykov [18] and Rudenko et al [19] studied the same impact later on in human life, which is important for changing the age threshold of workers in the country.

Unsolved aspects of the problem. Despite a number of scientific studies of the problem, the impact of challenges to Ukrainian higher education and the threat of loss of human capital is insufficiently studied.

The purpose of the article. The purpose of the research is to analyze the impact of challenges and threats for the human capital of higher education taking into consideration all institutional components and to develop proposals for the formation of directions for the response of higher education to the challenges.

Research results. Analysis of the dynamics of changes in indices of human development and human capital (see *Table 1*) indicates a general deterioration of the situation in the country as a whole. At the same time, the observed increase in the specific value of the human capital index (per capita), according to this analysis, shows that this is also not a positive phenomenon because it means that the downward trend in the working population is greater than the downward trend in the human capital index.

Table 1

Dynamics of change of integrated indicators of human capital

Years	Human Development Index	Human capital index	Human capital index per person
2015	0.747	0.742	3.25542
2016	0.743	0.746	3.26391
2017	0.749	0.747	3.27244
2018	0.751	0.750	3.28103
2019	0.750	0.630	3.28997
2020	0.630	0.600	3.29945

Source: it was summarized by the author using [1;2].

The declining population also radically changes the working conditions of higher education, as it reduces the number of students and undergraduates, which leads to a decrease in the number of teachers respectively. Thus, the number of higher education institutions for the period of 2010/2011 academic year decreased by 24%, the number of teachers in them by 68%. The natural effort of the HEI as a comprehensive institutional structure to prevent a decrease in the number of students as an institutional component leads to a tendency of reducing the quality of human capital of this institution. This, with a lag in time, leads to a decrease in the quality of all subsequent institutional categories — masters, graduate students and so on. That is, the problem of the quality of human capital in higher education should be analyzed for all institutional categories, which, in their entirety, form the institution of higher education, because these categories are emergent as elements of one system.

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An analysis of the existing threats of human capital loss and possible responses to them in higher education is conducted. Threats can be divided into direct and indirect. The direct ones, for example, include the migration of highly qualified teachers and the migration of young people who have become or could become students and post-graduate students. Further, a group of factors has been identified that can lead to a decrease in the quality of both teaching and student human resources.

This group of factors has both an objective and a subjective basis. Objectives include the reduction of the scientific experience of the teaching staff and, accordingly, the quality of teachers as scientists. This reason has several reasons — both a decrease in funding for research, which leads to a decrease in the number of scientists (*Fig. 1*) and an increase in the workload of the teaching staff, and, above all, bureaucratic workload, which reduces opportunities for research. The reasons for this are that there is a decrease in public funding for research, which leads to a decrease in the number of scientists (see *Fig. 1*) Also an increase in the workload of the teaching staff, and, above all, bureaucratic workload, reduces opportunities for scientific activities. Another significant challenge consists in the fact that the economic crisis is reducing the number of jobs for highly qualified staff. The structure of vacancies today is as follows: the simple unskilled jobs ~ 16.2%, skilled workers with tools ~ 15.7%, specialists ~ 9.1%, professionals ~ 7.9% [1]. That is, specialists are in demand by 72% less than workers. This reduces the motivation to study in the HEI and obtain higher qualifications.

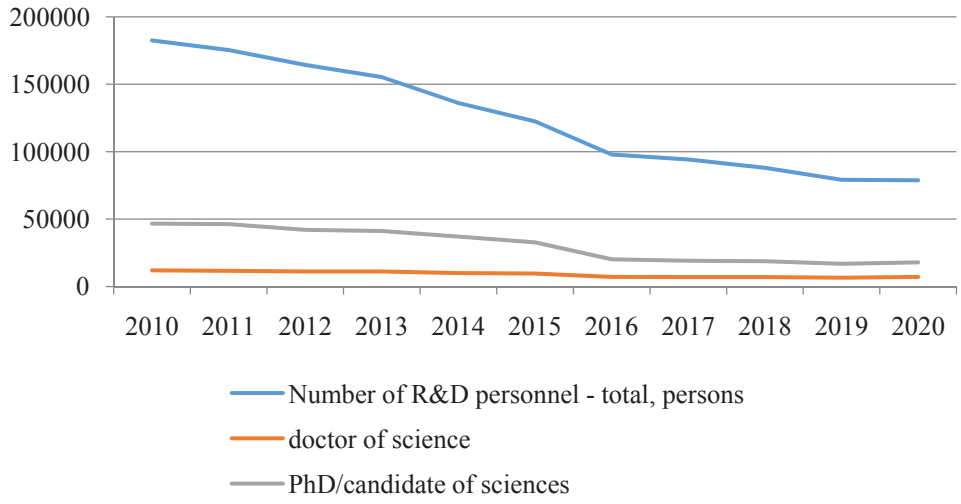

Fig. 1. **Dynamics of the number of employees involved in research and development**
Source: developed by authors.

The analytical study revealed a factor of imbalance in the financing of HEI students and the reproduction of highly qualified personnel from budgetary sources and the growth of the share of self-financing (*Fig. 2*).

According to the distribution of education costs by organizations that finance them (financial agents) and providers (service providers), higher education (short cycle, bachelor's degree, master's degree or their equivalent) under ISCED 5–7 is 25.76% funded from non-state sources. The share of funding for this level of education by private firms and corporations is only 1.02% and, according to statistics, the financial agent «Households» finances a fairly large share (24.74%) of total expenditures. Doctoral studies or its equivalent (ISCED 8) is already 47.57% funded from non-state sources. The share of financing of this level of education by private firms and corporations is 14.05% and 34.2% is financed by the financial agent «Households».

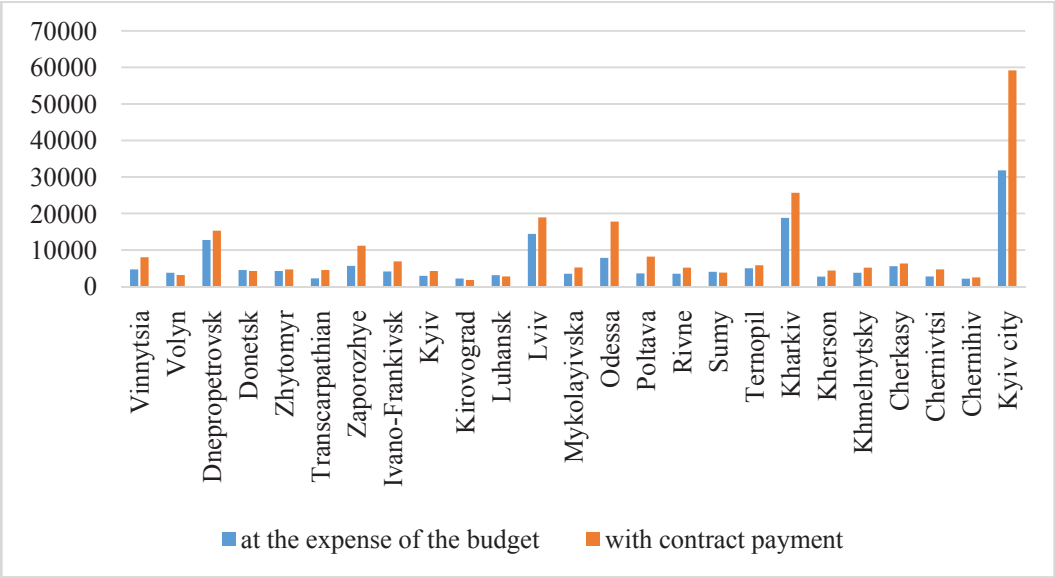

Fig. 2. **Number of persons admitted to study at the HEI at the beginning of the 2020/21 academic year, by sources of funding for their training and regions**

Source: it was summarized by the author using [1; 2].

For comparison, «post-secondary» non-higher education (ISCED 4) is 6.57% financed from non-state sources and 3.75% by households. Moreover, the share of funding for training of both highly qualified personnel and students from non-state sources tends to increase from year to year and has a significant difference by region (*Fig. 2*).

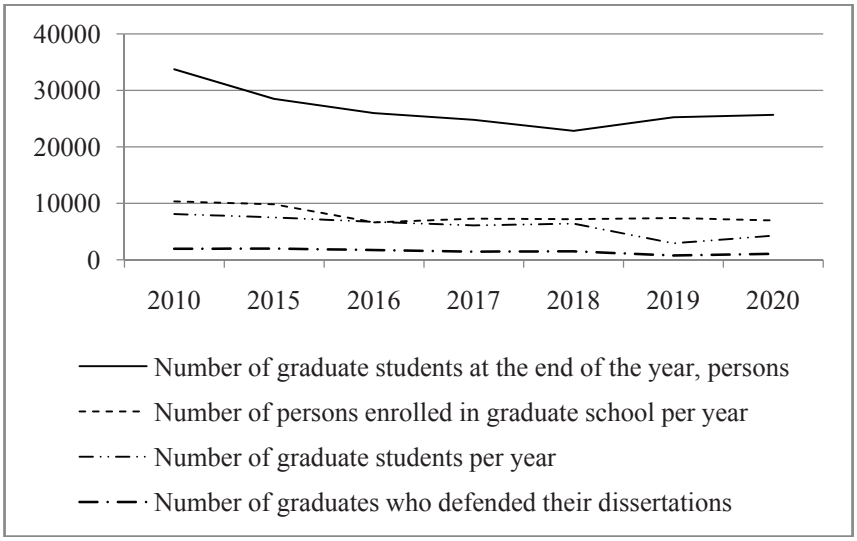

Fig. 3. **Dynamics of the number of post-graduate students, persons**

Source: developed by authors.

Also, in the process of analytical research a narrowing of the base of quality reproduction of qualified personnel was revealed. Thus, the number of the age group that served and serves as a basis for potential higher education is decreasing.

The next factor is a decrease in the welfare of the population and an increase in direct and related costs associated with training. The third factor is the reduction of employment opportunities in the specialty acquired during training.

There is a significant disparity by region in the ratio of the number of students studying at public expense and by contract. For example, for Odesa region this ratio is 2.26, and for Sumy region — 0.95. The share of state-owned HEI students in the total number of students in the region

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differs significantly by region. For the city of Kyiv, it is 78.31%, for the regions: Dnipropetrovsk ~ 79.21%, Mykolayiv ~ 80.26%, Odesa ~ 91.0%, Kharkiv ~ 95.43%. By age groups: 16–22 years study 73.77% of the total number, 23–31 years study 17.4%, 32–59 years study 8.1%.

The study found a significant difference between those who completed post-graduate school and those who defended their theses. There is a tendency to increase enrollment in graduate school, and those who graduated from it and finished it without defending a thesis (*Fig. 3*). This indicates the indirect impact of the economic crisis and the lack of funds for self-financing.

The number of doctoral students or its equivalent decreased during the period under review by 37.39%, master's degree students by 37.53%, bachelor's degree students by 97.37% (*Fig. 4*). For comparison, the number of students in the short cycle of higher education decreased by 59%, after secondary non-higher education 2.28 times.

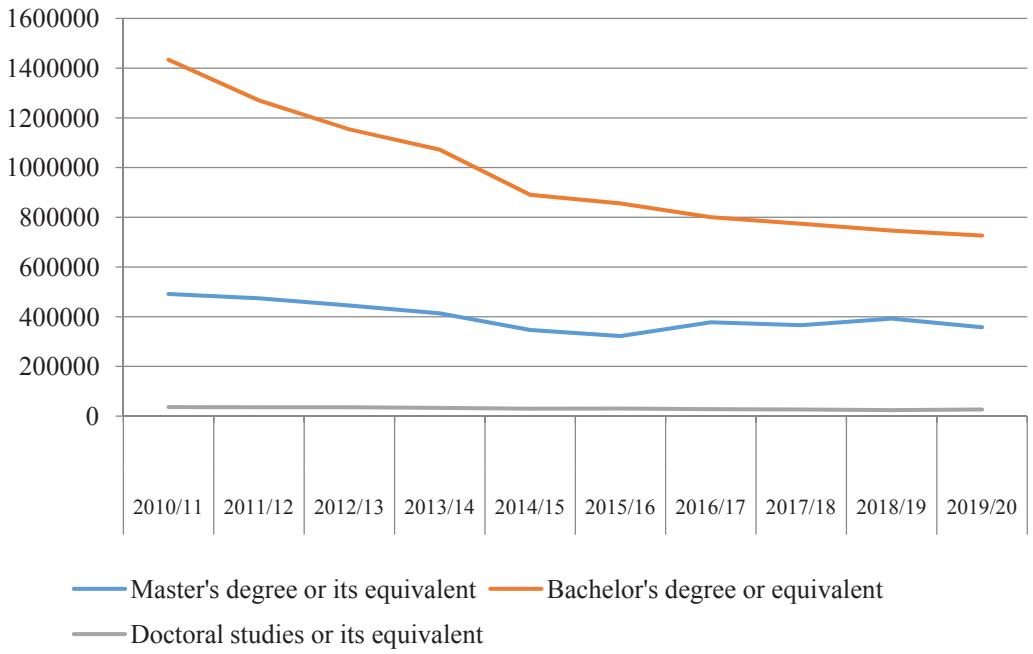

Fig. 4. **Dynamics of the number of students in educational institutions of Ukraine according to the International Standard Classification of Education ISCED 2011**

Source: it was summarized by the author using [1; 2].

A significant disproportion of the teaching staff of the HEI at the beginning of the 2020/21 academic year by region was revealed. Thus, 21.8% of staff work in Kyiv, 14.5% — in Kharkiv, 9.3% — in Lviv, 7.5% — in Odesa, 3.3% — in Vinnytsia, 6.3% — in Dnipro. This is not fully correlated with the population of the regions and with the volume of industrial production in the regions, which leads to a certain uneven impact on the human capital of the regions and the human resources of regional HEIs.

Distribution of scientific and pedagogical workers of the HEI with the rank of associate professor and professor by regions, respectively: 19.02% and 24.13% — Kyiv, 14.63% and 15.4% — Kharkiv, 8.52% and 8, 42% — Lviv, 7.2% and 7.8% — Odesa, 3.7% and 3.06% — Vinnytsia, 6.6% and 6.5% — Dnipro. This proves the discrepancy between the quality of human capital of HEI employees in the regions and the disproportion of distribution in accordance with the ranks of associate professor and professor by region. The study of the number of post-graduate students by region 33.46% — Kyiv, 13.43% — Kharkiv, 8.54% — Lviv, 6.26% — Odesa, 2.5% — Vinnytsia, 5.3% — Dnipro indicates that the disparity in quality will increase as regional centers lose the status of a scientific school.

According to the study, the direct losses of Ukraine from the migration of highly qualified personnel associated with government spending on their training (*Fig. 5*) have a disappointing trend

with a tendency to increase. Direct losses of more than UAH 120 million are projected in 2021. A significant reduction in migrants in 2016 (more than 3.5 times) resumed in subsequent periods. In fact, all this leads to the irreversible financing of other countries with more developed economies by Ukraine. Thus, only half of the EU, the United Kingdom and the United States would have to spend $ 22.9 million to train an equivalent number of professionals that they acquired through migrationin 2020 only(*Table 2*). And these are only direct losses of Ukraine.

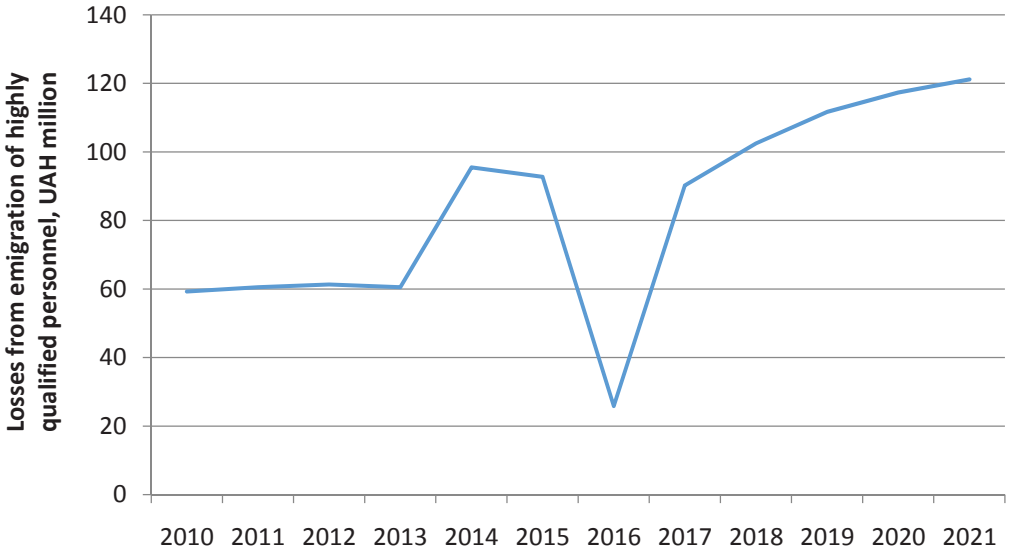

Fig. 5. **Losses from emigration of highly qualified personnel,** UAH million
Source: it was summarized by the author with using (http://www.ukrstat.gov.ua).

According to research, ~ 15% of highly qualified personnel implement innovations, ~ 50% contribute to this implementation. The outflow of specialists leads to a reduction in innovation, which is one of the significant consequences for the country's economy and, in fact, contributes to economic stagnation (*Fig. 6*).

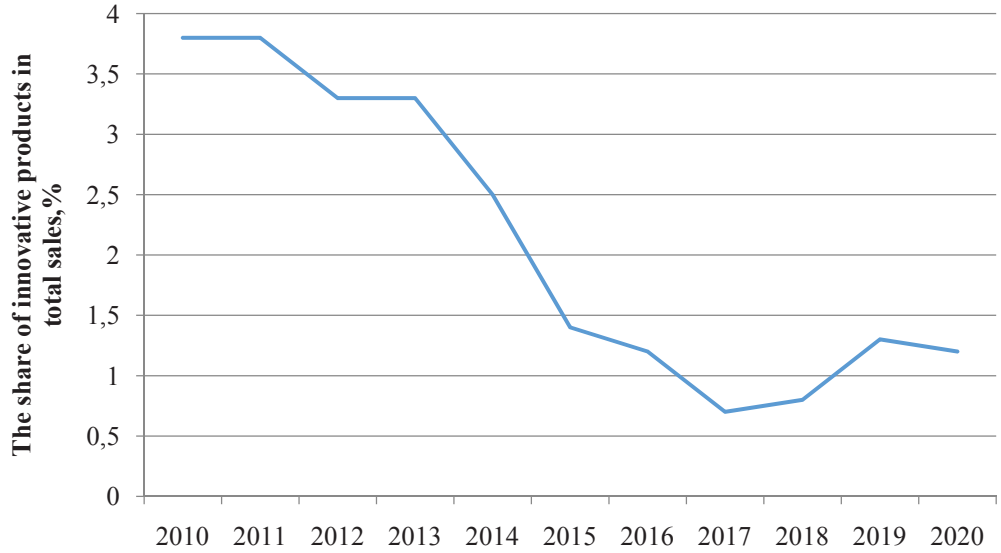

Fig. 6. **Share of the volume of sold innovative products (goods, services) in the total volume of sold products (goods, services) of industrial enterprises,** %
Source: it was summarized by the author with using (http://www.ukrstat.gov.ua).

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During the period 2010/2011 — 2019/2020 academic years, the number of higher education institutions in Ukraine decreased by 24.2% to 281, the number of students decreased by 68.22% to 1266.1 thousand people.

Thus, despite certain strengths of higher education in Ukraine (established traditions, level of education of the population), weaknesses have been identified [20]. Weaknesses include the limitation of public funding to obtain certain qualification levels and, in general, higher education; reducing the quality of human capital in institutional categories (both students and teachers), which makes the institution of higher education more vulnerable to challenges (*Table 2*). Unfortunately, the challenge lies also in the fact that the acquisition of higher education and appropriate qualification levels is not always equivalent to the rate of wages and the availability of jobs.

Table 2

Expenditures for training an equivalent number of specialists in the country where Ukrainian specialists emigrated in 2020

Country	Expenditures on education, % of GDP	University tuition costs, USA	Number of migrants	Total costs for training specialists, USA
Belgium	5.5	6508	39	253812
Denmark	8.0	9562	20	191240
Germany	4.7	9481	949	8997469
Greece	3.7	4157	19	78983
Spain	4.5	5038	21	105798
France	5.9	7226	44	317944
Ireland	4.6	8522	9	76698
Italy	4.5	6295	191	1202345
Netherlands	4.8	10757	81	871317
Austria	6.3	11279	127	1432433
Portugal	5.7	no data	37	207940
Finland	6.2	7327	4	29308
Sweden	7.7	13224	14	185136
United Kingdom	4.6	9699	87	843813
USA	5.2	14500	559	8105500
Total				22899736

The urgent requirement is to optimize public funding of human capital; to create regional funds for financing higher education, to form scientific schools and acquisition of higher qualification degrees to eliminate regional disparities in the development of the HEI.

Conclusion. The multilevel category of human capital by institutional structure (students, masters, post-graduate students, doctoral students, scientific and scientific-pedagogical staff) of higher education establishment, the importance of the higher education institution to restore human capital and economic indicators of human development determines the need for systematic analysis.

As education and training are one of the main tools for improving the quality of human capital, it is necessary to increase the share of public funding for higher education costs and the appropriate incentives for highly qualified personnel to reduce labor migration.

Determinant in increasing investment in human capital at all levels is, firstly, the high efficiency of such investments, and secondly, the growth of human capital is a factor in stabilizing the socio-economic situation in the country.

With this in mind, public policy should focus, on the one hand, on increasing the availability and improving the quality of higher education, on the other hand, on expanding the scope of highly skilled labor in all sectors of the economy.

The response of higher education to the challenges should consist in the introduction of new approaches and technologies for learning, high requirements for qualification selection, the creation of a modern system of lifelong learning and social partnership in ensuring the competitiveness of highly qualified personnel.

Література

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