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THE RISK OF A "BRAIN DRAIN" EFFECT IN UKRAINIAN SPECIALISTS WHO LEFT UKRAINE AFTER THE RUSSIAN INVASION BEGAN

Daryna A. Piven[1]

The Ukrainian refugee crisis is one of the most significant humanitarian problems since the Russian invasion. Many highly educated people have fled Ukraine to find a safe place where they can safely continue their personal and professional lives. It follows that qualified Ukrainian workers may face the effect of "brain drain" in the countries of their current residence, which will have a negative impact on the economies of refugee-hosting countries and on the economy of Ukraine in the future. The object of the study is the labor market in the field of information technology, as it is a highly demanded and developing sector around the world. The conceptual category "brain waste" and its impact on the economy of the host country and the source country is considered. In order to make a forecast of the possible impact of the "brain drain" effect on Ukrainian IT-specialists in the most visited countries, the state of the Ukrainian IT-industry was analyzed according to the results of 2021. The author identified the reasons for the change of place of departure before and after the war. The professional level of IT specialists who migrated because of the war was determined. Countries were chosen based on the number of refugees from Ukraine and a survey conducted in March 2022. The article also presents a comparative analysis of the overall level of economic and digital/technological skills in the destination countries of emigrants from Ukraine and in Ukraine itself. The methodological basis of this study was a systematic approach to the study of theoretical aspects of the impact of "brain drain" on contemporary Ukrainian emigrants in order to clarify and define the essence of the basic concepts of "brain drain", systematize concepts, factors of emigration of highly qualified persons after the Russian invasion, and determine the possible future impact of "brain drain" on Ukrainian society. The methods used in this article are observation of survey results and analysis of secondary data. Collaborative projects between governments, universities, and businesses are suggested as a possible way to tap the economic potential of migrants. The main conclusions of the research are formulated and further ways of scientific research are outlined.

Keywords: *migration, brain waste, brain drain, IT specialists, labor market.*

JEL Classification: *O15, J40*

Problem statement. After Russia invaded Ukraine, nearly 6 million Ukrainians were forced to leave their homes and come to other countries as refugees without legal status. The migration crisis has intensified the drain of highly skilled labor. Among them, IT specialists account for a large share because the IT sector is constantly developing and occupies a large share of Ukraine's economy. Ukrainian workers could share their experience in destination countries. But in other circumstances they might lose their competencies through unsuitable work.

At the same time, it can be predicted by identifying and comparing the economic and technological state of countries where Ukrainians are currently located. As for the IT sector, the digital skills of countries should also be analyzed, as this is a decisive characteristic of competitiveness on the labor market.

Analysis of recent research and publications. The migration of highly skilled people is a big problem for developing countries. It is an important topic of research by various organizations because, according to Pires, it is believed that skilled migrants can contribute to positive externalities (increased human capital stock and knowledge spillovers) for the host economy and for the source economy if they return [7].

The immigration of such a skilled population can cause a "brain drain" effect. Mattoo defines "brain drain" as a situation where immigrants' skills are underutilized in the labor market [4]. Another definition by Özden refers to the case when migrants earn less than natives with the same skills [6].

In other words, "brain drain" is the reduction or complete loss of a person's qualifications or the non-recognition of skills and qualifications acquired by migrants outside the country, which does not allow them to use their full potential [9].

Formulation of the article's objectives. The main purpose of the article is to predict the possible impact of the "brain drain" effect on Ukrainian IT-specialists. The sub-objectives as follows:

– to analyze the overall situation in the Ukrainian IT sector;
– to understand how many IT specialists have emigrated;
– to form the reasons for emigration;
– to subdivide the most popular destination countries;
– to compare Ukraine's economic and social state with the most popular destination countries.

Presentation of the main material of the study. The Ukrainian IT industry is constantly growing. For example, in 2021, the IT sector grew by 36% from USD

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5 billion to USD 6.8 billion in exports [1]. At the same time, the number of specialists increased to 285 thousand from 244 thousand in the previous year. Thus, over the past three years, the industry has more than doubled its exports and increased the number of specialists by more than 50%.

If to compare Ukraine with other nearest competing IT markets, it has the most significant labor market and the largest number of graduates with IT specialties. At the same time, the number of IT specialists per 100,000 population in Ukraine is 2–4 times lower than in competing countries. This fact shows the high potential of people who start education or training now to have a successful job in the IT sector after graduation. The aggregate ranks for these questions can be seen in Table 1.

According to previous studies, people mostly make the decision to emigrate based on a combination of economic and existential reasons [10]. The main economic basis is a higher level of wages than the average in the country of origin. On the other hand, existential issues are individual and vary depending on gender, quality of life, level of education, marital status or other reasons. Other reasons include geographic proximity, political tensions, common language, etc. Moreover, economic reasons related to study or work play a greater role in the choice of destination country than family or personal reasons, especially for citizens with a high level of education. The same is applicable to decisions to return.

But the choice of destination countries during the war is the opposite for Ukrainians. According to a survey of 6,812 IT professionals from Ukraine conducted March 23–26 [9], the main reasons why IT professionals chose destinations abroad were the presence of friends or relatives and the possibility to leave (Figure 2). Thus, personal reasons are weightier, as psychologically people are looking for a "comfort zone". But it should be noted that only 14% of respondents decided to go abroad, while the majority leave for safer Ukrainian regions.

According to information from IT associations [2], the most significant percentage of employees relocated is in companies with 1200+ employees (32%). In medium-sized companies with 200–1200 people this indicator is 24%, in small companies with up to 200 people – only 14%. Poland, Germany, Spain, Romania, Portugal, Bulgaria, the Netherlands, Turkey, the Czech Republic, Moldova, and Croatia are the main countries to move to. According to the DOU survey [9], the leading countries to go to are Poland – 35%, Germany – 10%, Romania – 6%, the Czech Republic – 4% and Turkey – 4%.

The total flow of refugees from Ukraine to neighboring countries is shown in Table 2 [9]. Data on refugees to the Russian Federation and Belarus have been diverted because it is difficult to prove that these people were removed from these countries of their own free will.

The number of refugees from Ukraine throughout Europe can be seen in Figure 3. Most Ukrainians stayed in Germany, the Czech Republic, Italy, Bulgaria, Turkey, etc. These are the same countries mentioned by IT specialists in their surveys in the DOU investigation. Data from these countries will be analyzed by the author in this article.

At the same time, all large IT companies (1200+ people) and 64% of companies with 200–1200 people plan to open new offices in neighboring countries. On the contrary, 75% of companies with up to 200 people are not going to expand. Company owners have instances to open new offices in Poland, Romania, Spain, Bulgaria, Portugal, Croatia and the UK. Companies expect 18–25% of employees to move abroad after the war.

Table 1 – The Ukrainian IT market in comparison with competing markets [1]

Share of computer services exports in GDP %	Size of the labor market, millions of persons	Numder of IT specialist, thousand of persons
3.2%, Belarus	18.1, Ukraine	430.7, Poland
2.8%, Serbia	17.0, Poland	289.2, Ukraine
2.7%, Ukraine	4.7, Hungary	132.5, Hungary
2.4%, Estonia	4.5, Belarus	124.9, Belarus
1.5%, Hungury	3.2, Serbia	93.2, Serbia
1.3%, Poland	2.7, Slovakia	76.6, Slovakia
1.2%, Lithuania	1.5, Lithuania	37.0, Lituania
1.2%, Slovakia	0.7, Estonia	32.3, Estonia

Table 2 – Total flow of refugees from Ukraine to neighboring countries [8]

Country	Individual refugees from Ukraine Registered throughout Europe	Border crossing from Ukraine	Border crossing to Ukraine
Poland	1 246 315	4 944 264	2 910 041
Romania	84 884	890 168	544 546
Hungary	27 316	1 041 762	Data do not available
Republic of Moldova	86 880	549 333	180 356
Slovakia	87 027	627 555	360 715

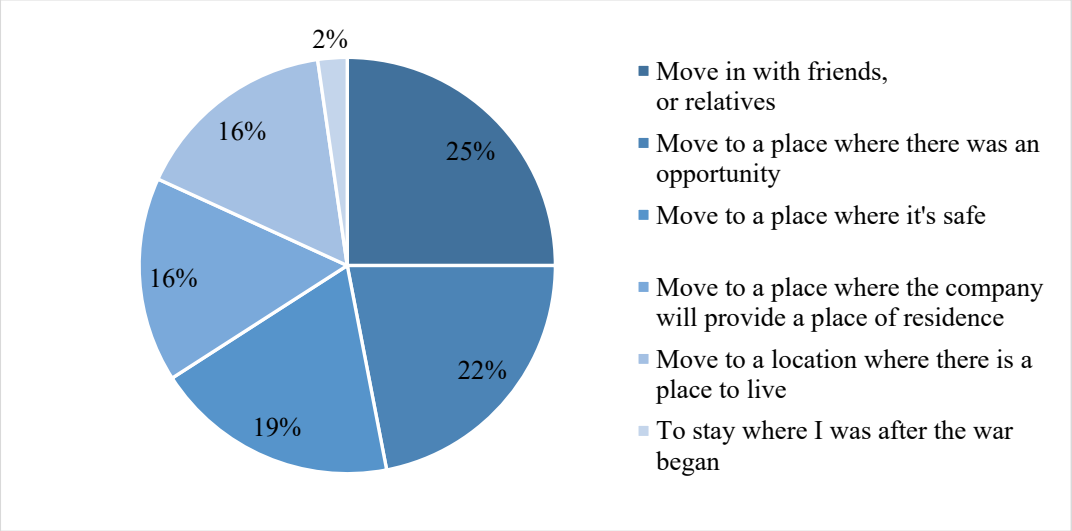


Figure 1 – How Ukrainian IT specialists choose the place where to relocate after 24.02.2022 according to [9]

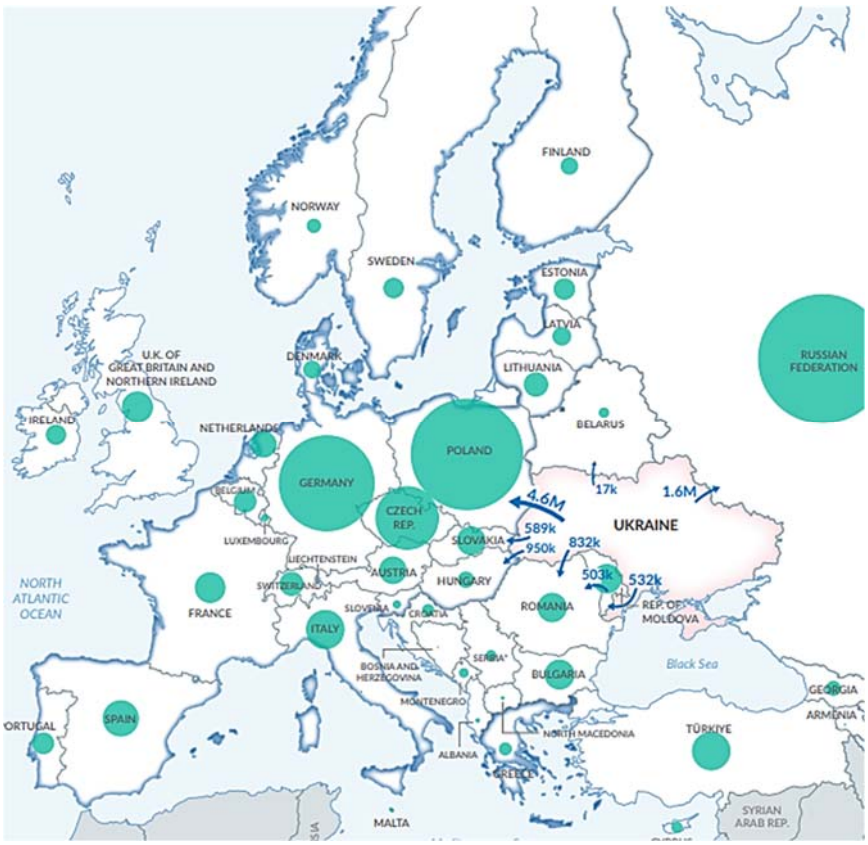
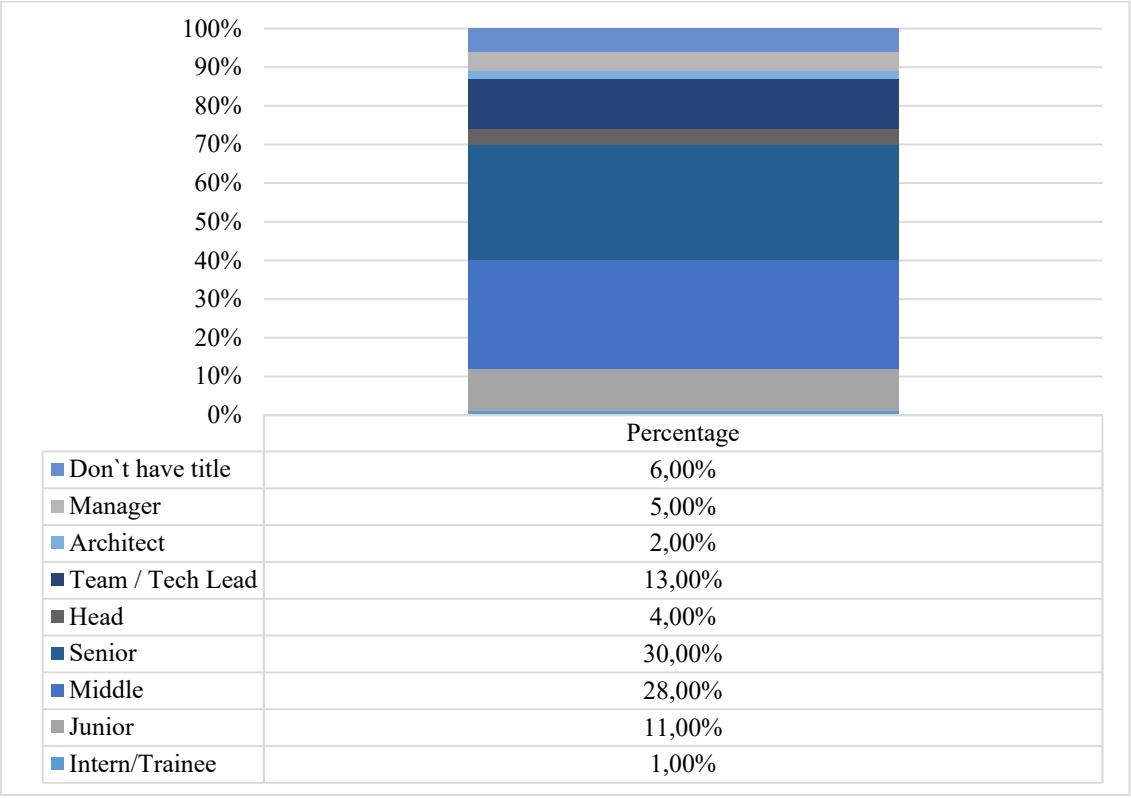


Figure 2 – Refugees from Ukraine across Europe on 13.07.2022 [8]

The professional level of specialists who leave Ukraine to have a safe place varies, but more than half (58%) of IT workers [9] have middle and higher ranks. The distribution of working ranks according to the surveys can be seen in Figure 3.

In Figure 4 it is possible to see a comparison of country profiles of the huge number of Ukrainian refugees and Ukraine according to the IMD world competitiveness ranking [3]. The IMD World Competitiveness Ranking is calculated on the basis of 255 ranking criteria. According to the data discussed earlier, Moldova was taken into account in the selection of countries, as the IMD website has no data on Moldova.

As can be seen, Ukraine ranks lowest on the "Domestic Economy," "Finance," and "Health and Environment". But at the same time, it has the best rating in the "Attitudes



	Percentage
Don`t have title	6,00%
Manager	5,00%
Architect	2,00%
Team / Tech Lead	13,00%
Head	4,00%
Senior	30,00%
Middle	28,00%
Junior	11,00%
Intern/Trainee	1,00%

Figure 3 – The professional level of IT workers-migrants according to [9]

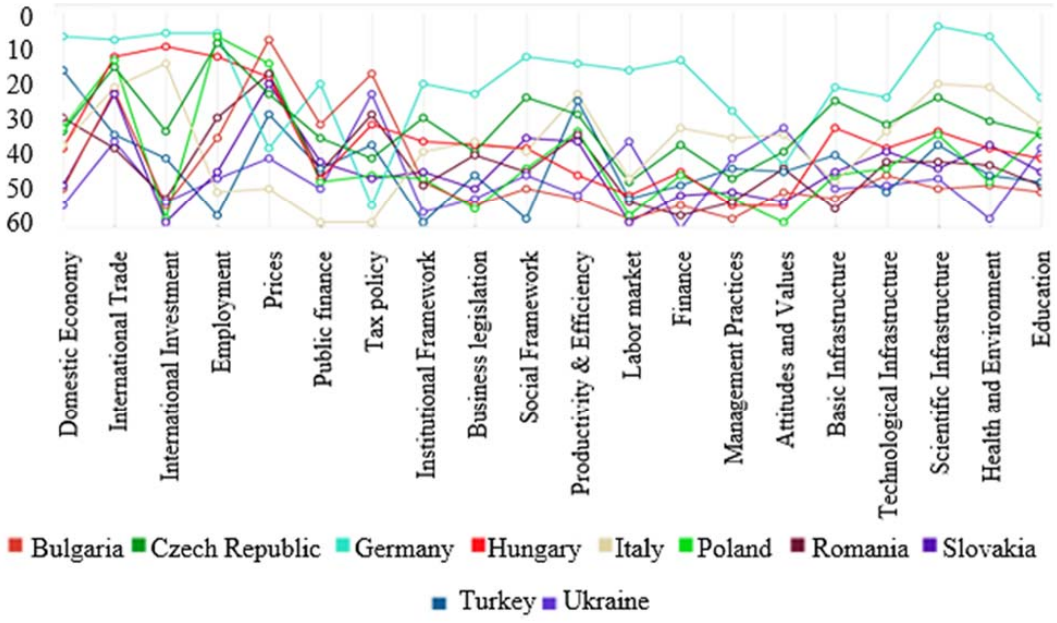


Figure 4 – Competitiveness landscape on 2021

and Values" indicator and the second best in the "Labor Market" indicator. Therefore, Ukrainian workers will be competitive in most labor markets.

But to understand the possible effect of brain waste on IT professionals, it is crucial to understand the digital environment in the countries where such professionals are currently located. This situation is shown in part in the "Technological Infrastructure" criterion. Ukraine has 51 points on this criterion and only Turkey is better, while Germany has the best position. Thus, workers from Ukraine should not be affected by the "brain drain" effect, as they can find a suitable job.

On the other hand, the labor potential of Ukrainians is much higher. This situation can be shown with the help of

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Table 3 – Digital/Technological Skills of countries [3]

Digital/Technological skills	2017	2018	2019	2020	2021
Bulgaria	7.67	7.20	7.02	7.47	6.70
Czech Republic	7.02	6.85	6.71	6.83	6.63
Germany	6.65	5.80	5.64	5.89	5.78
Hungary	5.30	5.34	4.99	5.50	5.40
Italy	5.97	6.19	5.91	6.27	6.27
Poland	7.02	7.04	6.42	6.69	5.61
Romania	7.45	7.93	7.47	7.49	7.10
Slovak Republic	6.13	7.15	7.32	6.93	6.83
Turkey	6.88	6.85	6.74	7.13	6.77
Ukraine	6.28	7.01	6.70	7.22	7.30

the IMD world digital competitiveness rating [3], which is calculated on the basis of 52 ranking criteria (32 Hard and 20 Survey data). The results of the countries for the previous five years are presented in Table 3.

Thus, the Ukrainian digital skills criteria have increased by more than 1 point since 2017, and in 2021 Ukraine has the best performance among the studied countries. And the most dangerous labor markets in terms of the "brain drain" effect are Hungary, Poland and Germany.

Conclusions. About 14% of Ukrainian IT specialists decided to emigrate to a safer place because of March 2022. Most of them are mid- to high-level specialists, so Ukraine has lost a lot of its highly educated and highly profitable workforce. Most Ukrainians move to neighboring European countries or other European countries.

A comparative analysis of the IMD World Competitive Ranking shows that Ukraine's overall economic and social position is lower than most destination countries, but labor potential is significantly high. And the Digital/ Technological skills of Ukrainians are constantly evolving and in 2021 will have the best performance among all countries.

The continuous development of the Ukrainian digital sphere leads to the fact that Ukrainian emigrants may face the problem of "brain drain" because it will be difficult for them to find suitable work in the countries of destination. But the IT sector is already responding to this problem by opening new offices in safe countries such as Poland. In addition, employees of multinational companies have been using the relocation tool since the beginning of the invasion. Thus, the main targets of the "brain drain" effect are employees of local small IT companies that no longer exist. Possible ways to reduce this effect on them or other highly skilled Ukrainian emigrants are cooperative projects between governments, local businesses, universities, or other educational institutions. A unified strategy to help people realize their labor potential can help develop the digital sphere of the host countries and not lose the competencies of Ukrainian professionals.

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РИЗИК ЕФЕКТУ «РОЗТРАТИ МОЗКУ» У ІТ ФАХІВЦІВ З УКРАЇНИ, ЯКІ ПОЛИШИЛИ УКРАЇНУ ПІСЛЯ ПОЧАТКУ РОСІЙСЬКОГО ВТОРГНЕННЯ

Дарина Андріївна Півень[1]

Криза українських біженців є однією з найважливіших гуманітарних проблем, що стали наслідком російського вторгнення. Багато високоосвічених людей втекли з України, щоб знайти безпечне місце для життя, як особистого так і професійного. Висококваліфіковані українські працівники можуть зіткнутися з ефектом «розтрати мізків» у країнах їх нинішнього проживання, що негативно вплине на економіку країн, що приймають біженців, і економіку України в майбутньому. Предметом даного дослідження є ринок праці в ІТ, оскільки цей сектор економіки розвивається у всьому світі і займає значну частку на ринку праці в Україні. Розглянуто концептуальну категорію «розтрата мізків» та її вплив на економіку приймаючої та вихідної країн. Щоб спрогнозувати можливий вплив ефекту «розтрати мізків» на українських ІТ-фахівців у найбільш відвідуваних країнах, було проаналізовано стан української ІТ-галузі за підсумками 2021 року. Автор визначив причини зміни місця виїзду до і після війни. Визначено професійний рівень ІТ-спеціалістів, які мігрували через війну. Країни були відібрані на основі даних про кількість біженців з України та опитування, проведеного в березні 2022 року. У статті також представлено порівняльний аналіз загального рівня економічних і цифрових/технологічних навичок країн призначення емігрантів з України та самої України . Методологічною основою дослідження став системний підхід до дослідження теоретичних аспектів впливу «розтрати мізків» на нинішніх українських емігрантів з метою з'ясування та визначення сутності основних понять «розтрати мізків», систематизації понять, факторів еміграції висококваліфікованих осіб після російського вторгнення, визначити можливий майбутній вплив «розтрати мізків» на українське суспільство. У статті використовуються методи спостереження за результатами опитування та аналіз вторинних даних. Як можливий шлях використання економічного потенціалу мігрантів були запропоновані проекти співпраці між урядом, університетами та бізнесом. Сформовано основні висновки наукового дослідження та окреслено подальші шляхи наукового пошуку.

Ключові слова: *міграція, розтрата мізків, відтік мізків, ІТ індустрія, ринок праці.*

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