

Impact of Brain Drain on the Development of the IT Sphere

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Abstract

The relevance of the study is explained by the trend of migration processes intensification in the modern Russian economy, a wave-like increase in the volume of emigration of highly skilled professionals. The paper describes the concept and causes of migration, combinations of political, economic, and cultural factors of the migration process. The authors have characterized the main destinations of migration and the structure of migrating human resources and proposed fields for the development of the Russian migration policy to reduce the migration flows of highly skilled professionals from Russia, as well as attract foreign specialists to work in the Russian Federation.

Keywords

Migration Flow, Research Centers, Labor Market, Brainpower Outflow, IT Industry.

Introduction

The globalization of the modern world reduces the importance of traditional productive forces, putting creativity and intellectual capital in the first place as a country's competitive advantage. The trend of internationalization of scientific and educational activities in the modern world increases the importance of analyzing the features of the migration processes of intellectual capital to reduce the outflow of highly skilled professionals. In the current period of digital and technological transformations, special

attention must be paid to the quality of human resources, since creativity and human capital are the keys to economic progress (Finch & Sharma, 2010).

According to O.V. Gutorovich (2018), scientific and technological progress has radically changed the conditions of human existence. A glance into history allows us to state that science and technology have penetrated all spheres of human life and society, not just transforming the sphere of material production and ensuring an increase in labor productivity, but qualitatively modernizing people's lifestyles. Humanity has reached a different level of its development, demonstrating the transformation of production, management, and operations and changing the way of life, work, and communication. In these conditions, a high-quality workforce forms a research base and influences the development of scientific and technical potential, thereby contributing to the adaptation and development of a country in a modern innovative digital environment.

Migration processes are an intensively developing trend in the modern world. The species structure of migration is diverse: movements and resettlement can occur both within a country (internal, interregional migration) and between countries (external, intercountry migration). The reasons for migration can also be different, from improving housing and social conditions (for example, resettlement from rural to urban areas to receive the highest quality medical services, education, etc.) to finding the desired employment (labor migration).

Initially, the concept of migration was considered by scientists as a change of permanent residence. In modern conditions due to the expansion of opportunities for intercountry and interregional movements, the concept of migration has expanded significantly, which influenced its interpretation as movement, circulation, or flow of talent (Kahanec *et al.*, 2013; Kapur & McHale, 2005).

A special type of labor migration is brain drain, which involves the movement of highly skilled professionals within a country and in the cross-country context (outflow of brainpower, brain circulation) to educational and scientific centers to improve their professional level, self-realization and organize research activities. Based on the definitions, the essence of labor migration is the movement of the working-age population between countries, caused by various reasons. Scientists from various branches of knowledge are trying to explain the complex and multidimensional phenomenon of labor migration, affecting the political, legal, economic, and religious aspects of society.

There is currently no single definition of brain drain. The term "brain drain" first appeared in a 1962 report of the British Royal Society and denoted the emigration of scientists, engineers, and technicians from Great Britain to the United States. Very quickly, it began to be applied everywhere, since even then the flows of brain drain in the world increased significantly and began to influence the economies of countries (Sulakshin, 2012).

According to V. Ledeneva (2014), brain drain can be viewed in a broad sense as "migration flows of qualified personnel working abroad for more than one year", as well as in a narrow sense as "migration of scientific and technical specialists and creative intellectuals".

In the Organization for Economic Cooperation and Development (OECD), highly skilled workers are those who have completed higher education or have not formally completed it but work in such areas of science and technology where this qualification is usually required (Freitas *et al.*, 2012).

The concept of brain drain is closely related to another term, "outflow of brainpower", which also appeared in 1962 (Ikonnikov, 1993). The outflow of brainpower, in comparison with labor migration, presupposes migration of professionals with a high level of qualifications or creative abilities from a region or country or complete termination of their professional activities.

At present, the brain drain is also an active ongoing process. The list of countries of migration is expanding; it includes not only developed but also developing countries. The forms of attracting human resources are changing, recruiting agencies are appearing, and migration motivation and attraction measures are changing.

In literature (Dragunsky, 1995), the influence of migration processes on interethnic relations and problems of tolerance is considered. The conflict-generating aspect of the immigration process is revealed by A.N. Sevastyanov (2015). Also interesting are the studies of V.L. Inozemtsev (2001) who studied the migration situation in postindustrial countries.

State and legal regulation of migration are considered in such works as (Goldin, 2001; Gradirovskii, n.d.), where the authors investigate the development of migration policies. This issue is well researched all over the world. In Russian sociology, social psychology, and social work, various authors have studied the factors influencing the process of sociocultural adaptation of migrants (Herbst & Erofeev, 2019), the relationship between

migrants and the local population (Mkrtchyan *et al.*, 2020), and the linguistic, cultural, and psychological aspects of socio-cultural adaptation (Sevastyanov, 2015). The implementation of practice-oriented development of programs and training courses for working with migrants are mentioned in (Bondar, 2014; Ledeneva, 2011, 2014).

Despite the large number of scientific literature devoted to migration issues, modern materials characterizing state policy aimed at attracting highly skilled professionals in the context of digital and technological transformation are insufficient, and, therefore, this problem requires additional study.

Materials and Methods

As an empirical basis for the study, we used data from the Federal State Statistics Service of the Russian Federation (n.d.), the official website of the International Labor Organization (2019), the official sites of the President (2020) and the Government of the Russian Federation (2019), the official website of the Main Directorate for Migration Issues of the Ministry of Internal Affairs of the Russian Federation, the analytical center "Institute for Public Policy Studies" (Finch& Sharma, 2010), the expert express survey of IT companies by RUSSOFT (2020), and the report of the Center for Strategic Research and the National Research University "Higher School of Economics" "Migration policy: diagnostics, challenges, proposals" (Demintseva *et al.*, 2018).

The main research methods within the framework of the work are monographic, retrospective, and content analysis of scientific literature and empirical sources, comparative logical analysis, and methods of generalization and systematization.

Results

Depending on the specifics of the country in question, the reasons for brain drain can be different. In the context of the Russian Federation, the main reasons for the dynamic migration of intellectual capital abroad are the following:

1. Low wages. The drop-in rate of the ruble and a significant difference in wages in R&D activities between Russian and foreign specialists are pushing Russians to change their place of residence (Sulakshin, 2012);
2. Insufficient facilities and resources, such as insufficient funding and obsolete equipment used in comparison with developed and even developing countries, creates barriers in the work of highly skilled professionals. The growth of tension in

- connection with the emerging difficulties has a significant impact on the migration of personnel abroad;
3. Lack of opportunities for self-realization. Foreign research centers provide more incentives for personnel than Russian (Tung & Lazarova, 2006);
 4. Corruption and bureaucracy. A widespread bureaucracy that slows down scientific processes and developments and the distribution of funds according to bureaucratic requirements reduce the level of interest of professionals in working within the country;
 5. Weak level of knowledge of the problem. The lack of accurate official data on brain drain, as well as the outflow of brainpower in the country, affect the level of control of the process by the authorities, which reduces the speed of adjusting the implemented state policy in this area (Tung & Lazarova, 2006);
 6. The aging of scientific personnel in modern Russia. The high level of intellectual migration after the collapse of the USSR influenced the age gap in scientific personnel, which led to the fact that the intellectual sphere is headed by old school professionals a part of whom denies everything new and slows down progress.

Based on the foregoing, it can be concluded that currently in the Russian Federation, there are limited opportunities for personal and professional growth of highly skilled professionals, which reduces the interest of Russian specialists working within Russia.

The difficulty of analyzing labor migration of intellectual capital in the global context is complicated by the fragmentation and often lack of representative statistical data. Let us consider the dynamics of the migration processes of Russia's intellectual capital based on data from the Federal State Statistics Service of the Russian Federation (n.d).

According to the dynamics of the migration flow in Russia, one can see a decrease in the number of labor emigrants since 2016 by 99.2% compared to 2015. This trend is associated, first of all, with the destabilization of the world economic and political situation and the growth of intercountry tension. The unstable situation also affects the dynamics of immigrants from Russia; the number of migrants decreased by 77% compared to 2015 in 2016. Comparing the migration processes of highly skilled professionals, it can be argued that the immigration flows of the population with higher education significantly exceed the emigration flows, both in the pre-crisis period and during the crisis. The share of the population with higher education who arrived in Russia in 2018 is 6.5% of the total number of immigrants.

Brain drain is a specific type of migration, the driving factor of which, in addition to professional qualities, can also be ethnic factors. For example, a significant proportion of those emigrating from Russia consists of ethnic Germans whose resettlement has relatively ethnic characteristics (Table 1).

Table 1 Dynamics of labor emigrants with higher education from the Russian Federation in 2014-2019, thousand people (Herbst & Erofeev, 2019)

Country	2014	2015	2016	2017	2018	2019
Azerbaijan	846	895	1,125	1,420	1,392	1,596
Armenia	2,254	2,636	3,250	3,659	3,586	3,970
Belarus	1,522	1,537	1,623	1,962	2,589	2,636
Kazakhstan	3,569	5,983	6,398	7,758	9,105	10,074
Kyrgyzstan	902	1,547	1,555	1,606	1,868	1,709
Moldova	1,807	2,256	2,782	3,669	3,763	3,363
Tajikistan	1,590	1,878	2,213	2,433	3,156	3,624
Uzbekistan	3,335	4,182	4,291	4,747	4,859	4,241
Ukraine	4,510	7,260	11,560	23,342	30,287	23,446
Germany	388	1,533	1,568	1,494	1,756	1,338
Georgia	368	395	494	515	516	518
China	128	460	582	314	321	379
USA	730	561	629	561	490	473
Turkey	469	407	263	236	211	304

Among the active countries that import intellectual Russian capital (except for the Commonwealth of Independent States (CIS) countries), one can separately name Germany and the USA. During the analyzed period, the number of Russian labor migrants with higher education to Germany increased markedly, from 388 in 2014 to 1,338 in 2018 (a relative increase of 344.8%). The opposite trend is demonstrated by the volumes of specialists migrating to the USA. The number of emigrants from Russia in this direction decreased by 35.2%, while the number of emigrants in the USA is relatively high compared to other Western countries. This trend is associated with the wide development of the local IT industry in the USA attracting IT specialists from over the world.

A significant emigration flow can be traced from Russia to the CIS countries such as Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Uzbekistan, and Ukraine. The development of crisis processes also affects the emigration orientation of human resources. During the analyzed period, there was an increase in the interest of specialists in such countries as China (the emigration flow for 2014-2019 increased by 196.1%), Georgia (by 40.8%), as well as South Korea. Thus, the migration processes in the Russian Federation are at a fairly high level, while the dynamics of immigration for the period 2014-2019 exceeded the emigration processes in the country.

The level of migration flows is currently being affected by the destabilization of the world order, which reduces both the emigration and immigration flow of highly skilled professionals. Among the countries with the largest import flow of intellectual capital from Russia, one can name the CIS countries, such as Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Uzbekistan, and Ukraine, as well as Germany and the USA. Besides, the global crisis has influenced the growing interest of migrants in developing countries.

Economic and political instability in the world had an impact on immigration flows. There was a relatively small increase in the number of Russian highly skilled professionals returning to Russia (Table 2).

Table 2 Dynamics of labor immigrants with higher education in the Russian Federation in 2014-2019, thousand people (Herbst & Erofeev, 2019)

Country	2014	2015	2016	2017	2018	2019
Azerbaijan	2,028	1,954	2,203	2,385	2,610	732
Armenia	5,527	5,443	5,855	6,049	6,016	1,944
Belarus	3,122	3,328	3,338	4,468	4,614	1,158
Kazakhstan	12,831	14,826	15,847	16,625	16,745	7,437
Kyrgyzstan	3,317	3,207	2,773	2,917	2,931	1,220
Moldova	5,125	5,557	6,010	5,558	5,359	2,319
Tajikistan	3,478	4,142	4,543	5,355	6,177	358
Uzbekistan	8,468	8,393	7,356	7,027	5,821	2,100
Ukraine	23,172	49,127	46,169	38,414	35,338	19,838
Germany	1,020	1,129	1,069	963	873	468
Georgia	852	819	876	820	842	347
China	546	642	391	376	412	15
USA	212	240	212	239	165	90
Turkey	516	279	324	358	362	83

One of the factors influencing the return of specialists to Russia is the development of transnational corporations that organize branches regardless of the territory of origin, allowing them to carry out work without leaving the country while having career growth opportunities. Besides, the growth of immigrants from the CIS countries is associated with the interest of foreign personnel (from the neighboring countries) in working conditions in Russia and the level of wages, which is higher than in their countries.

Fast-paced emigration harms low-income countries, but it is a mistake to view skilled emigration only as negative. Long-term interaction between migrants and their countries of origin has enormous potential for the development of poor countries that export skilled migrants. Since emigration can improve the prospects of the country of origin, developing

countries must stop efforts to curb skilled emigration and strive to realize the development potential presented by emigrants. The positive and negative effects of the brain drain in developing countries are shown in Table 3.

Table 3 Positive and negative effects of the brain drain in developing countries (Tung & Lazarova, 2006; International Labour Organisation, 2019)

Positive effects of brain drain	Negative effects of brain drain
Highly educated citizens can help improve governance and the quality of debate on public issues and strengthen the administrative capacity of the state.	Local citizens lose opportunities for learning and mutually beneficial exchange of ideas.
Brain drain stimulates education and remittance flows, lowers international transaction costs, and brings benefits to countries of origin for both repatriates and diasporas abroad.	Significant financial losses.
Appropriate policy adjustments, which depend on the characteristics and policy objectives of the source country, can help maximize the benefits or minimize the costs of the brain drain.	Above a certain level, the brain drain reduces the stock of human resources and causes irregularities in professional fields.
	Opportunities for high-scale economical achievements in highly skilled areas of work may be reduced.
	Society loses the return on highly skilled workers trained at public expense.

India and China, which account for nearly a quarter of all students studying abroad, are making significant efforts to attract talent. In 2012, more than 2.6 million Chinese students completed their studies abroad and only 1.09 million returned to China. However, China has also managed to increase the number of international students studying in the country from 80,000 to 330,000 in just the past decade. To make this possible, the Chinese government is increasing university budgets and trying to secure them first places in the world rankings. They also give foreigners more opportunities. In addition to traditional "export" courses (such as studying the Chinese language), China now provides high-quality training in life sciences, IT, and other in-demand disciplines. Academic preparation is complemented by investment in research to create the living conditions for the most promising students. The Chinese are also taking some controversial measures. Since positions in international university rankings depend on the quality of staff and citation indices, some Chinese institutions choose to buy the right to include foreign experts on their professorship lists. This does not mean their physical presence in China (especially in connection with the spread of distance learning courses)

or significant participation in the work of universities, but it helps to meet some formal criteria (Kapur & McHale, 2005).

The total digitalization of modern public life and the economy as a whole puts forward new requirements for the quality of human resources, increasing the importance of mobility, digital literacy, and creativity. Information technologies have firmly entered modern life, allowing storing the accumulated experience, as well as carrying out various processes with savings in time, labor costs, and energy.

The IT sphere is one of the fundamental components of the digitalization of the economy, where the main problem is the lack of highly skilled professionals combined with a fairly high average salary in the industry (52,802 rubles in Russia as a whole, 73,715 rubles in Moscow, 55,507 rubles in St. Petersburg). The apparent shortage of CVs in 2019 amounted to 3 people per job; the number of IT vacancies increased by 25% compared to 2018 (Demintseva *et al.*, 2018).

One of the reasons for the shortage of personnel in the IT-sphere in Russia is the brain drain, caused, first of all, by significant differences in salaries of personnel abroad and in the Russian Federation (the salary of an IT specialist in the USA is \$100,000 per year, in Canada, it amounts to \$68,321 per year, and in India, to \$50,000 per year), the standards of living, as well as Russia's lag in the development of digital infrastructure (for example, Finland is recognized as one of the best countries in the world for the development of digital infrastructure as part of improving the quality of life of the population). With all the positive characteristics of the working conditions of IT specialists abroad, some difficulties significantly reduce the level of migration of specialists:

- A high level of competition;
- Experience in the field – most foreign companies try to attract specialists with more than 4 years of work experience in this profession;
- A high cost of living (Australia), etc.

Consequently, an increase in staff salaries and the development of a digital innovative environment for self-realization will reduce the level of the emigration flow of IT specialists from Russia.

The current destabilization of the situation in the country and the world, namely a pandemic, an economic crisis, tensions between countries, etc., has a significant impact on migration processes in Russia and the IT sphere, in particular.

According to a survey of IT companies conducted by the Russoft Association, more than 80% of enterprises in this area have problems due to the pandemic, including unemployment, the loss of key employees, the emergence of risks of project failure, the loss of foreign markets, delays in payments for completed work, etc., which, in aggregate, significantly affected the decline in companies' revenues. In the first quarter of 2020, revenue increased by 2.4%, which is a rather low indicator (the growth in turnover of enterprises developing software had recently been at least 10-15% per year). However, a drop in revenue was observed in 38.2% of the surveyed companies. Another negative point is that enterprises do not predict a further optimistic scenario of events. It is assumed that the companies' revenue will decline in the future (Figure 1).

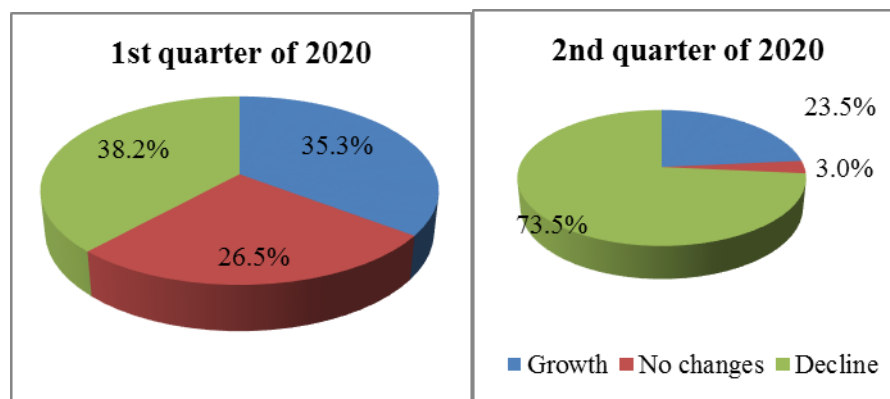


Figure 1 The changes in the revenue of IT companies (RUSSOFT, 2020)

A specific feature of the organization of an IT enterprise is the prevailing share of staff salaries in the structure of expenses, amounting to about 80%. A decrease in the income of this kind of company will cause massive redundancies, which, given the current economic situation in the country at the moment, will affect the growth in the number of specialists migrating to the West. Thus, according to the survey, only 29.4% of companies did not plan to have layoffs in the second quarter of 2020 (Figure 2).

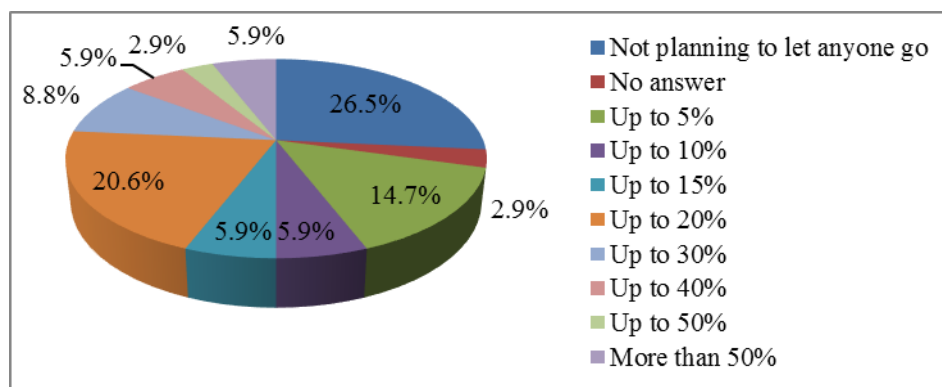


Figure 2 Expected staff reduction in IT companies (RUSSOFT, 2020)

The level of financial damage to IT companies as a result of the pandemic can be reduced, and the growth in the number of emigrants in the industry to foreign countries can be inhibited by the implementation of some government measures, including the growth of subsidies for the IT industry in the Russian Federation during the pandemic, as well as the provision of installments to enterprises to pay taxes and contributions.

The brain drain of highly skilled professionals has both positive and negative sides for the exporting and receiving countries. Let us look at some of them.

The creation of a highly qualified workforce is directly related to investments, both financial and temporary, in ensuring an adequate level of education. It is assumed that the formed human capital will pay back the state's expenses for training and advanced training. The migration of graduated professionals abroad increases the level of the country's expenses and the risks of not replenishing them. However, O. Stark (2005) adheres to a different point of view on this issue, arguing that professionals migrating to another country also invest in improving their qualifications, thereby increasing the level of their education at home. According to the researcher, a formed migration policy of the state contributes not only to the stabilization of investment in the development of the country's intellectual capital but also to the formation of the proper level of qualifications of the personnel.

Among the negative aspects of migration processes, one can also highlight a decrease in the level of highly qualified personnel in the country, an increase in unemployment, and a decrease in the quality of education, which harms the level of economic development, while the process of outflow of brainpower can have a positive impact on the world economy as a whole. Migration of professionals increases the productivity of existing knowledge and skills, contributes to the development of creative and innovative potential on a global scale, and also affects the social sphere in the global context, contributing to the self-realization of personnel and the growth of household income (both in the context of the host country and the country of emigration (Stark, 2005), which increases the socio-economic level of development of the population.

Discussion

The prevalence of the outflow of intellectual capital from Russia negatively affects the implementation of the counter-sanction policy in the country. A modernization of the economy is impossible without the availability of highly qualified personnel. This statement allows us to conclude that increasing the effectiveness of government measures

that restrain the level of outflow of Russian highly skilled professionals, as well as facilitate the attraction of foreign specialists, will increase the interest of migrants in working in Russia.

Among the opportunities to increase the interest of human capital in working in Russia, one can name an increase in the level of wages of highly skilled professionals. Currently, the Russian Federation is in 54th place in terms of wages in 2019 with a value of \$788 per month (Table 4).

Table 4 Wage levels in the countries of the world in 2019 (International Labour Organisation, 2019)

Place	Country	Monthly income, \$	Place	Country	Monthly income, \$
1	Switzerland	6,244	6	Germany	4,392
2	Denmark	6,192	7	Japan	3,998
3	Luxembourg	5,854	8	Belgium	3,930
4	Norway	5,450	9	USA	3,921
5	Iceland	5,436	10	Finland	3,908

As can be seen from the table, the level of average wages in Russia is at a fairly low level. Among the countries for which these average monthly and average annual earnings are attractive, one can name Belarus, Kazakhstan, Ukraine, Georgia, Moldova, Armenia, Azerbaijan, Kyrgyzstan, Uzbekistan, Tajikistan, etc., where the level of wages is an order of magnitude lower than in Russia. However, for Russians at present, the dynamics of salaries of personnel, including those employed in R & D, are negligible.

The growth of the interest of highly skilled professionals is facilitated not only by the stabilization of the standard of living and the increase in wages but also by the level of prestige of scientific work in the country, which directly depends on the increase in expenditures on civil science from the federal budget (Kahanec *et al.*, 2013).

To increase the prestige of scientific work in Russia, the Russian Government has developed the National Project "Science" (2019). For 2018-2024, the main goals of this project are an increase in the attractiveness of work in the Russian Federation for personnel engaged in research activities, an increase in financial costs for research activities, and, consequently, an increase in the level of scientific and technological development of the country.

The project is supposed to facilitate the following:

1. The development of scientific and production cooperation;

2. The development of advanced R&D infrastructure;
3. The development of human resources potential in the field of R&D.

It is assumed that the implementation of the project contributes to the expansion of the country's scientific and educational base (creation of world-class research and educational centers (REC)), increasing the recognition of Russian authors abroad due to the increase in the number of Russian journals included in international databases and the number of publications in foreign journals, updating the instrumental base of leading scientific organizations, as well as increasing the share of researchers under the age of 39.

One of the factors stimulating migration processes in the country is the low standard of living of the population, such as poor housing provision, the level of development of engineering infrastructure, and the social climate in the regions. The creation of a favorable social climate and provision of benefits in support of the return of specialists to Russia contributes to the growth of interest of returning professionals.

The main destination of the majority of immigrants in 2019 was the Central Federal District (namely, Moscow and the Moscow Region), where 190,414 foreigners moved, the Northwestern Federal District (namely, the Leningrad Region and St. Petersburg with 59,587 foreigners), the Southern Federal District (69,951 foreigners), the Siberian Federal District (76,511 foreigners), and Volga Federal District (78,603 foreigners). The regional distribution of the migration flow in 2019 can be represented in the form of a histogram (Figure 3).

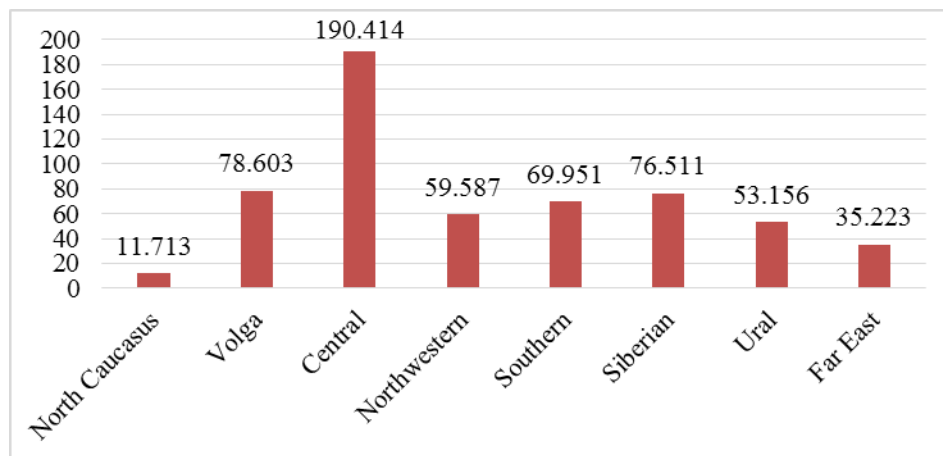


Figure 3 Distribution of migrants by regions of the Russian Federation, 2019 (Mkrtchyan et al., 2020)

To be more precise, in 2019, the most popular regions were Moscow and the Moscow Region (25,788 and 35,267 immigrants respectively), St. Petersburg (22,391), and

Leningrad Region (10,890), Krasnodar Territory (23,550), and the Voronezh region (18,580). These regions are known for their best job opportunities, relatively high wages, good climate, and numerous tourist attractions. For many years people of different nationalities and religions have lived there without acute ethnic conflicts. The Siberian part of Russia attracts a large number of immigrant workers due to the high level of industrial development: in 2019, 22,360 immigrants arrived in the Novosibirsk Region, 14,471 in the Krasnoyarsk Territory, and 11,853 in the Tyumen Region. The Far Eastern Federal District of Russia attracts mainly Chinese workers. 11,458 immigrants arrived in the Khabarovsk Territory and 129,139 in the Primorsky Territory in 2019. 60% of those who migrated to the Russian Far East were Chinese citizens of working age. The smallest number of immigrants was registered in the Nenets Autonomous District (199), the Republic of Kalmykia (104), and the Chukotka Autonomous District (81) (Glavnogoe Upravlenie po voprosammigratsii MVD Rossii, n.d).

According to the data of the Main migration department of the Ministry of internal affairs of the Russian Federation for 2019, one of the main goals of resettlement of immigrants to Russia (Figure 4) is employment (40%). The next most important are private visits (39%), tourism (7%), and other purposes (6%).

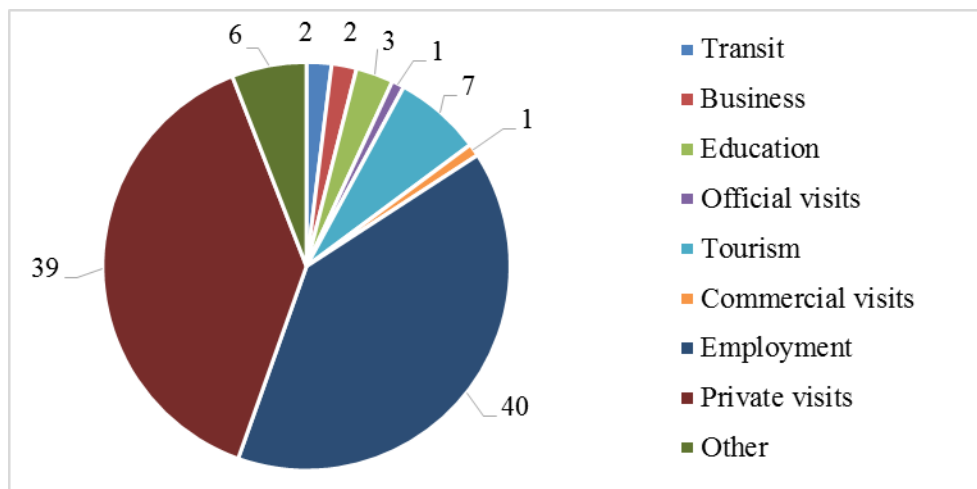


Figure 4 Purpose of stay of foreign citizens in Russia, 2019 (Official website of the Main directorate...)

Among the reasons prompting migrants to come to Russia, one should highlight the following:

- The economic reason. Long-standing friendships between Russia and other member states of the former Soviet Union and the visa-free regime allow people to travel relatively freely in search of work. Immigrants for reasons of employment mainly

- come from Tajikistan, Kazakhstan, Kyrgyzstan, Azerbaijan, Armenia, Moldova, and Ukraine, since the level of wages in these countries is lower than in Russia;
- The return of ethnic Russians to Russia (mainly from the former Soviet republics). For example, according to the 2014 census of Georgia, Russians make up 0.7% of the total population of this former USSR state, whereas, before the collapse of the Soviet Union (in 1989), Russians accounted for 24% of the total population;
 - Political reasons (including military). One of the reasons people come to Russia is because of their opposition to government policy or military conflict in their home state.

The problem of newcomers is the complicated procedure of registration and legalization. A decrease in the bureaucratization of the nostrification system and the deadlines for registration also contributes to an increase in the desire of migrants to live and work in the country.

In addition to the above measures, it is also necessary to consider the experience of foreign countries in reducing the level of migration flows. For example, in the legislation of some countries, a ban on travel abroad for specialists of certain professions, including doctors and teachers, is officially enshrined. However, these measures cannot be called highly effective, since the growth of this kind of restriction contributes to an increase in the shadow (unofficial) migration of specialists.

As an example of attracting specialists for IT structures for Russia, it is especially useful to consider the experience of the neighboring state of Belarus, on whose territory a new Silicon Valley is emerging. Such projects as World of Tanks, MSQRD, Viber, PandaDoc, and MAPS.ME have been developing in the country in recent years. Large outsourcing companies place their development centers in Minsk (such as EPAM Systems, Itransition, Qulix Systems, and IBA) (Mkrtchyan *et al.*, 2020). The reasons for the growth of this sphere in the country are caused by several factors (Lebedeva, 2014) such as:

- Highly skilled professionals;
- The low cost of development. This factor is associated with the difference in salaries of Belarusian and Western specialists, which allows Western companies to get the required result at lower costs;
- Creating a High-tech Park similar to Silicon Valley;
- Stimulating business creation in the IT sector;
- Geographic location. Located between two global markets (the Russian and the EU market), the country has quick access to both of them.

Among promising examples, we can highlight the experience of the USA and Great Britain that have increased the level of spending on scientific activities to preserve the national scientific elite. As part of attracting foreign highly qualified personnel abroad, networks of recruiting firms are being created to select promising foreign students. However, the growth of students' interest in studies and further work in the countries of migration is caused by the developed system of benefits for promising personnel in the USA, Canada, France, New Zealand, and Great Britain, as well as the accelerated process of obtaining citizenship for these potential specialists.

The policy of states to stabilize migration flows is aimed not only at increasing the interest of students, but also of highly skilled professionals. For example, France, Japan, and Germany stimulate the inflow of intellectual capital by providing special visas for people working under long-term contracts.

Thus, at present, at the federal and regional levels of the Russian Federation, measures are being taken to reduce the outflow of brainpower from the country and to attract foreign specialists. The state's interest in the development of the scientific sphere is increasing, the popularity of scientific and intellectual activities is growing, and financing of promising areas of development is being regulated. Nevertheless, these measures are not enough to support the work of highly skilled professionals in Russia. The government needs to expand the list of areas to increase the prestige of science and the interest of young highly skilled professionals using the experience of foreign countries, as well as based on the country-specific problems of intellectual capital, raising the standard of living of the population of the regions, regularly indexing the salaries of specialists engaged in research and engineering and technical developments, attracting specialists to the regions through programs to improve housing conditions, etc.

Conclusion

The process of brain drain has a significant history, depending on the time frame, the directions of migration flows, types of migrating specialists, and forms of migration change. Migration processes affect both the region of immigration and the region of departure. Depending on the specialization of the labor migrant, the research base of the territorial unit may change. The effective activity of the migrant in the field of R&D contributes to increasing the investment attractiveness of the region, as well as the country as a whole. However, these characteristics of the country of emigration, in this case, can be reduced.

One of the pressing modern problems of the Russian economy is the lack of highly qualified personnel in science, engineering industries, and the IT industry. The small number of personnel in these areas is mainly caused by the low level of funding for scientific work in the country, the depreciation of these professions at present, as well as the lack of measures of material incentives and the possibility of self-realization for highly skilled professionals.

According to the results of the study, it was revealed that in the context of the Russian economy, the migration processes of specialists had a direct impact on the formation of a competitive economy in modern digital conditions. In 2018, among Russian immigrants, the share of personnel with higher education was 6.5% of the total number of migrants, which is a fairly significant indicator, while the number of immigrating personnel of this personnel exceeded the level of emigration in the country.

The modern conditions and level of wages created within the country attract to Russia mainly migrants from the CIS countries such as Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Uzbekistan, and Ukraine, where average wages are an order of magnitude lower than in Russia. However, these conditions do not contribute to the retention and attraction of Russian scientists and professionals to the country.

The global financial crisis, the unstable economic situation in the country and the world also have a significant impact on the direction of migration flows. For example, among foreign countries attracting the interest of Russian highly qualified migrants, one could name the USA, Canada, as well as Germany, that have a developed education system, using modern computer technologies with a high standard of living. Currently, the interest of immigrants is growing towards developing countries such as China, Korea, and India.

Based on the study, it was revealed that the main factors stimulating the growth of migration processes in the country were the unsatisfactory living conditions, low level of education and wages, poor facilities and resources for scientific R&D, and a decrease in the prestige of scientific work in Russia.

To increase the interest of Russian highly skilled professionals in returning to the country, attract foreign personnel to exchange experience, as well as organize work properly, it is necessary to develop a system of measures to increase immigration quotas for the population, reduce the tax burden, and simplify the visa regime, in particular, for highly skilled professionals at the state level.

Russia needs to provide the intellectual elite with access to modern technologies, challenging projects, and communities of their colleagues, where they can exchange ideas and feel that they belong to the international academic community. Among other tools, one can note such tools as:

- Propaganda. Propaganda is a relatively effective tool for limiting brain drain. Many countries today appeal to the patriotic sentiments of the academic community and skilled workforce, trying to convince them to work for the national economy;
- Special visa agreements. Other countries are paying more attention to attracting specialists. For example, Australia, New Zealand, Canada, France, Great Britain, and other countries facilitate visa processing for international students. In Great Britain, Germany, Ireland, or Japan, there are special types of visas for highly skilled professionals in certain fields, for example, in the field of IT. Some countries even simplify the process of obtaining citizenship for university graduates and their families. Among other measures, one can note the allocation of work permits for people with student visas (especially for graduate students) or a simplified recognition of foreign degrees;
- Financial incentives. Another option is to use financial incentives. Many countries provide talented undergraduates and graduate students with grants or simply take on the costs of their education. The EU is gradually increasing its R&D budget to persuade talented foreigners to stay in their laboratories and institutions. It is also important to ensure a strong link between universities and employers so that international students have immediate access to work after graduation and, therefore, more reasons to stay;
- Globalization of educational opportunities. In Scandinavia, Germany, and Hungary, more and more academic programs are taught in English. Singapore, Qatar, and Malaysia sign agreements with leading US universities and open their campuses or provide dual courses that help to get both a national and an American degree. Considering the lower cost of training, compared to the USA or Australia, this approach makes sense.

Besides, the growth of housing provision of personnel and the formation of favorable socio-economic and cultural living conditions contribute to the attraction of specialists to the regions. To increase the interest of intellectual capital, it is also necessary to use the experience of advanced countries in regulating migration flows. These measures contribute to improving the quality of human capital, as well as reducing the share of highly skilled professionals migrating from the country.

Thus, the analysis of the migration situation in the Russian Federation shows that for effective management of migration processes in Russia, it is necessary to involve not only the federal level of state power but also the regional level and local self-government bodies with the involvement of civil society institutions.

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