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***Brain Drain from Russia:
in Search for a Solution***

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Brain drain from Russia: in search for a solution

Abstract

During the short but full with novelties post-soviet period, Russia has faced the phenomenon of international migration in all its diversity. Brain drain¹, or emigration of intellectuals, is likely to be the most painful issue in this context. For years, dramatic negative effects of brain drain for Russian economy have been emphasized and losses have been calculated. Surely, these wails do have grounds. However, in the open market economy restrictions on labour migration of intellectual workers can be hardly effective. Globalization of intellectual labour market and universalization of science, knowledge, and education, remove obstacles for cross-border movements of scientists, researchers, and professors. This understanding is growing over the world. Russia is also evidently shifting towards pragmatic search for new opportunities to benefit from participation in the global intellectual labour market.

In this paper, the author intends (a) to show the new trends in intellectual migration in Russia; (b) to give estimations of how situation can develop based on surveys of graduating students and researchers who have already participated in professional short-term migrations; and (c) to evaluate the measures that are now taken by the Russian government in the field. The paper summarizes researches dealing with brain drain from Russia issue in the last 15 years, and empirically proves incipience of new understanding of how intellectual migration is to be managed in the global context in order to lessen the ‘direct’ losses of origin countries and provide them with ‘indirect’ benefits resulting from sharing the results of internationally developed high technologies. The paper is primarily based on the results of sociological surveys conducted in Russia in the recent years and interviews with Russian policy-makers and distinguished academics.

Introduction

Usually it is the initiative of ‘drained’ countries to raise a question of losses related to outflow of high skilled migrants or knowledge workers. The fact that this conference is initiated and organized by the German Marshall Fund of the U.S. – the country, which has been benefiting from inflow of intellectuals for the greatest extent during the decades, gives grounds to think that we are witnessing a radical shift in interpretation of trends and effects of migration of high skilled workers in the globalizing world. Development of many branches of science within the frames of only one country is hardly possible now. On the one hand, modern science needs new organizational forms – transnational. Projects in space investigations, in energy technologies, in physics of high energies, molecular biology – all these fields of highest priority need huge resources, both intellectual and financial. On the other hand, peculiarities of intellectual labour lie in brains’ *need* for circulation and for professional contacts that provide

¹ There is no commonly recognized understanding of the term *brain drain* in the modern migration literature. In the context of this paper, brain drain is understood in the narrow sense, i.e. as permanent emigration of intellectuals, knowledge workers, and high-skilled specialists, engaged in research and information science, as well as potential specialists (students, post-graduate students, trainees).

mutual enrichment and produce new ideas. There are numerous examples that prove that co-operation between scholars from different scientific schools gives most effective results.

So, nowadays development of fundamental science needs global regulation. This means that new forms of organization and mobilization of intellectual resources at the global level are to be found.

This paper is focused on Russia, the country that has been facing brain drain in a large scale for years. As economic situation in Russia is recovering after dramatic post-soviet crisis, the former despair related to outflow of highly skilled workers is gradually shifting to more pragmatic attitude towards participation of Russian migrants in the international labour market. Nowadays attitude towards scientists, researchers, professors, and PhD students who go to other countries to continue their studies, or to participate in joint projects, or to work as contract workers, is not negative as it was in the early 1990s. Much more Russian intellectuals are involved in international migrations. The character of these migrations is shifting to primarily temporary labour migrations rather than permanent emigration. Migrants are surely enriched by these trips, and their enriched knowledge could effectively work for Russia if they come back, but even if not, they can act as promoters of collaboration with Russian research centers, create international research groups, consult and supervise graduate students from Russia, etc. So, for international migration policy-makers in Russia, the core of the brain drain problem seems to have shifted to the following issues:

- how to maintain contacts with émigré academics not to lose them irrevocably;
- how they can employ their new knowledge in Russia if/when they return;
- what is the role of Russian scientific diaspora in international science.

Brain drain from Russia: the scale?

It is a great temptation to start with estimation of the scale of brain drain from Russia because the estimates are so impressive... but at the same time so much differing from each other. So, except only one reliable figure of about 30,000 Russian ‘knowledge workers’ (people with academic degrees) who have left Russia for permanent residence (and have declared that!) (“Draining brains”, 1998) – all other estimations of *temporary* intellectual labour migration and students’ migration from Russia are fragmentary and hardly compatible.

In 2003, the Russian National Statistics Committee (ROSSTAT) started to publish data on numbers of Russian researchers who have worked abroad through official channels² (On numbers... 2003). The data cover 4,037 institutions³ engaged in research activities, with 422,200 research workers. Among them, about 3,000 researchers worked or were trained in other countries in 2004 (the data includes trips for the period over 3 months⁴). The structure of these migrants is presented in Picture 1. In fact, this is less than 1% of the total. However, it is important to note that these data do not include migrants who are ‘invisible’ to statistics, i.e. those who leave the service in Russia when find a job in another country, or the personnel of small scale enterprises in the R&D industry⁵ not covered by the ROSSTAT survey. Besides, it

² Researchers who were sent to overseas universities or research centers by administration of their institutions for a period over 3 months and who were staying staff-members of their institutions.

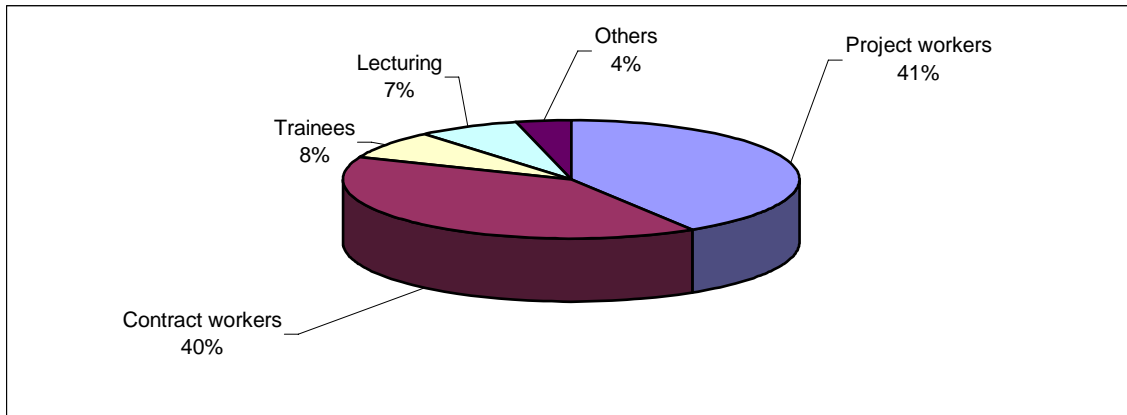
³ Institutions attached to the Russian Academy of Sciences, branch academies, ministerial research institutions, universities, and research centers.

⁴ The 3-months criterion is chosen by official statistics to distinguish temporary labour migration from short-term trips for participation in conferences and training courses.

⁵ In 2004, there were 28,500 small-scale enterprises in the R&D industry with 107,800 employees (Russian Statistical Yearbook, 2004).

is clear that some fields of science are affected by brain drain to a more extent while others are facing this phenomenon less.

Picture 1.
Structure of officially registered temporary intellectual labour migration from Russia, 2004



Source: ROSSTAT (Russian National Statistics Committee)

In fact, the degree of brain drain can be evaluated only with concrete examples. Thus, in the Institute for Theoretical Physics of the Russian Academy of Sciences, 2/3 of key researchers work abroad the major part of their time. Another example: there are about 300 most distinguished mathematicians in Moscow. Half of them work abroad permanently, by prolonging their job contracts. They are not emigrants in the classical understanding of the word but labour migrants as they are contracted temporarily. But will they return? Maybe they are to be perceived as members of *international academic community*?

Number of Russian students in overseas universities is also incomplete and incompatible. For example, the Institute of International Education, USA estimates growth in numbers of students from Russia in American universities from 1,000 in mid 1990s to 8,000 in 2004. The UNESCO estimates numbers of students from Russia in overseas universities as 13,000 in mid 1990s and 18,000 in 2004. At the same time, data from the Russian Ministry of Education estimates number of Russian students in foreign countries 20,000 in mid 1990s and 50,000 in 2004 (including short-term youth work programs).

High skilled migration from Russia: new trends

New trends of intellectual migration from Russia by mid-2000s look not so pessimistic as in mid-1990s, first of all, due to the shift in potential migrants' strategy from permanent emigration to temporary labour migration. Partially because of positive dynamics in economic situation in Russia and correspondingly a valid hope to return sooner or later; partially because of trust in irreversibility in democratic reforms in Russia including freedom of movement to other countries, - Russian intellectuals likely prefer not 'to burn down their bridges back' and reserve their professional contacts, employment opportunities, and properties in Russia.

Stepwise migration is a typical feature of contemporary high-skilled migration from Russia. When students, young people go for a training course to a foreign university, set up professional contacts there; after graduating they join a post-graduate course there to have international level skills and diplomas or start research work in an international project; and later they go there and back benefiting from higher salaries abroad and habitual home

environment in Russia. Of course, this situation can result in emigration for permanent residence, i.e. brain drain for Russia. But it can also keep the stage of temporary labour migration for the benefit of all the participating parties: a migrant, Russia, and a receiving country.

The new priorities of the Russian policy in the field of R&D are aimed to support this situation. They are: (1) active academic contacts with foreign research institutions; (2) encouragement of contacts with the Russian scientific diaspora; (3) engagement of Russian IT specialists in out-sourcing; (4) development of new incentives in the sphere of innovations to provide Russian scientists and scholars with proper jobs in Russia. Return migration of émigrés that is taking place now, gives hopes that the Russian academic schools in theoretical physics, mathematics, biological engineering, fundamental medicine, will be developing in a closer contact with the global advanced science.

Foreign investments in high-tech industries in Russia give another alternative to researchers in the conditions when financing of Russian R&D industry is limited. For example, the *Boeing Company* has opened its design bureau in Moscow where 1,300 high skilled Russian engineers and technical designers work. The *Intel Company* has established a IT laboratory affiliated with the Nijny Novgorod University. (3) Again, in Nijny Novgorod the *Microsoft Company* has opened its IT center and included the Nijny Novgorod University in the top list of the world centers of IT business. These companies use Russian brains in Russian territory. Is it brain drain? No, it is globalization. Moreover, for Russia it is surely a benefit because its high skilled specialists do not seek ways to emigrate, they work in the country, pay taxes, and gain new knowledge when working in the most advanced companies.

In terms of intellectual migration, Russia is not a typical ‘country of origin losing its brains’. Russian science, rich in its traditions and successes, is still alive despite severe crisis of the 1990s and staff losses and it still demonstrates breakthroughs in different fields of fundamental natural sciences. The traditional weak point of the Russian R&D sector is transformation of new ideas into applied products. In the Soviet period, science could develop ‘by itself’ being financed from the state budget. Its inventions and discoveries were applied in military and defense-related industries. In present time this situation is inadmissible: economic progress of the country strongly depends on applied innovations in various sectors of economy. That’s why in the recent years development of innovations sectors is one of major priorities of the Russian economic policy.

Table 1. Reasons to emigrate, 2004

76%	Low wages
53%	Decline in prestige of intellectual labour
50%	Lack of opportunities to realize scientific potential
19%	Vague prospects of the carrier
40%	Social outburst threat
35%	Anxiety about children’s future
35%	Economic instability, unemployment threat

However, push factors motivating emigration of Russian scholars and students are still rather significant. They are summarized in Table 1 using the results of the survey of professors and researchers of the Moscow universities in 2004.

The first four reasons are dealing with professional interests and concerns of the Russian intellectual workers. $\frac{3}{4}$ of them point low wages as a major push factor, which often forces

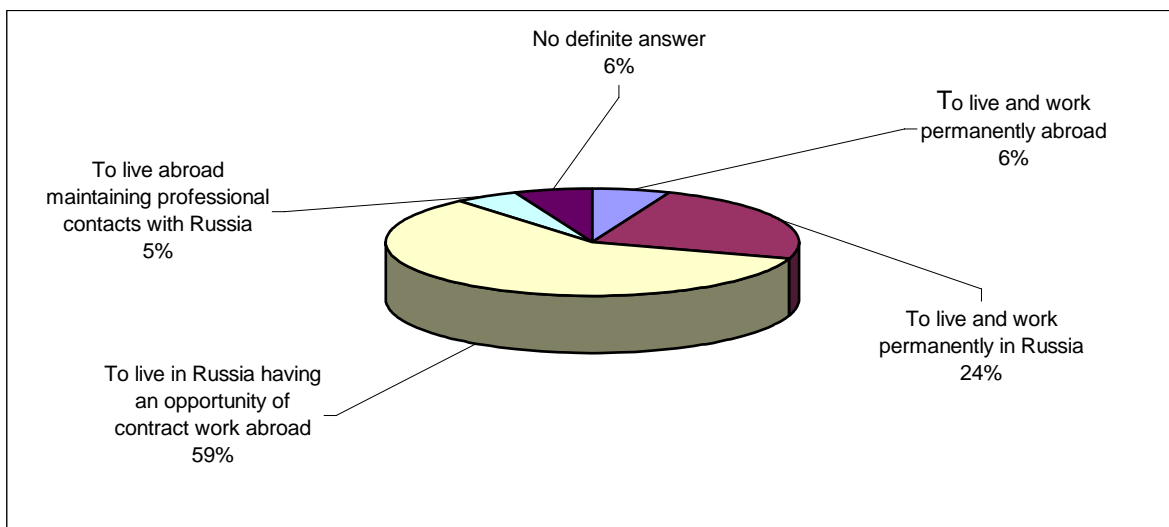
researchers and professors seek for job opportunities in other countries where qualified labour is paid better. Besides, half of respondents emphasize low prestige of intellectual labour in Russia and poor chances to realize their scientific potential. “General’ economic and social push factors are also important: every third respondent indicate their fear of possible social outburst or economic crisis. Anxiety about children’s future is a typical concern of highly educated parents who can’t imagine their children without higher education but at the same time they realize the narrowing possibilities to get good higher education (because of widening of the fee education sphere) and moreover – to bring knowledge to fruition after graduating.

Migration intentions of Russian university graduate students

In order to estimate the threat of brain drain it is very useful to understand migration intentions of university graduate students because they are the future of a science and a future of a nation.

Annually over 1 mln students graduate from Russian universities and other higher education institutions. This number is growing. In Russia there are 67 students per 1,000 of population. It is one of the highest rates in the world. (In South Korea it is higher; in the U.S. it is approximately the same).

Picture 2.
Migration strategies of Russian university graduate students, 2003*



* 2003 Survey of graduate students in the Moscow State Lomonosov University. N=465. Faculties: Mathematical, Biological, Physical, Chemical, Computing & Cybernetics, Economics

The results of recent surveys of graduate students demonstrate the *potential* of intellectual migration from Russia. Picture 2 is based on the 2003 survey of 465 graduate students of five faculties in the Moscow State Lomonosov University (Ledeneva, Nekipelova, 2003). To characterize the respondents, it is important to note that 24% of them have already participated in different kind of international projects; 34% are fluent in English language. This means that they can more or less realistically estimate their chances to work in other countries. Some of them have already faced an interest from foreign research centers/universities: 10-13% of future physics, chemists and biologists have already got invitations to continue their studies abroad after graduating from the Moscow State Lomonosov University. They are most likely to leave the country after graduation. The majority of them are most advanced students in terms of

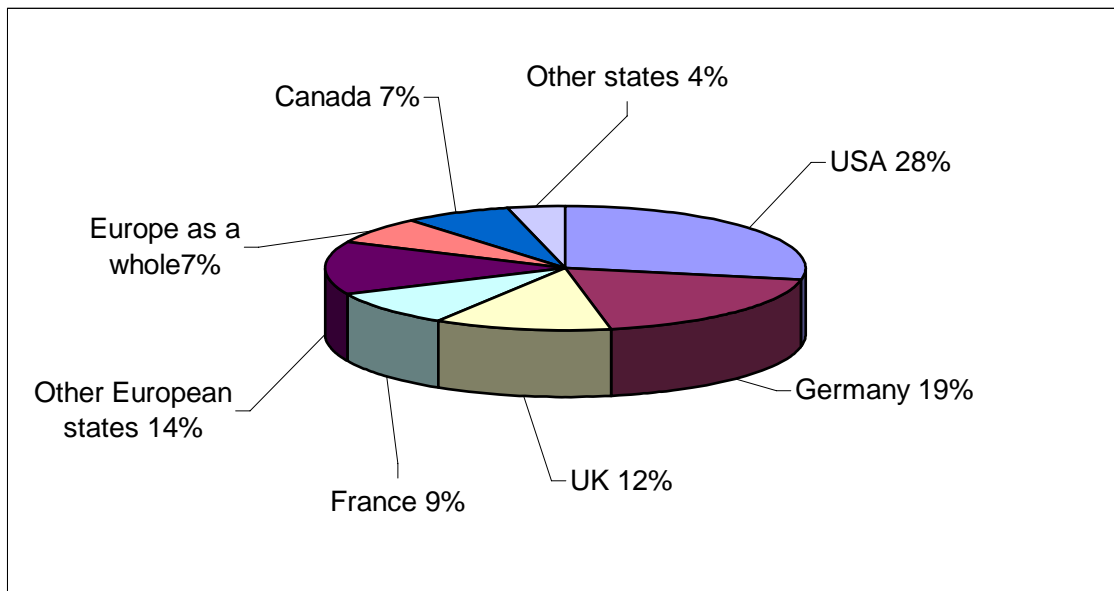
good results in studying and research initiatives. Over 60% of ‘A students’ have got proposals to continue studying or researching in foreign institutions.

The most preferred migration strategy (59%) is to live in Russia having an opportunity of contract work abroad, i.e. temporary labour migration. Only ¼ of respondents would prefer to live and work in Russia while overwhelming majority would like to apply their professional knowledge at the international level. Surely, it is just a model of behavior or a ‘dream’ that will not be realized by all of them. However, the results of the survey demonstrate the moods dominating among the elitist Russian students.

Among those students who would prefer to pin their future professional carrier on out-migration, 70% were actively gathering information about such opportunities, 50% were intensively studying foreign languages, 27% already addressed to foreign universities and research centers, 16% sent application forms and CVs, 15% participated in concourses of foreign foundations to have grants for studies or research. Generally, about 25% of graduate students were really active in their search for opportunities to announce themselves internationally. They are a potential of future intellectual migration from Russia.

When answering a question about financial sources of studying abroad the students primarily rely on ‘external sources’, i.e. scholarships or grants in receiving countries. This fact can be evaluated as an indirect evidence of their high competitive ability among applicants for scholarships or grants.

Picture 3.
Destination countries of potential Russian migrants – university graduates, 2003*
(as noted in students’ answers)



* 2003 Survey of graduate students in the Moscow State Lomonosov University. N=465. Faculties: Mathematical, Biological, Physical, Chemical, Computing & Cybernetics, Economics

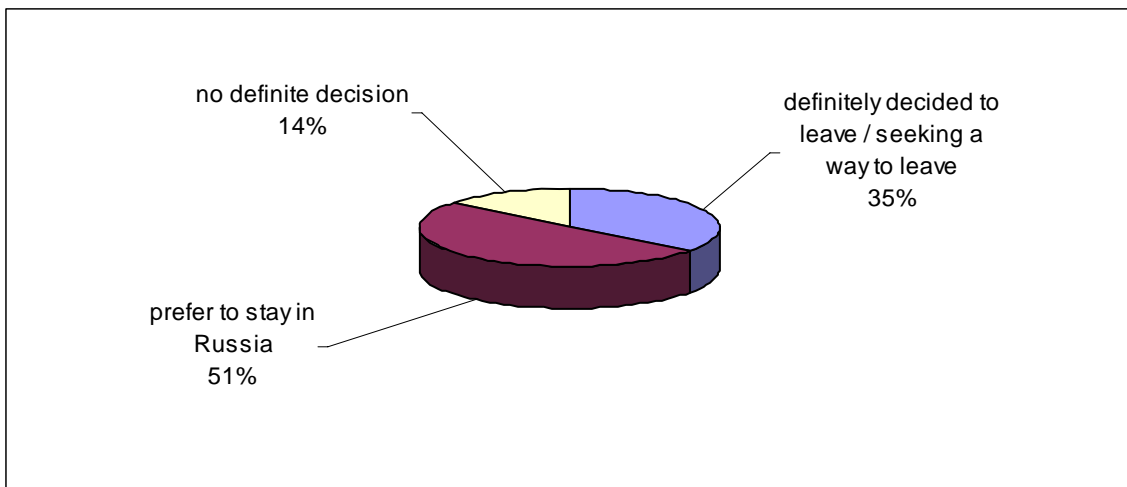
Among potential receiving countries, European states dominate (61%) (refer to Picture 3). However, the USA is the most desired target (28%) followed by Germany, UK, France and Canada.

The survey has exposed that the major source of information on opportunities to study and work abroad is Internet (73% draw information from Internet sites). It may seem a paradox

that 43% of potential migrants get information from their professors of the Moscow State Lomonosov University who, together with professional knowledge, give their students information about the world leading universities and research centers, foreign scholars, etc. Thereby, they favor integration of Russian students into international educational and research networks.

Another survey of migration intentions of Russian university graduate students was conducted in five cities of Russia: Moscow, Saint-Petersburg, Yekaterinburg, Ufa, and Smolensk (Picture 4). The number of respondents was 824. Over 1/3 of graduate students 'definitely decided to leave' or 'seeking a way to leave'; in Moscow this percentage is higher while in a smaller city (Smolensk) it does not exceed 15%. However, 14% who have not come to any definite decision can also include those who will leave. The most preferable type of migration is long-term (over 1 year) contract (40%). Though the authors of the survey conclude that 'emigration intentions of Russian students are strongly exaggerated' (Tchudinovskikh, Denisenko, 2003), migration potential of graduate students seems high.

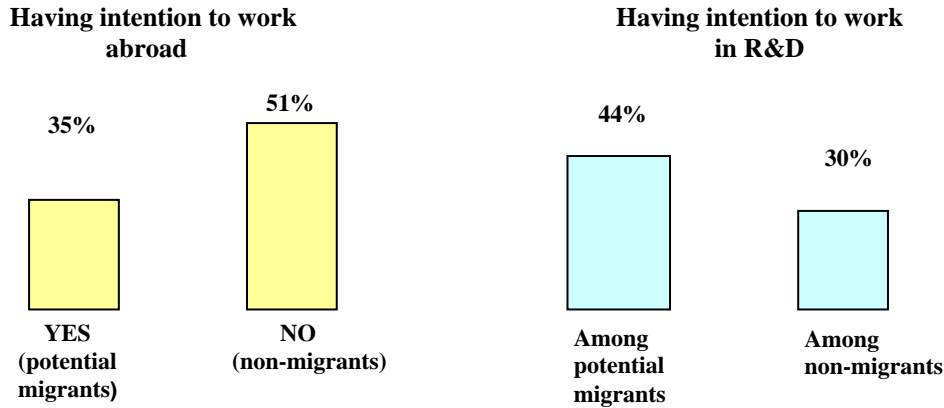
Picture 4.
Migration intentions of Russian university graduate students, 2003*



* 2003 Survey of graduate students in 5 cities of Russia: Moscow, Saint-Petersburg, Yekaterinburg, Ufa, and Smolensk. N=824

Picture 5 summarizes the results of a number of surveys in the field. *Every third Russian student* has a desire to join international scientific community. Among graduates from faculties of Biology this percentage is close to 50%; in faculties of Chemistry – 40%. It is appropriate to mention again here that these are the most advanced students. They are working hard to meet the requirements of the world leading universities and realize their human capital potential by intensive studying of foreign languages, selecting information, participation in international research projects, etc. Is it good or bad from the perspective of the State? The right side of Picture 5 gives an answer to this question. Much less share among 'non-migrants' (students who prefer to live and work in Russia) declare their intention to work in R&D sector that among 'potential migrants' (students who choose to work in other countries). It is a very disappointing sign for Russia. This means that students do not see proper prospects for research work in Russia, in terms of wage levels, technical/equipment opportunities, prestige, etc. *A desire to work in R&D among students of natural science faculties is a strong push factor.* Sphere of Science in Russia is likely not to give an opportunity to combine professional interest for scientific research with sufficient wages.

Picture 5.
Migration intentions of Russian university graduate students



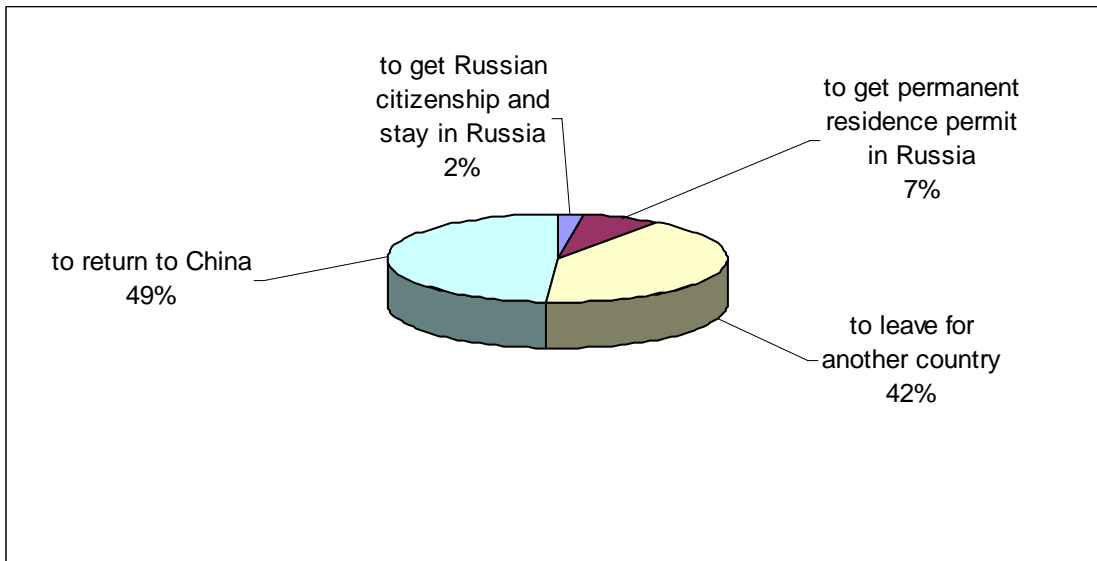
Attracting foreign students is a time-proved source of brain gain for receiving countries. Most advanced students are encouraged to continue their education via post-graduate course and involved in research activities. Presently, students from the post-Soviet states are welcomed to Russian universities. CIS⁶ students who are graduating from Russian universities have a right to apply for Russian citizenship in accordance with facilitated procedure (reduced requirements)⁷. According to ROSSTAT, by mid-2000s there were about 12,000 students from CIS states and 2,500 students from other foreign countries in Russian universities and other higher school institutions. Students from former Soviet states definitely intend to stay in Russia after graduating while students from China, for example, demonstrate low interest to stay in Russia after graduating (Picture 6). Survey of Vilia Gelbras concludes that ‘Russia, with its good-quality and low-price higher education, is usually regarded as a sort of starting point for further migration to more developed countries’ (Gelbras, 2002, p. 31). However, progress in economic and social situation in Russia can affect its attractiveness for foreign students.

Facing serious demographic crisis (about 1 mln. annual population decline and labour age population decrease), Russia is in need of additional labour resources, particularly high skilled labour. Foreign students could be a promising resource at the Russian shrinking labour market.

⁶ Commonwealth of Independent States (CIS) is a regional structure at the post-Soviet space that joins Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

⁷ Amendments to Article 14 of the 2002 Law on citizenship of the Russian Federation.

Picture 6.
The plans of Chinese students after graduating from Moscow universities, 2001*



* 2001 Survey of Chinese students in the Moscow State Lomonosov University. N=124. Faculties: Biological, Chemical, Fundamental medicine, Computing & Cybernetics, Economics.

Now, let's turn from migration intentions of students to migration strategies of those researchers who already have the experience of short-term academic trips for participation in joint research projects, for working in archives, training courses, etc. The 2005 Survey of 250 Humboldt Fund scholars and Alexander Humboldt Award winners from Russia demonstrates long-term migration strategies of Russian researchers (Table 2). 70% of surveyed researchers are natural scientists; 20% are human scientists; 10% are medical workers and engineers. During 1989-2005 they were participants of research projects and training courses in Germany (national and international research centers, universities).

When analyzing the results of the Humboldt Fund scholars survey it is important to keep in mind that (a) the respondents are already experienced scientists, not students, (b) the respondents have already 'tasted' how valuable it is to contact with researchers in other countries for their professional up-grade. The results of the survey give reasons to conclude that short-term trips to research centers and universities in other countries are estimated as an important factor of *human capital* growth. But this very growth results in *imbalance* of the enriched skills, on the one hand, and conditions of research work in Russia when they return (in terms of wages, equipment, and status) on the other hand. That's why when returning to Russia the scientists continue their contacts with foreign colleagues and identify themselves as members of *international academic community* rather than members of Russian institutions staff.

Table 2. Long-term migration strategies of Russian researchers, 2005

82%	Short-term trips to other countries to work in joint projects
15%	Long-term / permanent migration to the West
30%	Academic sub-contracting with permanent stay in Russia

The results of the Humboldt Fund scholars survey effectively prove the initial idea of this paper: the success of contemporary science is hardly possible within the closed frames of one country, and scientists understand that. The State is likely coming to this understanding as well.

What is the solution?

As it was mentioned above, intellectual migration is a very specific type of international migration. There are three major concepts of its management:

- (1) *Active management*. Mainly origin countries that suffer from *brain drain* and want to reduce their losses advocate this concept. This approach is based on assumption that a State *can* manage intellectual migration in principle – by means of legal instruments, paying special attention to combination of national policies and international efforts to provide return of knowledge workers back to origin countries.
- (2) *Non-interference*. This strategy is popular in receiving countries that benefit from *brain gain*. It is based on understanding that state management of international migration is basically incompatible with intellectual migrants because for this category of migrants freedom of movement, freedom of creative work, self-realization, human capital growth – are much more important values than for other categories of migrants.
- (3) *Forward-looking approach* emphasizes global benefit from *brain circulation*. It is based on understanding that international migration of intellectuals can be managed only in supranational context, with the emphasis on migrants' rights. In fact, the (3) approach is a part of a wider concept of a *new global order*, which is aimed at internationalization / globalization of all types of human activities within the frames of human global community. In this context, internationalization of research activities is a 'natural' process going ahead to maximum interstate cooperation for the benefit of every state and all of them together.

The last concept seems to gain more and more support in the world. It can be said that *internationalization of the Russian science has already happened*. List of participants of the recent international conference in the field of neuro-sciences held in the USA is a good example. Neuro-science is one of priorities of academic and applied science. The conference has gathered over 3,000 participants. Among them, 300 were Russians, but only 8 arrived from Russia. All the rest are working in other countries (In our universities... 2006).

We are living in a globalizing world. But this world still consists of sovereign states different in levels of their development and different in their abilities to absorb the results of scientific progress and high technologies. That's why there is a question related to the (3) concept: if supranational institutions organize and manage global science by attracting brains and financial resources and produce a result – high technologies products, which countries will benefit from these new technologies? The answer is: those countries where economy is ready to assimilate these technologies. These are the most developed countries, with open economy, open not only to the rest of the world but also open to the results of scientific and technical progress.

This argument is crucially important to realize the deepness of the shift Russia is experiencing now in its approach to the brain drain issue. The Russian Government is coming to a new understanding that in order to participate in a newly organized global scientific research process most effectively it should not only give its brains but also be ready to absorb produced innovations in its economy. That's why the measures to reduce brain drain damages are at the same time the measures to stimulate application of high technologies.

Here are some measures Russia is trying to apply as key responses to brain drain:

1. *Reorganization of R&D sector* with priorities given to forward-looking studies, scientific schools, talented young researchers. The enlarged oil-prices-driven budget gives a chance to increase financing of R&D sector. However, the decades of crisis and depression have seriously damaged research activities. Grants and scholarships for most prospective research groups are the major instrument to encourage breakthrough in the most promising directions.
2. *Restructuring of economy with special emphasis on HT sector.* Presently, the share of HT products in Russian export is only 2%. No more than 4% of new scientific ideas are applied in final consumer products. To compare, in Germany the share of applied ideas is 45%. Of course, Russia is earning with oil & gas exports. But oil & gas industry could also be a sphere of high technologies, not mentioning other industries. E.g. the IT sector demonstrates the highest growth rate among all Russian industries (24% in 2005). Elaboration of new incentives to attract foreign HT companies is one of priorities of revisited Russian investment policy.
3. *Encouragement of private investments in R&D.* In Russia, development of science was traditionally the sphere of the *State* interest. Growing private sector is a relatively new actor in Russian economic performance. There are a lot of instruments, financial and economic, at the disposal of a State to inspire interest of business to invest in science. Political will and interest of the State towards development of knowledge-based economy are a reliable guarantee.
4. *Development of 'technology-parks', 'business-incubators', 'HT zones'* to transform innovations into business objects. In this context, experience of the EU countries is very valuable. Russia also attentively studies experience of India where technology-parks produce 8% of GDP. In Russia, there has always been a gap between fundamental science and practical economy. Science was doing 'by itself' supported by the state budget being applied primarily (if not only) in military industries. To fill this gap it is necessary to make science/knowledge a commodity. So, technology-parks with their 'innovations climate', tax benefits, IT infrastructure are aimed at transformation of new ideas into new technologies. It is a risky sphere but the State is ready to share the risks with businessmen.
5. *Experiments in organization of 'breakthrough labs'.* In biology, in physics, in medicine, a number of laboratories are organized, with extremely favorable work conditions in terms of equipment, IT infrastructure, and wages for groups of researchers who are working in a definite project. However, it is necessary to mention again that these experiments will be effective only in case the economy of Russia will be technologically advanced and have a demand for a final product of these 'breakthrough labs'. So, this measure is good only in combination with the others.
6. *Crediting students.* This idea is under discussion. It is definitely directed at reducing the outflow of newly graduated students. Till now training in many state universities is free for students. For example, in the Moscow State Lomonosov University about 50% of students do not pay for their classes. They are most brilliant students: they passed entry exams with the best results and so they were taken in the university on 'budgetary basis'. So, if they decide to leave the country after graduating (as it was mentioned above, over 60% of 'A students' of natural science faculties get proposals from foreign universities and research centers at their final year) it's a direct damage for the State budget. The scheme is as follows: students are given a credit, which is in fact his/her tuition fee. After they graduate they are to return the credit during several years. It's an attempt to reduce losses. But it needs proper deliberation. This step would decline the competitive ability of Russian

graduates at the world labour market in comparison with ‘free’ Chinese or Indian graduates and be an obstacle in their access to globalizing research process.

7. *Interstate cooperation in R&D sector.* In this context, the experience of East European countries is very important because (a) they were the first on the path of social transformation and in cooperating with more developed states; (b) organization of science in former European socialist countries was similar to that in the Soviet Union; (c) they faced the similar brain drain as Russia and now they are seeking for new organizational forms of internationalization of science for mutual benefit.

Conclusion

Russia is a good example of how *delicate* the intellectual resource of a nation is, how easy it is to ruin it, to lose it, and how cautiously it is to be treated. Political and economic crisis in the 1990s provoked the outflow of high skilled workers to other countries, on the one hand, and ‘internal brain drain’, i.e. outflow of specialists from R&D sector to business, self-employment, etc. in order to survive, on the other hand. About 2.2 mln. persons with academic degrees dropped out from science in the 1990s. These losses can be irretrievable, and in many fields of science Russia will never restore its leading positions, as it has happened to Germany from where during the fascist regime *all* the leading scientists have emigrated to the U.S.

All the ‘drained’ countries are worried about the effects of out-flow of highly educated citizens. In some cases, emigration of only one leading scientist can frustrate development of the whole scientific school. However, the globalizing world gives new chances to researchers, and it is unconstructive to impede them and calculate the brain drain losses. Alternative comes from development of national R&D sector and active participation in international research projects. Sober Russian academics argue for search of new forms of organization and management of Science at the global level (In our universities... 2006). Mobilization of intellectual and financial resources for fundamental investigations in high-energy physics, molecular biology, genetic engineering, medicine, etc. could result in improvements of human life quality and environment the whole mankind would benefit from. The Russian Government is coming to this understanding putting special emphasis on development the capacities of Russian science in close collaboration with most advanced international institutions and restructuring national economy towards knowledge-based model. It is uneasy process opposed by die-hard bureaucrats but it is the only possible way to give new impulse to the Russian R&D sector and modernization of its economy.

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