

VIRTUAL SCIENTIFIC COOPERATION OF SCIENTISTS BELONGING TO THE SECOND AND THIRD EMIGRATION WAVE FROM THE FORMER USSR

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Abstract

The report is devoted to a problem of the organization of virtual scientific scientists collaboration who have emigrated from the former USSR at the end of XX - the beginning of XXI centuries, in the form of virtual scientific associations and also in the form of standing virtual scientific seminars.

One of the characteristic phenomena in a science of the end XX - the beginnings of XXI centuries is the international and interstate migration of the scientists. This phenomenon has accepted especially wide scales on the post-Soviet space. The reasons of this phenomenon are investigated in the article [1], and they are not object of research in the given paper. Authors aspire to investigate the positive and negative moments connected to a mass migration of scientists, and also to define some possible neutralization means (or, at least, mitigations) of the negative moments, which are determined by such migration [2, 3].

It is significant, intensive migration of scientists may import into development of a science the several positive moments [2]. We may attribute to these moments the concentration of scientists in places of the greatest demand of their scientific potential. Collaboration and integration of scientists-representatives of various scientific directions and schools in one scientific association is also positive consequence of migration. In our opinion, it is additional stimulus of progress in a science [4, 5].

Overcoming of a privacy atmosphere, which was begotten by global political opposition in 30 – 90th years of XX century, absorbed scientific researches and destroyed traditional open information space in a science, doubtless became positive factor of intensive scientists migration [6, 7].

Unfortunately, “the reverse of the medal” is present. Migration and concentration of scientists in places of greatest claiming of their scientific potential inevitably leads to essential decrease of scientific potential in places of their exodus [8].

Quite often the reason of scientists’ migration is reduction of financing of a science in places of their exodus, which determines the continuation impossibility of scientific researches caused by such reduction. Getting mass enough character, migration of scientists leads to significant decrease(reduction) in quality and volume of scientific researches in places of an exodus, that, in turn, leads to the further reduction of financing of a science (sometimes adjoining with a collapse) [9, 10].

On the other hand, excessive concentration of scientists-migrants in places of prospective greatest demand of their scientific potential leads to decrease of researches financing of separate scientists and/or their scientific projects, and reduction tempi of such financing may considerably outstrip increase tempi of science's financing as a whole (even if such increase is present) [5].

We may distinguish two basic categories of the scientists-migrants, which essentially differ both by age parameter, and by the experience of scientific researches.

The young scientists, which begin their scientific career, may be ascribed to the first category [11]. Possessing some skills of scientific work, but not having enough the big luggage of original scientific researches in the certain scientific area, such scientists are capable easily enough adapt for new conditions in which they appear as a result of migration. It may be explained by rather small experience of scientific researches and by rather small thesaurus, and also by the significant time resource, which allow without serious consequences to change a line of scientific researches and afresh to begin scientific career [12].

The scientists-migrants, who overstepped an age barrier of 45-50 years, may be ascribed to the second category. Such scientists, as a rule, possess significant experience of scientific researches. The extensive thesaurus is inherent for this category of scientists. Sizeable stored knowledge and experience in the certain area of scientific researches and also rather small time resource do not allow this category of scientists to change cardinally the area of scientific researches and afresh to begin the scientific career. These circumstances considerably complicate scientists’ adaptation of senior age categories to the new conditions arising owing to migration. Existing systems of scientists' adaptation “are invented” by the officials of corresponding departments and

are far enough from scientific specificity. These systems are applicable in a greater extent for so-called “small business”, than for scientific researches [3, 12, 14]. For these reasons considerable potential opportunities of such scientists find oneself unclaimed.

At the same time departure of the leading scientist (or of several scientists) from the formed scientific group considerably weakens this group, impedes the solution of scientific problems, quite often leads to reorientation, and at worst – to disintegration of this scientific group. Hence, migration of leading scientists inevitably weakens scientific potential in places of their exodus.

Analyzing these problems, we may note, that negative migration consequences of scientists of senior age groups both for these scientists, and for scientific groups in which such scientists worked (or headed them) before their migration, in the basis are connected to infringement of the established information connections [3, 7].

Above-mentioned negative aspects of the phenomenon of scientists' migration induce methods search of their indemnification and the fullest use of scientific potential of scientists-migrants [1, 13]. The restoration of information streams between separate scientists and between scientific groups, which were interrupted as a result of migration, lays in a basis of such methods. We may classify these information streams in science as connective elements between separate scientists in scientific group and between scientific groups at their integration for the solution of scientific problems [15].

Irrespective of complexity, many-sided nature and a concrete orientation of the problems solvable by any scientific group (or by association of scientific groups), information streams inside scientific group (or inside association of scientific groups) are limited to various forms of audiovisual contacts [12, 13]. Destruction of immediate audiovisual contacts as a result of migration and, as consequence, interruption of information streams, is the reason of a lot of the mentioned above negative consequences of migration of scientists.

However modern Internet-technologies allow carrying out virtual audiovisual contacts and an exchange of any kinds of the information real time between any reasonable quantity of abonents somehow removed from each other. Modern Internet-technologies give practically unlimited opportunities of an exchange of the scientific information and allow consolidating in common information space of scientists united by the common problematics, without taking into account their real geographical position.

It follows from this, use of modern Internet-technologies can be considered as a key to restoration of the information connections broken as a result of scientists' migration. Modern Internet-technologies may give to scientists, who are territorially separated, an opportunity of team-work at such elements of scientific knowledge, as formation of scientific hypotheses, examination of their adequacy and formation of scientific theories. In other words, modern Internet-technologies allow the scientists, who are situated in different geographical zones, to develop cooperative scientific researches [5, 10, 12, 14].

It is beyond question, modern Internet-technologies allow to scientists who located in different geographical zones, to develop cooperative theoretical researches within the framework of virtual scientific association. Realization of experimental researches, at first sight, is more complicated. It is obviously, realization of experimental researches demands presence of the laboratory base (and/or industrial base) supplied with the corresponding equipment. It is obviously also, such laboratory base (and/or industrial base) cannot exist in purely virtual form.

Nevertheless, we may notice at the analysis of an experimental research (as the active influence on observable object), virtual participation of the scientist in experimental researches (including a guidance of experiment) becomes possible at presence of experimental base with the qualified support personnel capable to carry out the equipment acquisition and installation of experimental setup by the specified documentation [5, 10, 12, 14]. This thesis may be proved by continuation of the researches, which are using scientific connections engendered in 1972 – 1992 years (including conferences and symposiums) and intact after dissolution of the USSR and emigration of colleagues into other countries. So, for example, within the research of a common problem, scientists of NTUU KPI forecast and model new heterostructures, scientists of the Belarus university make plasma spraying of necessary nano-layers, scientists of Moscow and Novosibirsk universities study the topology of separate layers, scientists of Institute of semiconductors physics of Ukrainian National Academy of Sciences and Ioffe Physical-Technical Institute of the Russian Academy of Sciences (St.-Petersburg, Ioffe Institute) investigate electromagnetic and other physical and chemical properties of samples, scientists of the Kaunas and Vilnius universities and NTUU KPI carry out steadiness tests of the received samples at extreme conditions of their work. In case of necessity, virtual consultations with colleagues from USA (Denver, Colorado State and Seattle, California) for correction of technologies of synthesis and selection of other materials - of new components of heterostructures, are in progress with using of modern Internet-technologies. The received results (and also preliminary protection of post-graduate students' dissertations) have discussing at the annual seminars which have conducting alternately in NTUU KPI or Ioffe Institute. Kaunas University, Khmel'nitsky National University and NTUU KPI carry out joint researches of vibration of various high-speed mechanisms, turbines, etc. [16 – 18]. Now Ukrainian scientists carry out about 600 projects (at the cost of budgetary financing) together with scientists from 65 other countries. At that, correction of experiments, discussion of researches results and also joint publications are carried out with use of modern Internets-technologies. It follows from this; execution necessity of experimental researches is not an insuperable barrier to creation of full-scale virtual scientific associations.

It follows from worded, the modern Internet-technologies allow territorially separated scientists to carry out joint theoretical researches (both in the field of fundamental, and in the field of applied science), and also (at presence of experimental base with the qualified support personnel) to accept active virtual participation in experimental

researches (including control by experiment). Thus, there is an opportunity of consolidation of territorially separated scientists in the united scientific organization [5, 7, 10].

Comparative parameters and characteristics of virtual scientific associations and locally concentrated scientific institutes are shown in table 1.

Table 1 - Comparative characteristics of virtual scientific associations and locally concentrated institutes

PARAMETERS AND CHARACTERISTICS				LOCALLY CONCENTRATED INSTITUTES	VIRTUAL SCIENTIFIC ASSOCIATIONS
1				2	3
Integration opportunity of territorially separated scientists in united group				Impossibly	Possibly
Opportunity of joint actions of various scientific schools and directions				Limited	Possibly
Fundamental scientific researches	Getting of the scientific facts	Active experiment	Passive supervision	Possibly	Possibly
			Definition of the experiment purpose	Possibly	Possibly
			Definition of object and method of researches	Possibly	Possibly
			Scheme definition of experimental setup	Possibly	Possibly
			Selection of the equipment and installation of experimental setup	Possibly	Possible at presence of experimental base and support personnel
			Elaboration of an experiment procedure	Possibly	Possibly
			Control by experiment	Possibly	Possibly
			Registration of experiment results	Possibly	Possibly
			Publication of results	Possibly	Possibly
	Scientific-hypothesis formation and verification of its adequacy			Possibly	Possibly
Scientific-theory formation			Possibly	Possibly	
Scientific-theory adequacy verification on the basis of supervisions and/or active experiments			Possibly	Possibly	
Results publication of scientific researches			Possibly	Possibly	
Applied scientific researches	Theoretical researches			Possibly	Possibly
	Experimental researches			Possibly	Possible at presence of experimental base and support personnel
	Elaboration of experimental models			Possibly	Possibly
	Production of experimental models			Possibly	Possible at presence of experimental and production base and support personnel
	Elaboration of the documentation			Possibly	Possibly
	Publication of researches results			Possibly	Possibly
Auxiliary activity	Organization of symposiums, conferences, seminars			Possibly	Possibly
	Editorial and publishing activity			Possibly	Possibly
	Patent researches			Possibly	Possibly
	Organization of experimental production			Possibly	Possible at presence of experimental and production base and support personnel
	Financial, economic and investment activity			Possibly	Possibly
	Use of researches results			Possibly	Possibly

The comparative analysis is shown; characteristics of virtual scientific associations differ from organizational characteristics of the traditional locally concentrated scientific institutes a little. Thus, modern Internet-technologies give an opportunity of creation of virtual scientific associations with the united program and the plan of researches, with united investment space, with a united patent policy, financial policy and marketing.

It follows from said above; the constant information interchange with the colleagues is the important factor of consolidation of the scientists who have found oneself in abhesion as a result of migration. Such information interchange allows to get acquainted with the newest results of scientific researches of colleagues (frequently before their publication in periodic scientific editions), with mutual advantage to realize discussion and consideration of such results, to correct scientific researches by results of discussions and remarks of colleagues (when it is necessary).

The traditional forms of such information interchange are scientific symposiums, conferences and permanently functioning scientific seminars.

The participants quantity of conference (symposium) and quantity of reports represented there, usually has measuring in tens or in hundreds, and time of conferencing can amount (on the average) from two to five days. For

these reasons, it is enough difficultly to suppose an opportunity of virtual scientific symposiums and conferences. However virtual participation of separate scientists in scientific symposiums and conferences represents oneself as quite real at presence of appropriate technical base and at use of modern Internet-technologies.

Permanently functioning scientific seminars convoked one's sessions periodically (for example, one or two sessions a month). Each such session of a seminar musters usually considerably smaller group of participants, than conferences or symposiums, and is devoted to proceedings and discussion of one (more rarely – two) message or of the report. As any form of representation and the subsequent discussion of the message (report) are limited to realization of audiovisual contacts of participants, use of modern Internet-technologies allows conducting permanently functioning scientific seminars in a virtual mode.

It follows from worded, the full use of opportunities of modern Internet-technologies allows to restore practically completely information connections between territorially separated scientists (as a result of migration), and thus to a great extent to liquidate negative consequences of migration. Last circumstance is especially important for scientists of the second and third wave of emigration from the former USSR where the phenomenon of migration has accepted especially wide scale.

References:

- [1] Богорош О.Т. Еміграція вчених як результат кризи науки і влади // Проблеми науки. – 2000. – № 8. – С. 11-17.
- [2] Богорош А.Т. Ирония «законов», или «Законы Паркинсона» и классический менеджмент // Персонал. – 2000. – № 1. – С. 105-110.
- [3] Sokol V.M. Integration Problems and the International Cooperation of Scientists-Repatriates // Proceedings of National Conference “Scientific Researches in the Field of the Control and Diagnostics”. – Arad: Publishing IASA, 2006. – P. 5 – 9.
- [4] Яцків Я.С., Богорош А.Т. Співпраця України з державами СНГ у сфері науки і технологій. Прогноз експортосприможності національного товару на ринку // Стратегічна панорама. – 2000. – № 1-2. – С. 80-94.
- [5] Sokol V.M. Some aspects of the virtual scientific associations' organization // Proceedings of the Fifth International Conference “Internet – Education – Science 2006”. Volume 1. Vinnytsia: Universum, 2006. – P. 111-113.
- [6] Богорош А.Т. Научно-техническое сотрудничество и интеграция Украины в научно-технологическое пространство // Проблемы науки. – 1999. – № 1. – С. 21-23.
- [7] Sokol V. Virtual Scientific Associations & Internet // Proceedings of the Fourth International Conference “Internet – Education – Science 2004”. – Volume 1. – Vinnytsia: Universum. – 2004. – P. 90-92.
- [8] Богорош А.Т., Соловьев В.П. Информационное управление конфликтами на основе коммуникационной модели // Проблемы науки. – 1999. – № 1. – С. 115-119.
- [9] Богорош О.Т. Вплив інвестицій та наукової складової на експортний потенціал України (на прикладі ринку Російської Федерації) // Наука та наукознавство. – 1999. – № 2. – С. 3-17.
- [10] Сокол В.М. К вопросу об организации виртуальных научных объединений // Труды Института прогрессивных исследований. – Вып. 6. – Арад: Изд-во ИПИ, 2006. – С. 7 – 16.
- [11] Богорош О.Т. Спробуй нашим менталітетом управляти // газета «Україна молода», 26 січня 2000 р., С.12.
- [12] Сокол В.М. Некоторые проблемы миграции и международного сотрудничества ученых // Сборник трудов Международной научной конференции «Современные достижения в науке и образовании», Нетания (Израиль), 9 – 17 сентября 2007 г. – С. 34-39.
- [13] Сокол В.М. Некоторые проблемы интеграции ученых // Труды Института прогрессивных исследований. – Вып. 5. – Арад: Изд-во ИПИ, 2005. – С. 7 - 18.
- [14] Богорош О.Т. Науково-технічний потенціал України: стан, проблеми, перспективи розвитку // Науково-аналітичні матеріали до засідання Круглого столу «Проблеми державного регулювання науково-технічного потенціалу України та підвищення ефективності його використання». – Київ: ЦДНТПІН ім. Г.М. Доброва НАН України. – 2000. – 57 с.
- [15] Богорош А.Т., Соловьев В.П. Моделирование состояния социальных и экономических объектов на основе косвенных методов // Наука и наукознание. – 1999. – № 1. – С. 48-58.
- [16] Богорош А.Т., Воронов С.А., Ройзман В.П. и др. О диагностике разрушения объектов микро- и нанoeлектроники под внешним влиянием. / Сб. VIII Международного украинско-российского семинара «Нанoeфизика и нанoeлектроника», 7-8.12.2007, Киев, Украина, 2007. С. 35-37.
- [17] Bogorosh A.T., Voronov S.A., Vishnyakov N.E. and ets. Disclosing Materials at Nonsocial 3rd International conference on "Mechatronic Systems and Materials 2007" (MSM 2007), which will be held at Kaunas University of Technology (Lithuania) from 27th to 29th of September, 2007. – P.P. 12-18.
- [18] Diagnostics of nano-particles on a surface and in volume of a solid body //A. Bogorosh, S. Voronov, S. Larkin, N. Višniakov, D. Ščekaturovienė //Journal of Vibroengineering, Vol.9, Issue 2, Numbers of Publication from 263 to 283, 2007. P.75-84.