Peculiarities of Integration of Russian Scientists into the World Scientific Medium

A Yu Ogorodnikov
Philosophy and Sociology Department, Kutafin Moscow State Law University (MSAL), Moscow, 125993, Russian Federation

oau2005@yandex.ru

Abstract. The article describes the Russian experience in science institutionalization in the conditions of intensive innovative international interactions in the framework of the large-scaled research projects, such as megascience, etc. The research methodology of the science subject as the intellectual innovative potential carrier is discussed. The analysis of the results of the sociological research of the strategies for achieving goals by scientific field agents is described. The comparison of motivations and nature of professional self-fulfillment of two groups of scientists oriented towards the active international interaction and striving for attaining scientific objectives within one country is the distinctive feature of the article. The results of the research demonstrated institutional nonconformity of functioning of scientific systems on the level of separate scientists, organization and government regulation which restricts the opportunities for creating the positive image of the Russian science, protection against the risks of loss of the intellectual property in the course of international cooperation. The authors made a conclusion about the necessity to establish coordination structures engaging the scientists themselves which are able to integrate the activities of organizations in the framework of large-scaled long-term state programs.

1. Introduction
The success of the scientific process institutionalization in the conditions of new challenges of the global process environment and rebuilding of the noosphere greatly depends on the conformity of subjective motivations, organizational integrity and managerial and legal control mechanisms. The transition of intellectual potential into the result of scientific activities in the research practice is concluded in the complex transformation mechanism of subjective inertia into design methodological procedures crystallized in the cognitive structure of the organization. Both personalities and collectives play the role of subjects. The creation of directive control methods of the scientific and research process, the accurate measurement of the practical effect of its results become impossible under the current conditions of the informational uncertainty and absence of universal criteria of veracity. However, the influence of scientific research on the everyday life increases more and more and gets proliferated globally on the whole mankind. The necessity in using common assessment parameters for quality and topicality of scientific research increases too.

In the conditions of the intensive exchange of information, enlargement of the share of large-scaled international scientific projects, research experimental centers, the investigation of institutionalization of scientific activities needs the definition of the science management subject and scientific reproduction subject to be reviewed. The parameters of scientific efficiency and topicality become
more and more dependent on international figures, ratings, demand for results. And the necessity to protect the national interests on research planning, to use the results of scientific activities, to prevent undesirable consequences of research persists. The duality of the science management subject as the regulation for the national and international relation system occurs. The international institutional regulation medium of scientific activities is considered as the change of the state one less often. Protection of the intellectual property, restriction of dangerous, inhumane research are efficiently performed mainly by state authorities. At the same time, the implementation of large-scaled scientific projects, for example, megascience, is possible only in case of exchange of experience on the international level, engagement of specialists from various countries, synthesis of technologies. The condition requires the development of the international law.

If considering the science reproduction subject, it is of complex structure too. Three levels are distinguished in it by us: personal, organizational and structurally institutional. The first one includes scientific employees, carriers of the creative intellectual potential. The second one includes scientific, research, scientific and experimental and educational institutions providing the technological basis, methodological support and generating scientific collectives. The third one forms state authorities directly regulating the scientific activities, including the implementation of its results into the technological, social and production practice. The complementary activities of all levels of the science subject and its concordance with managerial structures are required for the successful integration of the Russian science into the world-wide cognitive space, corresponding to the national interests.

2. Research methodology

The sociological study was performed by us in order to establish the level of such concordance, to define the most important significant ways of development of the science management subject and scientific activities subject, to determine the positive and negative experience in science management, its legal regulation in modern Russia. The data collection method concluded in a semi-formal questionnaire survey among scientific employees in Russia in 21 Federation Subjects (N=640). The data were collected during March - April 2019. The meaningful part of the questionnaire consisted of three sections of questions: personal motivation system in the scientific activities, structure of efficiency figures of the scientific activities within the organization, parameters of the institutional science field.

When preparing the research, creating its methodological base we used the works describing the mechanism of institutional traps which imitate the efficiency of institute operation by temporary, non-statutory social practices, for example, informal liaisons, influence of the personal authority, corruption mechanisms, etc. [1], [2], [3]. To determine the functional stability, establishment of long-term vectors for goal achievement of the institutionalization process of the Russian science during the innovative period and analysis of the institutionalization experience of scientific activities in Russia we used the works directed towards studying internal aspects of the scientific field, nature of the collective interaction of scientific employees and their professional motivations [4], [5], [6]. The indicators of interaction successfulness among scientific employees, methods of competition in the scientific area were derived from the mechanisms of operation of the science field described by the French philosopher and sociologist P. Bourdieu [7]. The incentive structure of scientific employees in the innovative medium of Russia possesses its peculiar features, which were defined and included into the workbench based on the works by N.N. Orlov [8], A.V. Ochirov [9], I.P. Popov [10], describing as well the mechanisms for strengthening professional motivations of scientific employees under the condition of improvement of their social status. The state policy in the field of the organization of the scientific activities contributing to or preventing from the safe implementation of the professional potential of scientific employees in the conditions of international interactions is no less important aspect of the issue of fulfillment of managerial technologies in the sphere of the regulation of the scientific activities from the standpoint of the state. This issue with regard to the analysis of modern international legal standards of the legal status of scientific employees is described in the works by V.
Shugurov [11]. The works of D. Nord [12] helped us to investigate the correlation of formal and informal mechanisms of reconstruction of social institutes.

3. Research results
Let's study the results of the sociological research according to the three-level approach of the subject of science and distinguish the degree of concordance of the personal, organizational and structurally institutional levels.

3.1. Personal level of the subject
On the personal level we are interested, first of all, in the motivation and professional strategies of the science agents actively interacting with foreign scientific centers. According to the research, the scientists oriented towards active interaction with colleagues from abroad are the least satisfied with the labor conditions. Among them the share of those dissatisfied with the financial standing, feeling the uncertainty in life, instability, impossibility to be of benefit to the society, science, considering the organization where the professional activities are performed as non-prestigious increases more than twice (see Table 1). The number of scientific employees having additional earnings not related to the scientific activities is twice more. And the main task of the interaction with scientific structures from abroad in this group is successfully fulfilled by a half of those questioned, whilst about 30% of scientists from the whole sampling pattern possess professional liaisons with colleagues and organizations from abroad.

Table 1. Dependency of professional self-fulfillment on the ambition to interact with foreign scientific organizations, scientists (%)

| Successfulness of implementation of professional potential | Among those possessing the ambition (%) | Among those having no ambition (%) |
|-----------------------------------------------------------|----------------------------------------|----------------------------------|
| To implement own professional potential (knowledge, experience, abilities) | 67                                      | 70                               |
| To regulate the working activities, the working day on an individual basis | 51                                      | 54                               |
| To live the life according to own interests, besides the working activities | 40                                      | 45                               |
| To earn good money, to have a comfortable financial standing | 27                                      | 37                               |
| To be employed by a well-known, successful organization | 45                                      | 56                               |
| To contribute personally to the area of science I work in | 50                                      | 60                               |
| To possess the sense of stability, certainty in life | 28                                      | 40                               |
| To develop own ideas for the perception of, search for truth, to implement own ideas in practice | 57                                      | 58                               |
| To work together with like-minded persons, to belong to the scholarly traditions, to possess the company, social circle by interests | 61                                      | 63                               |
| To serve the society, its progress | 43                                      | 56                               |
| To achieve good social standing, recognition | 46                                      | 50                               |
| To possess additional sources of income (secondary employment, single or temporary day-to-day jobs) | 55                                      | 42                               |
| To go on business trips, training sessions, etc. abroad | 51                                      | 30                               |
| To get additional knowledge, skills | 50                                      | 64                               |
The analysis of professional strategies demonstrated that among the scientists oriented towards the international interaction the aspiration to make the scientific activities commercial sharply increases. If among those questioned such desire is felt by about 12%, in this group the number of respondents is more than one third. Such desire as a rule is fueled by the dissatisfaction of the management efficiency in the organization where the scientist is employed, less by a low status of the organization or impossibility to implement the results of activities in practice.

Those questioned emphasize on limited possibilities for international cooperation. Only 21% of the respondents believe that those are enough for the fruitful cooperation with the world scientific community. Even among those scientists who set the task to interact without question with foreign colleagues, this share reaches 30%. Doctors of Science oriented towards the large-scaled fundamental research can sense the restrictive guidelines as the most acute. Scientific employees in social and humanitarian fields are the most restricted in the possibilities of foreign interaction. Representatives of philosophic sciences say about optimal conditions.

3.2. Organizational level of the subject
The synthesis of professional motivations and the recognition of social significance of achievements take place on the organizational level of the subject of science. The possibility of such synthesis is provided by the accuracy of the work quality criteria, coordination of the activity efficiency parameters and transparency of the performance evaluation methods. In the scientific filed of Russia, according to the respondents, the specter of long-term efficiency evaluation criteria, which would take into account the effect from the scientific activities in future, possibilities for development of the research base on the basis of the existing results, must be widened. The main incentives enhancing the motivation for the conduction of long-term, fundamental research are the interests towards science and material incentives, which are insufficient nowadays for maintaining the strive for long-term scientific activities. As a result, 58% of scientific employees have to deal besides the scientific activities with other types of activities beyond the primary employment in order to get additional earnings, which frequently decrease the efficiency of their professional activities.

Some respondents oriented towards the international scientific interaction believe that the gains in performance of the scientific activities is a too multi-faceted indicator impossible to be measured. Therefore, the efficiency of the activities of a scientist cannot be evaluated only on this basis. The sense of insufficiency in material incentives of labor and state support of long-term fundamental scientific research increases in that group. And the successful international cooperation is possible under the developed system of national indicators of successfullness of scientific activities with widening of peculiarity and uniqueness of research but not inclusion into the existing international projects as performers. The implementation of proper Russian efficiency parameters different from the foreign ones will not complicate but contribute to the international interaction, make it partner, meaningful, and Russian scientists will feel more confident. The adoption of the scientific research performance parameters established abroad, on the contrary, often ranks Russian scientists among outsiders of the research process.

Modernization of the scientific activity evaluation methods is often accompanied with toughening of requirements towards candidates for the substitution of vacant scientific positions. Such practice is welcomed by less than a half of scientists. However, among scientific employees interacting with colleagues and scientific organizations from abroad the requirement toughening practice provokes absolutely negative assessments and enhances the motivation to move aboard. According to their point of view, the modern attestation and efficiency evaluation system of the agents of science abounds with nominal indicators. And toughening of those will restrain constructive, innovative initiatives in the Russian science, make the interaction with scientific structures from abroad more complicated.

3.3. Structurally institutional level of the subject
On the structurally institutional level the important aspect of conformity of the nature of management by the scientific field and subjective intentions of the scientist is the legal protection of professional
activities corresponding to the necessities in self-fulfillment. The legal vulnerability defined by scientific employees interacting with the international scientific medium was found by us in the sphere of the international scientific integration. The development of the patent rights allowing to protect their intellectual property, including globally, improvement of the legal regulation of interaction between scientists and state on the issues concerning the innovative policy and development of priorities for the state scientific and technical regulation, possession of the organizational informational support in order to be published in prestigious international publications is more essential to them than to other scientists. The legal regulation of internships in prestigious universities and scientific centers abroad, housing allowances or the right for the compensations of house maintenance expenses, creation of legal mechanisms for the regulation of implementation of the results of scientific work into entrepreneurial, consulting, production and management activities on the commercial basis, when there is the scientist himself dealing with the regulation for the implementation of the results of own intellectual labor into practice in the partner relations center are important for all Russian scientists (see Table 2). These are the aspects of the legal regulation of science, according to the point of view of the respondents, being the least developed and restrain the implementation of the Russian science into the international space. The respondents distinguish possibilities of access to scientific databases, technical means, equipment, improvement of the right in the sphere of establishment of creative unions of scientists, scientific associations and communities, protection of the labor right when working in international scientific organizations and participation in international creative scientific associations, possibilities to achieve social and state recognition based on the results of the scientific activities are developed enough for the international interaction in the modern conditions.

Table 2. Ratio of legal security of scientific employees and orientation towards international interaction (%).

| Aspects of legal security                                                                 | Orientation towards international interaction in the field of a science |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| To have access to and to use technical means, equipment, databases, etc. being necessary for the work | High 66 | Low 61 |
| To participate in scientific discussions on the development strategy and priorities of the state scientific and technical and innovative policy | High 45 | Low 61 |
| To use own intellectual property rights in the framework of entrepreneurial or consulting activities | High 39 | Low 38 |
| To unite with other scientists in constant or temporary scientific collectives in order to conduct joint scientific and scientific and technical activities | High 66 | Low 64 |
| To establish creative collectives, scientific associations and unions, professional organizations for scientists independently or together with others | High 69 | Low 56 |
| To draw patents and other certificates recognizing the authorship of scientific inventions and developments | High 36 | Low 52 |
| To publish on a regular basis the results of own research in publications included into international abstract databases, such as Scopus, Web of Science, Erih | High 50 | Low 53 |
| To achieve the national and social recognition of the results of the scientific activities by awarding scientific and academic degrees | High 63 | Low 53 |
| To participate in the activities of international scientific communities, creative associations, scientific organizations | High 59 | Low 49 |
| To obtain housing allowances for the compensation of residential, utility, telephone communication and Internet expenses | High 19 | Low 12 |
| To get compensations for business trips and transport expenses related to the participation in the work of scientific symposiums and conferences | High 52 | Low 40 |
| To undertake an internship in prestigious universities and scientific centers abroad | High 49 | Low 27 |
Comparing the Russian science institute with the international one, the scientists agree that in all (!) parameters preconditioning the scientific activities, Russia concedes the advanced countries (see Table 3). The largest retardation is seen in the sphere of remunerative incentives of scientific research by the state, social or private organizations as well as provisioning of technical aids, equipment, laboratories for research. The substantial difference is defined in the area of the legal protection of the scientists and his/her intellectual property, creation of the conditions for deployment of the innovative potential and international cooperation.

Among the international cooperation-oriented scientific employees, the attitude towards institutionalization of the Russian science is more negative. The difference is manifested especially acutely in to the negative side when evaluating the attestation methods of scientists, conditions for the establishment of scientific communities and creative unions, the level of development of the legal protection of the intellectual property (see Table 3). The condition of science in Russia in some issues is evaluated by them better than by other respondents. First of all that concerns the issues of the implementation of scientific results into practice, material incentives of scientists, availability of free time for professional growth and exchange of experience among scientific personalities from various countries. As seen from these data, the real interaction with agents of science from abroad changes the idea for the better as for material support of the Russian science and the way of life of Russian scientists. However, the collision with the issues of the protection of intellectual rights, establishment of international scientific organizations, obtaining of scientific degrees create substantial problems for the scientific growth and restrict motivations for the men of science in Russia.

Table 3. Comparison of the conditions of science institutionalization in Russia with advanced countries (variation from -1 to 1, where the positive value characterizes the advantage of Russia, the negative value is retardation of Russia)

| Conditions for science institutionalization | Orientation towards international interaction in the field of a science |
|-------------------------------------------|-------------------------------------------------|
| Low | High |
| Remunerative incentives of scientific research on the part of the state | -0.54 | -0.40 |
| Remunerative incentives of scientific research on the part of the scientific or educational organization | -0.60 | -0.70 |
| Protection of intellectual property | -0.46 | -0.70 |
| Provisioning of equipment, laboratories, databases required for the research | -0.55 | -0.60 |
| Contests of research projects | -0.27 | -0.30 |
| Attestation of scientific employees | -0.01 | -0.40 |
| Creation of scientific centers, communities | -0.23 | -0.50 |
| Organization of events on exchange of experience among scientists, internationally as well | -0.38 | -0.30 |
| Evaluation of the results of scientific activities | -0.33 | -0.40 |
| Distribution of the results of scientific activities | -0.37 | -0.30 |
| Implementation of the results of scientific activities into production | -0.47 | -0.30 |
| Implementation of the results of scientific activities into educational process | -0.27 | -0.30 |
| Deployment of the scientist's innovative potential | -0.40 | -0.40 |
| Freshness of scientific research | -0.21 | -0.40 |
| Legal protection of the scientist status | -0.47 | -0.60 |
| Free time for professional growth | -0.46 | -0.30 |
4. Conclusions
The agents of science on each of the three levels are eligible for the superiority in the legitimation of research directions and procedures. The scientific art subjects declare accurate fulfillment of the interaction rules in the scientific field as being the most accurate and adequate to the innovative scientific search of apprehension of the topicality of research. The organization management and leaders of point of views in scientific collectives focus their attention on the accuracy of the regulation of the reporting and control activities allowing to trace the practicality and gains in performance of scientific activities. The subjects of authorities use the system of common social priorities and interconnection of social interests, where the social sphere takes a special but not a single or priority place. Since the innovative research requires the indicators of efficiency to be reconstructed, the control over them is the most difficult and often impossible. Therefore, the role of self-organization of science collectives and subjects greatly increases in the sphere of innovations.

Our research demonstrates insufficient concordance of the scientific field subjects for successful integration with the international scientific community as an equal partner. The high level of subject individual activity loses its potential on the organizational level. For example, the national strategy-oriented scientists are interested in innovative scientific projects. However, for scientific organizations such transformations require improvement of the efficiency and control evaluation methods, envisage structural transformations which take place slowly. The factor of personal, informal relations, which prevails over the functional one, makes the organizational changes more difficult. Informal communities take a key role in establishing scientific strategies, methodological foundation. Such situation decreases the possibilities for controlling the scientific society, creating the positive image of the Russian science contributing to increasing the interest of the world community. Since the innovative activity is associated with additional risks, it requires a special protection from the part of the state by means of scientific organizations. The insufficiency of the organizational and bureaucratic support results in the distortion of targets of the innovative development of science set by the state. The agents of science in the informal surrounding interpret in different ways the vectors of science development losing with that the concordance between themselves. The specter of simulation models of interaction in the spheres of attestation, creation of scientists’ rating, international cooperation gets widened.

The creation of coordinating structures performing the mediation between state programs and scientific organizations will provide a possibility for overcoming the stated desynchronization in structural levels of the science subject. Such structures will create conditions for the implementation of large-scaled scientific projects together with foreign partners. The Intergovernmental Coordination Council of RAS “Transnational Development of Eurasian Continent” can serve as an example of such structures in the sphere of geopolitics. The protection of the intellectual property in all its types, especially, at the international level with the interaction with foreign agents must be strengthened in the legal environment. The subjects of the use of intellectual property must be differentiated with regard to the variety of forms of organizations and associations; the mechanism of creation of scientific creative associations must be made easier. The growth in the variety of legal entities and private persons participating in the establishment and use of intellectual property requires new methods for the concordance of their interests, including both enlargement of individual freedom of the scientist and improvement of the coordination function of organizations, engagement to the coordination and control of the scientists themselves as the main subject of science.

Acknowledgments
This research was supported by the Russian Foundation for Basic Research (grant 18-29-15032 mk "The concept of the legal status of researchers in Russia and foreign countries: a theoretical and comparative study").

References
[1] Poletrovich V M 2005 Institutional Traps: Is There a Way Out? Social Sciences. 36 (1) 30-40
[2] Veretennikova N 2009 Institutional traps of the Russian higher education system *Bulletin of Tomsk state University. Economy* 1 5-13

[3] Romanov E V 2017 *Methodology and theory of innovative development of higher education in Russia* (Moscow: INFRA-M) p 302

[4] Przhilensky V I 2009 Social and professional practices as determinants of the evolution of scientific rationality. *Bulletin of Stavropol state University* 2 14-21

[5] Debene M 2012 *The rights of teachers*. (Paris: Dalloz) p 320

[6] Barnshaw J and Dunietz S 2015 Busting the Myths: The Annual Report on the Economic Status of the Profession *Academe* 101(2) 4-19

[7] Bourdieu P 2001 *Science of Science and Reflexivity* (Paris: Raisons dagir) p 240

[8] Orlova N N 2019 Specificity of social and labor relations of scientific and pedagogical workers and motivation of their work *Srednerussky Vestnik of social Sciences* 14 (1) 250-261

[9] Ochirov A V 2012 Three-Vector model of the system of motivation of workers of intellectual work of the scientific organization *Internet journal "Science''* 2 4-10

[10] Popova I P 2003 Professional status of researchers - behavior variations *Innovation in education* 1 118-121

[11] Shugurov M V 2016 TRIPS, international technology transfer and development: some lessons from strengthening the IPR protection *BRICS Law Journal* 3 (1) 90 - 125

[12] Lee J, Eggertsson T and North D *Empirical Studies in Institutional Change* (New York: Cambridge University Press) 1996 p 360