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TÍTULO: Investigación de comunicaciones y colaboraciones de científicos de la Federación de Rusia y países de la CEI dentro de los programas conjuntos de estudios y subvenciones.

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RESUMEN: El colapso de la URSS afectó negativamente en muchos aspectos las relaciones formadas en los años en el campo de la ciencia y la educación entre países individuales: las antiguas repúblicas de la URSS y equipos de científicos. El documento contiene los tipos clave de concursos científicos celebrados en la Federación de Rusia para la investigación conjunta con equipos de científicos de los países de la CEI, así como un análisis exhaustivo de la dinámica de las solicitudes presentadas para proyectos conjuntos y el número de concursos ganados en el contexto de países individuales de la CEI. Los autores hicieron recomendaciones para ampliar la cooperación en el campo de la I + D entre investigadores de los países de la CEI y científicos rusos.

PALABRAS CLAVES: investigación científica, ciencia, países de la CEI, colaboraciones, proyecto.

TITLE: Research of communications and collaborations of scientists from the Russian Federation and CIS countries within the joint studies and grants programs.

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ABSTRACT: The collapse of the USSR affected negatively in many respects the relations formed in the years in the field of science and education between individual countries - the former republics of the USSR and teams of scientists. The paper contains the key types of scientific competitions held in the Russian Federation for joint research with teams of scientists from the CIS countries, as well as a comprehensive analysis of the dynamics of submitted applications for joint projects and the number of competitions won in the context of individual CIS countries. The authors made recommendations on expanding further cooperation in the field of R&D between researchers from the CIS countries and Russian scientists.

KEY WORDS: scientific research, science, CIS countries, collaborations, project.

INTRODUCTION.

The development of multilateral interaction and integration processes in the space of the Commonwealth of Independent States (CIS) was formulated by the President of the Russian Federation V.V. Putin as Russia's key foreign policy priorities (2012).

One of the forms of interstate interaction of the CIS countries is scientific cooperation - an institutional pool of efforts of scientists from different countries in order to increase the effectiveness of scientific activity (Maltseva, et al, 2019a) increase the contribution of science to the economic development of states, and increase its own scientific authority and potential (Khoperskaya, 2016).

In the context of globalization, the collaboration and communication in the field of science are becoming an important tool that creates the basis for the formation of a solid scientific backlog by collectives from different countries, and ensures the rapid growth of scientific research.

The development of scientific communications contributes to the popularization of science in society and provides consulting for management decisions at various levels of government (Hetland, 2015).

From the standpoint of terminology, scientific communication can be defined as a special specific phenomenon with an ordered system of multilevel connections and its structural elements, which main meaning is the search, accumulation, dissemination, exchange and discussion of new knowledge obtained in certain scientific fields and carried out through various channels, means, forms and institutions of communication (Maltseva, et al, 2019a; Maltseva, et al, 2019b).

The tools of scientific communication are special events (Hill, 2015; Horst, 2015), scientific and popular science journals (Born, 2015), video and audio online resources (Both, 2015), science museums (Amelung, 2015; Stengler, 2015), etc.

It is the effective forms of cooperation in the scientific sphere, the involvement of the maximum number of stakeholders into the scientific and technical activities within the framework of joint projects, which can provide an additional synergy effect from interaction, as well as identify those R&D priorities that can be implemented in practice.

Conducting joint scientific research is a very important tool of scientific communication, it facilitates the exchange of scientific information and results between partners.

Conducting modern interdisciplinary research by teams from various countries is essentially a scientific collaboration.

Collaboration development tools include collaboration design, training in collaboration, team management (Sturner et al., 2017; Olin and Ingerman, 2016; Heaton et al, 2016), networking technologies (Maggioni et al., 2013; Yunwei Chen and Shu Fang, 2013); for example, Kolfschoten and de Vreede-design approach (2009) for collaborative engineering that incorporates existing process design methods, pattern-based design principles, and insights from expert facilitators regarding design challenges and choices.

The study of communication and collaboration between teams of scientists from the CIS countries is an urgent topic, since it allows to identify key results and prospects for further scientific and technical cooperation, to develop measures in the field of public policy aimed at further rapprochement of countries that previously were a single state.

DEVELOPMENT.

Materials and Methods.

The Government of the Russian Federation, Russian scientific foundations and research centers are interested in developing international scientific and technical relations, including with the CIS countries.

Foundations and centers have special programs that offer their own way of international cooperation in various fields of basic and applied research, including for scientists from the countries of the former USSR.

Currently scientists from the CIS countries have the opportunity to:

- Get support through joint competitions with the CIS countries, conducted by the Russian Foundation for Basic Research.
- Win a grant for work on scientific and innovative topics in the framework of the activities of the International Innovation Center for Nanotechnology of the CIS.
- Get support through the mega-grant competition.
- Attract funding for research carried out jointly with foreign science and research and educational organizations as part of the federal target program "Research and Development in Priority Directions for the Development of the Russian Scientific and Technological Complex for 2014-2020", etc.

The Russian Foundation for Basic Research (RFBR), in accordance with the Charter, approved by Decree of the Government of the Russian Federation of August 9, 2016 No. 767, provides financial support, including in the form of grants to legal entities and individuals, and organizational support for fundamental scientific research, contributing to the implementation of state scientific and technical policy, the dissemination of scientific knowledge in society and based on the principles of granting scientists the right to freedom of creativity, choice of areas and methods of research practice.

The RFBR annually improves the main areas of competitive activity. Much attention is paid to research support programs, including: a competition of research projects carried out by young scientists and specialists; regional and international competitions, including competitions with the CIS countries; organization of international scientific events in the Russian Federation; participation of Russian scientists in international scientific events abroad.

International competitions, including joint ones with the CIS countries, are aimed at supporting the participation of Russian scientists in international scientific projects and developing ties with foreign researchers to achieve world-class scientific results.

The CIS International Nanotechnology Innovation Center (INIC CIS) was formed on December 17–18, 2009 in Dubna at the forum “CIS International Nanotechnology Innovation Center - Status and Prospects”. Its founders are 12 organizations from eight CIS countries, including academies of sciences, research centers, universities and business structures.

Since 2010, the CIS International Nanotechnology Innovation Center as the CIS base organization for scientific and innovative activities in the field of nanotechnologies, with the support of the Interstate Fund for Humanitarian Cooperation (IFHC) of the CIS member states, has been working on the selection of scientific and innovative projects in the field of high technologies for the purpose of grant support for scientific and innovative developments of young scientists and specialists from the CIS countries.

The goal of the federal target program “Research and development in priority areas for the development of the scientific and technological complex of Russia for 2014-2020” is the formation of a competitive and efficiently functioning sector of applied research and development”.

One of the objectives of the Program is to ensure the integration of the Russian R&D sector into the global international innovation system based on the balanced development of international scientific and technical relations of the Russian Federation. As part of this problem’ solution, the program activity 2.1, “Conducting research in the framework of international multilateral and bilateral cooperation,” is being carried out.

Funding of research that carried out jointly with foreign science and research and educational organizations, mainly in accordance with the formulated priorities is made within the framework of this event, including research with the possibility of subsequent multiple applied applications in

various sectors of the economy, unique high-risk studies, which will determine in the future fundamentally new opportunities for economic development, research on promising areas of development world science. Research is carried out in the framework of joint and coordinated competitions (with the exception of European Union countries).

Results.

In the database posted on the official website of the Russian Foundation for Basic Research, the joint competitions which were held from 2007 to 2018 with the CIS member countries were identified.

Competitions for international scientific and research projects with the participation of scientists from the CIS countries can be divided into bilateral and multilateral (table 1).

Table 1. Types of competitions for Basic Research conducted by the Russian Foundation with the CIS countries.

COMPETITION TYPE	PARTICIPANTS OF THE JOINT COMPETITION	COMPETITION CODE
Bilateral competitions	Azerbaijan Republic	Az_a
	Republic of Armenia	Arm_a
	Republic of Belarus	Bel_a, Bel_mol_a
	Kyrgyz Republic	Kyrgyzstan_a
	Republic of Moldova	Mol_a
	Republic of Uzbekistan	Uzb_t
	Ukraine	Ukr_a, Ukr_f_a
Multilateral competitions	Republic of Belarus, Ukraine	RBU_a
	CIS countries (mobility of young scientists from the CIS countries)	mob_sng_st
	Republic of Armenia, Republic of Belarus, Socialist Republic of Vietnam, Mongolia	EAPI_a

The main partner organizations of the Russian Foundation for Basic Research for joint competitions with the CIS countries are listed in table 2.

Table 2. Russian Foundation for Basic Research partners organizations for holding joint competitions with CIS countries.

CIS COUNTRY-PARTICIPANT	ORGANIZATION-PARTNER
Azerbaijan Republic	• National Academy of Sciences of Azerbaijan; • Science Development Fund under the President of the Republic of Azerbaijan
Republic of Armenia	• State Committee on Science of the Ministry of Education and Science of the Republic of Armenia
Republic of Belarus	• Belarusian Republican Foundation for Basic Research
Kyrgyz Republic	• State Fund for the Development of Academic and University Science at the National Academy of Sciences of the Kyrgyz Republic
Republic of Moldova	• Academy of Sciences of Moldova
Republic of Uzbekistan	• Agency for Science and Technology of the Republic of Uzbekistan
Ukraine	• National Academy of Sciences of Ukraine; • State Fund for Basic Research of Ukraine

The Russian Foundation for Basic Research holds competitions for financial support for fundamental research in 8 areas of knowledge:

01 - Mathematics, Mechanics and Computer Science.

02 - Physics and Astronomy.

03 - Chemistry and Materials Science.

04 - Biology and Medical Sciences.

05 - Earth Sciences.

06 - Natural Science research methods in the Humanities.

07 - Information and Communication Technologies and Computing systems.

08 - The fundamental foundations of Engineering.

Until 2016, funding for projects in the humanities and social sciences was provided by the Russian Humanitarian Science Foundation (RHSF). However, in the spring of 2016, he was annexed to the Russian Foundation for Basic Research and formed a department of the humanities and social sciences.

After the merger of the Russian Foundation for Basic Research and the Russian Humanitarian Science Foundation, funding for projects in the humanities and social sciences began to be carried out by the Russian Foundation for Basic Research.

In total, during the study period (2007-2018), 12 types of joint competitions with the CIS countries were revealed. The intensity of their implementation is presented in table 3.

Table 3. Intensity of holding joint competitions with CIS countries.

CIS COUNTRY	CODE OF COMPETITION	YEARS
Azerbaijan Republic	Az_a	2018
Republic of Armenia	Arm_a	2018, 2015, 2013
Republic of Belarus	Bel_a,	2018, 2016, 2014, 2012
	Bel_mol_a	2017, 2015
Kyrgyz Republic	Kyrgyzstan_a	2014
Republic of Moldova	Mol_a	2008
Republic of Uzbekistan	Uzb_t	2018, 2008
Ukraine	Ukr_a,	2014, 2012, 2010, 2008
	Ukr_f_a	2013, 2011, 2009
The Russian Federation, Republic of Belarus, Ukraine	RBU_a	2013, 2011, 2009
CIS countries	mob_sng_st	2012, 2011, 2010, 2009, 2007
Republic of Armenia, Republic of Belarus, Socialist Republic of Vietnam, Mongolia	EAPI_a	2018

Most often (5 times) in the period 2007-2018, the competition "The scientific work of young scientists from the CIS countries in Russian scientific organizations" was held. The main purpose of this competition was to attract talented young scientists from the CIS countries to work in Russian scientific organizations, support and development of international scientific relations. 4 times competitions with the Republic of Belarus and Ukraine were held.

A new joint competition with the CIS countries has been announced, it is a competition of projects of 2018 for fundamental scientific research, conducted by the Russian Foundation for Basic Research in conjunction with organizations participating in the Eurasian Association for the Support of Scientific Research (competition code: EAPI_a 20 applications were submitted, 2 applications were supported). The competition may include projects of fundamental scientific research coordinated by scientists from Russia, the Republic of Armenia, the Republic of Belarus, Vietnam and Mongolia on the topic: “Interdisciplinary research in the field of formation and vital activity of cultures of the Eurasian space: anthropology, genogeography, geoecology, paleolinguistics and ethnology”.

The work within the framework of cooperation with the Republic of Azerbaijan began in 2018 (85 applications were submitted, 21 applications were supported), the work within the framework of cooperation with the Republic of Armenia (156 applications were submitted, 39 applications were supported) and Republic of Belarus (323 applications were submitted, 124 applications were supported) was continued, cooperation with the Republic of Uzbekistan after a ten-year hiatus was resumed (83 applications were submitted, 17 applications were supported).

The results of competitions with the CIS countries for the study period are presented in table 4.

Table 4. Results for all competitions with CIS participating countries for the period 2007-2018.

CIS COUNTRY-MEMBER	APPLICATION 2007–2018 (NUMBER)	GRANTS 2007–2018 (NUMBER)
Azerbaijan Republic	85	21
Republic of Armenia	382	81
Republic of Belarus	1258	473
Kyrgyz Republic	63	9
Republic of Moldova	78	44
Republic of Uzbekistan	237	40
Ukraine	2551	513
The Russian Federation, Republic of Belarus, Ukraine	45	14
CIS countries	198	163
Republic of Armenia, Republic of Belarus, Socialist Republic of Vietnam, Mongolia	20	2
TOTAL	**4917**	**1360**

In the framework of joint competitions with the CIS countries for the period 2007-2018 about 5000 applications were considered. The number of funded projects (excluding rolling projects of previous years) amounted to more than 1300.

During the study period, the largest number of both applications and supported projects was observed in the framework of cooperation with Ukraine - 2551 applications and 473 projects, respectively. However, due to difficulties in relations between Russia and Ukraine, the cooperation came to ought after 2014 at the initiative of the Ukrainian side.

Cooperation with the Republic of Belarus is actively developing: in total for the study period, 1258 applications were considered, based on the results of joint examinations, 473 projects received support.

Today, together with the Belarusian Republican Foundation for Basic Research (BRFBR), the largest number of projects is supported. A competition of projects carried out by young scientists was added to the main competition several years ago. In conjunction with the BRFBR, a competition is being held under the auspices of the Eurasian Association for the Support of Scientific Research (EAPI), established at the initiative of the Russian Foundation for Basic Research in 2016.

The least activity in cooperation with the Russian Foundation for Basic Research for the entire study period was shown by the Azerbaijan Republic, the Kyrgyz Republic, the Republic of Moldova (less than 100 applications were submitted, less than 50 projects were supported).

The most popular areas of knowledge in which competitions are held to receive financial support for fundamental scientific joint research with the CIS countries are:

- Physics and Astronomy - the largest number of applications - 422 and 106 grants.
- Chemistry and Material Sciences - the largest number of applications - 270 and 60 grants.
- Biology and Medical Sciences - the largest number of applications - 403, 72 grants.
- Earth sciences - the largest number of applications - 248 and 46 grants.

In addition, to active cooperation up to a certain point with the National Academy of Sciences of Ukraine and the State Fund for Fundamental Research of Ukraine, throughout the analyzed period, there is ongoing cooperation with the Belarusian Republican Fund for Fundamental Research, which has a stable positive trend in the number of applications and supported projects. The Republic of Belarus is the most interested partner in joint competitions with the CIS countries.

In 2018, the Bureau of the RFBR Council decided to continue the competition programs with all the current partner countries of the fund, as well as to announce new joint competitions for 2019 with science-funding organizations, including the CIS countries. The RFBR partners will be organizations from the Republic of Kazakhstan and the countries of the Black Sea region.

The Bureau of the RFBR Council also decided that in 2018, it is possible to manage only one new international project and to participate in a maximum of two other new international projects. From 2009 to 2017, the CIS International Innovation Center for Nanotechnology gave 110 grants to young scientists and specialists from the CIS countries on a competitive basis for the implementation of scientific and innovative projects with a view to their subsequent commercialization.

Grants were distributed among the CIS countries as follows:

• Azerbaijan Republic - 17 grants.

• Republic of Armenia - 20 grants.

• Republic of Belarus - 19 grants.

• Kyrgyz Republic - 3 grants.

• Republic of Moldova - 3 grants.

• Russian Federation - 43 grants.

• Republic of Tajikistan - 1 grant.

• Ukraine - 4 grants.

In 2018, the competition for the selection of scientific and innovative projects in the field of high technology by the International Innovation Center for Nanotechnology of the CIS with the support of the Interstate Fund for Humanitarian Cooperation of the CIS countries (IFES) was held for the ninth time.

The objective of the Competition is the selection of scientific and innovative projects in the field of high technologies for the purpose of grant support for scientific developments and bringing them to the presentation stage for investors. Young scientists (up to 40 years old) from educational and scientific organizations of the CIS countries participating in research and development in high-tech

industries and having the potential to commercialize research results are invited to participate in the Competition.

The main objectives of the grant are: to carry out work on scientific and innovative topics within the framework of the activities of the International Innovation Center for Nanotechnology of the CIS. Preference is given to projects that are at the stage of patenting and implementation and related to the most promising areas: nanotechnology, nuclear technology, biotechnology, energy efficiency, information technology and others.

On April 9, 2010, the Government of the Russian Federation adopted Resolution No. 220, aimed at providing financial support and stimulating the development of science and its innovative component (access mode: http://www.p220.ru/).

Competitions of scientific megagrants are held with the aim of attracting leading world scientists to Russia, including compatriots living abroad, and creating competitive world-class laboratories under the leadership of leading scientists in Russian universities and scientific organizations. The subjects of the projects of the contest participants cover all 36 fields of science identified by the Grants Council.

Participants in six megagrant competitions were Russian and foreign scientists, occupying leading positions in a specific field of science. The total number of winners in the competitions that were held is 236. Among them: representatives from the Russian Federation - 104 (44%), from the Republic of Belarus - 2, from the Republic of Moldova - 1. The winners-scientists from the CIS countries make up slightly more than 1% for the entire duration of the competition. All three leading scientists from the CIS countries are winners of the fifth contest of scientific megagrants.

Thus, leading scientists from the CIS countries are practically not involved in Russian universities and research organizations. The intellectual potential of scientists from the Republic of Kazakhstan, the Republic of Azerbaijan, the Republic of Armenia, the Kyrgyz Republic, the Republic of

Uzbekistan and the Republic of Tajikistan remains unused. The experience and skills of these scientists can give an impetus to the explosive rather than progressive development of scientific groups, ideas, technologies.

Since the beginning of the Federal Target Program "Research and Development in Priority Directions for the Development of the Russian Science and Technology Complex for 2014-2020", 29 competitions were held on the activity 2.1 "Conducting research in the framework of international multilateral and bilateral cooperation", 4 competitions were held with the participation of research organizations from CIS countries. The distribution of competition projects with CIS countries is presented in table 5.

Table 5. Distribution of competition projects with CIS countries.

NAME OF THE COMPETITION	YEAR	APPLICATIONS, NUMBER	WINNERS, NUMBER
Conducting research in selected priority areas with the participation of scientific and research organizations and universities of the EEU countries (Republic of Armenia, Republic of Belarus, Republic of Kazakhstan, Kyrgyz Republic, Russia)	2017	11	7
Conducting research in accordance with the Interstate program of innovative cooperation of the CIS countries for the period up to 2020 in selected priority areas of scientific and technological cooperation with the participation of research organizations from the CIS countries	2016	8	3
Conducting research in accordance with the Interstate program of innovative cooperation of the CIS countries for the period up to 2020 in all priority areas of scientific and technological cooperation with the participation of research organizations from the CIS countries	2014	8	8
Selection of applied research projects aimed at creating products and technologies in all priority areas of scientific and technological cooperation with the participation of research organizations from the CIS countries	2014	17	9
TOTAL		**44**	**27**

According to the terms of the competitions listed above, the projects must be executed jointly with one or more research organizations or universities of the EEU or the CIS countries. The distribution of foreign competition partners by country is presented in table 6.

Table 6. Distribution of foreign partners (from the beginning of the program).

PARTNER'S COUNTRY	QUANTITY OF PROJECTS
Lot "Conducting research in selected priority areas with the participation of scientific and research organizations and universities from the EEU countries" (Republic of Armenia, Republic of Belarus, Republic of Kazakhstan, Kyrgyz Republic, Russia)	
Republic of Kazakhstan	*3*
Republic of Belarus	*2*
Total	**7**
Lot "Conducting research in accordance with the Interstate program of innovative cooperation of the CIS countries for the period up to 2020 in selected priority areas of scientific and technological cooperation with the participation of scientific and research organizations from the CIS countries"	
Republic of Belarus	*1*
Kyrgyz Republic	*1*
Total	**3**
Lot "Conducting research in accordance with the Interstate program of innovative cooperation of the CIS countries for the period up to 2020 in all priority areas of scientific and technological cooperation with the participation of scientific and research organizations from the CIS countries"	
Republic of Belarus	*3*
Republic of Belarus, Republic of Kazakhstan	*3*
Republic of Belarus and the Republic of Armenia	*1*
Republic of Tajikistan, Republic of Kazakhstan	*1*
Total	**8**
Lot "Selection of applied research projects aimed at creating products and technologies in all priority areas of scientific and technological cooperation with the participation of scientific and research organizations from the CIS countries"	
Republic of Belarus	*6*
Republic of Kazakhstan	*2*
Republic of Kazakhstan, Republic of Uzbekistan, Republic of Belarus, Ukraine	*1*
Total	**9**

The table shows that scientific organizations from the Republic of Belarus (11 times) and the Republic of Kazakhstan (5 times) more often than others acted as foreign partners in projects in competitions under activity 2.1 "Conducting research in the framework of international multilateral and bilateral cooperation" of the Federal target program "Research and development in priority areas of development of the scientific and technological complex of Russia for 2014-2020 years".

Since the beginning of the program, scientific organizations from the Kyrgyz Republic independently acted as a foreign partner of Russian scientific and research organizations or universities only 1 time, and scientific organizations from Ukraine, the Republic of Uzbekistan, the Republic of Armenia and the Republic of Tajikistan also acted as a foreign partner no more than 1 time and only together with other foreign partners.

CONCLUSIONS.

In conclusion of the analysis of the involvement of foreign scientists from CIS countries in joint research projects with Russian colleagues, the following conclusions can be drawn:

• Scientists from the CIS countries have the opportunity to participate in joint competitions with the CIS countries.

• The Russian Foundation for Basic Research is actively cooperating with partner organizations of the Fund in conducting joint competitions with the CIS countries.

During the study period, the largest number of both applications and supported projects was observed in the framework of cooperation with Ukraine, however, after 2014 the cooperation have been almost stopped on the initiative of the Ukrainian side.

Cooperation with the Belarusian Republican Foundation for Basic Research has a stable positive trend in the number of applications and supported projects. The Republic of Belarus is the most interested partner in joint competitions with the CIS countries.

The least activity in cooperation with the RFBR was shown by the Republic of Azerbaijan, the Kyrgyz Republic, and the Republic of Moldova.

• The largest number of grants to young scientists and specialists from the CIS countries for the implementation of scientific and innovative projects with a view to their subsequent commercialization by the CIS International Innovation Center for Nanotechnologies was given to scientists from the Russian Federation, the Republic of Armenia, the Republic of Belarus, the Republic of Azerbaijan, the smallest number of grants was given to scientists from the Republic of Tajikistan. Among the winners there are no representatives from the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Moldova, or the Republic of Uzbekistan.

• Scientists from the CIS countries are not active participants in the competition of grants of the Government of the Russian Federation (megagrants).

Among the winners of six megagrant competitions that were held, the largest number of representatives from the Russian Federation (44%). Winners-scientists from the CIS countries make up just over 1% for the entire duration of the competition.

• More actively than others the organizations from the Republic of Belarus and the Republic of Kazakhstan were acted as foreign partners in projects in competitions under the activity 2.1 "Conducting research in the framework of international multilateral and bilateral cooperation" of the federal target program "Research and development in priority areas for the development of the scientific and technological complex of Russia for 2014-2020".

Scientific organizations representing other CIS countries most often act as partners of Russian scientific and research organizations or universities only in conjunction with other foreign partners.

There is no Azerbaijan Republic, Kyrgyz Republic, Republic of Moldova among the winners of the competition of scientific organizations.

As part of the study, the methodological recommendations for scientific teams from the CIS countries were developed and replicated, including key areas and requirements for participation in joint competitions held by various structures of the Russian Federation. All this can become the basis for expanding further cooperation between the CIS countries in the scientific and technical field, the development of scientific communications and collaborations in the implementation of joint research projects.

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