Research performance and collaboration in the Novosibirsk region

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Abstract

The Novosibirsk region is one of the most industrialized in Siberia. In 1957 the Siberian Branch of the Academy of Sciences of the USSR (now Siberian Branch of the RAS (SBRAS)) was set up to stimulate a rapid development of the Siberian and Far East research forces.

The goal of this mainly bibliometric, empirical study is to obtain insight into R&D performance in the Novosibirsk region, its domestic and international collaborations and the impact of new government science policies focused on boosting the research and innovation activities of regional universities.

Key drivers of research performance are institutions of the SBRAS. Second place in terms of research output belongs to Novosibirsk State University. Its research focuses on hard sciences. 75 % of its papers were published in collaboration with SBRAS institutions. Research output is growing. Novosibirsk area's share of RFBR grants was stable around 8%. Publications from RFBR grantees in 34 subject categories had a level-aggregated indicator value of 1 or higher. In these hard-science areas Russian research develops in accordance with global trends.

We observed a concentration of domestic collaboration in the Novosibirsk area as well as a strong international collaboration with advanced economies, in particular in the Asia-Pacific region.

Key words: citation score, impact factor, level-aggregated indicator, mean weighted indicators, normalized indicator of international collaboration, Novosibirk area, research output, research performance, universities

Introduction

It is well known that in Russia research forces were and still are heavily concentrated in the Moscow and St-Petersburg areas. During World War II many factories were evacuated to Novosibirsk. As a consequence of this event, the Novosibirsk region is one of the most industrialized in Siberia: it creates about 10% of all industrial products, the bulk of which goes to heavy industry. By population (2,639,857 inhabitants on January 1st 2009) this region occupies third place in the Siberian Federal District (there are seven Federal Districts in Russia) and 16th place in Russia. 23,502 Persons form the R&D labour force, among which 22,996 are involved in research on natural and applied sciences and 507 researchers in social sciences (http://ru.wikipedia.org/wiki/Novosibirsk). The government expenditure on R&D in the Novosibirsk area during 2000-2008 was pretty stable at around 2.5% of the total national expenditure on R&D.

In 1957 the Siberian Branch of the Academy of Sciences on the USSR (now the Siberian Branch of the RAS) was set up to stimulate a rapid development of the research forces of Siberia and the Far East. Outside of Novosibirsk (40 km away) the now well-known city Academgorodok was built. It is impossible to overestimate the impact of this decision; it led to a great intensification of the theoretical and experimental research in the east of the country. There are 84 research institutions affiliated with the Siberian Branch of the RAS (SB), 36 of which are operating in the Novosibirsk area. The Siberian Branch of the Russian Academy of the Medical Sciences (RAMS) was set up in 1969 in Novosibirsk. Today there are eight institutions affiliated with the Siberian Branch of the RAMS.

There are two main state universities in Novosibirsk: the Novosibirsk State University (NSU), founded in 1965, and the Novosibirsk State Polytechnic University (NSPU), founded in 1953. NSU is affiliated with the Siberian Branch. About 70% of its teaching staff are also employees of the SB. University senior students get research training in its institutes. Beside these two universities there are 40 branches of various higher education institutions in Novosibirsk. In 2009 there were 152,758 students in the region, of which 98,000 pay for the tuition (http://www.edu.ru/abitur/akt.4/index.php). We have to emphasize that the Russian higher education system went through a notable transformation after the collapse of the Soviet Union. In the former USSR universities and higher education institutes were mainly involved in teaching and played an insignificant role in research, with the exception of the Moscow and St. Petersburg State Universities. During the last six years Russian government science policy has aimed at structural change in its research base from focusing on basic research in the RAS toward encouraging university research (Schiermeier, 2010).
The goal of this study is to obtain insight into R&D performance in the Novosibirsk region, its domestic and international collaborations and the impact of the new government science policy focused on boosting the research and innovation activities of regional universities.

Methods

As data sources for this study we used various information resources produced by ISI [1:] the Web of Science (WoS), the Essential Science Indicators (ESI), Journal Citation Reports (JCR), National Science Indicators (NSI), InCites, as well as the database of the Russian Foundation for Basic Research (RFBR) (Libkind, I. et al, 2006). We retrieved 8,651 bibliographic records from the WoS (AD=Novosibirsk* and PY= 2005-2008). The Histcite software was used to perform a bibliometric analysis.
Bibliometric indicators were: research output and its distribution by author, subject category, institution, country, source of publication and language; total local citation score (TLCS) and total global citation score (TGCS) [2] by author, journal and organization; RFBR grants distribution by year and organization; mean weighted expected impact factor of grantees publications and the level-aggregated indicator.

Results and discussion

Research output (RO) of the Novosibirsk region consisted of 8,651 publications for 2005-2008 (Histcite), which is approximately 10% of the total Russian RO in the same period. Total Local Citation Score (TLCS) was 4,192 and total Global Citation Score (TLCS) 38,828. With an average number of citations per paper (ACP) of 4.5, which is 1.8 times higher than the overall Russian ACP (2.37) according to NSI for the period 2004-2008, the impact of research activity was significantly higher.
Total Russian research output decreased gradually from 28,721 records in 2000 to 22,119 records in 2006. Since 2007 it grew slowly from 25,892 to 30,178 records (InCites). This pattern could be partly attributed to the extension of Russian journals coverage by WoS. The trend in RO from the Novosibirsk region looks similar (Fig.1). The distribution of RO by institution demonstrates the dominance of the Siberian Branch (SB) organizations (their share was about 75 %). The next largest producer was the NSU, its share was 15.4% in 2009 compared to 10% in 2000.

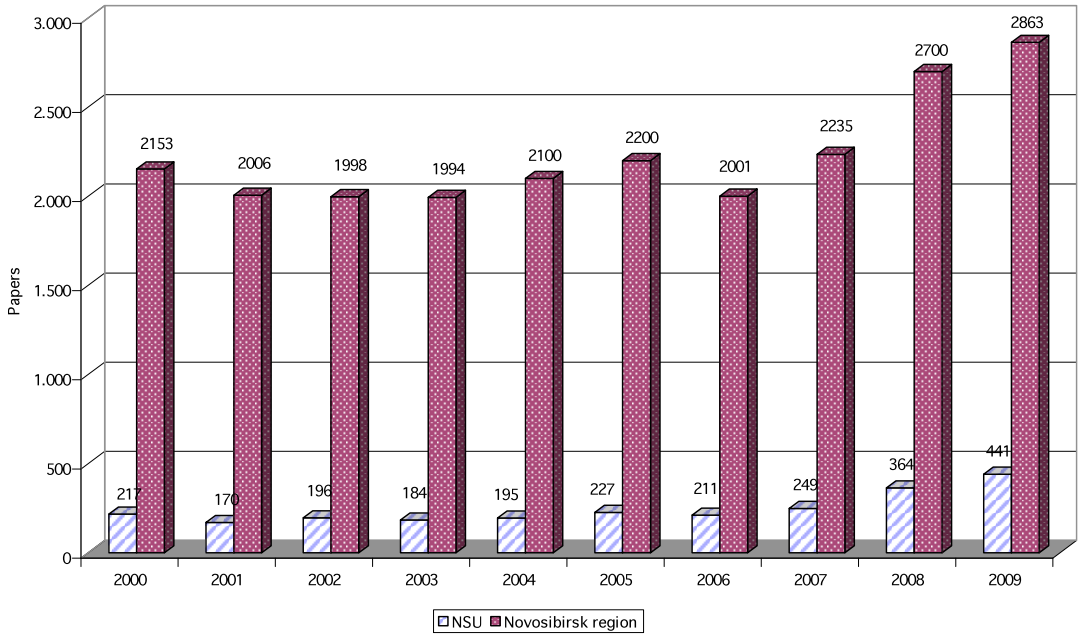

Figure 1. Trends in research output from the Novosibirsk region (InCites).

Looking at the distribution of RO by organization we found 1499 records listed as "unknown" due to missing information in the address in WoS. There were 2,542 organizations involved in research in the Novosibirsk region. About a dozen institutions belonging to the Siberian Branch (SBRAS) of the RAS were listed as separate organizations. Among them were well-known organizations such as the G.I. Budker Institute of Nuclear Physics (BINP) and the N.N. Boreskov Institute of Catalysis. The most productive organizations in terms of RO are presented in Table 1.

Table 1. Top organisations by research publication output

	Institution	*Publications*	*Total Local Citation Score (TLCS)*	*Total Global Citation Score (TGCS)*
1	Russian Acad. Sci.	4749	4226	17161
2	Novosibirsk State Univ.	751	561	3531
3	Budker Inst. Nucl. Phys.	627	1095	12051
4	Univ. Cincinnati	345	75	6840
5	Princeton Univ.	297	698	6068
6	Inst. High Energy Phys.	284	856	9437
7	Ist. Nazl. Fis. Nucl.	237	641	8028
8	Russian Acad. Med. Sci.	232	36	560
9	Univ. Penn.	221	605	7526
10	Univ. Padua	221	454	4125

Among the organizations listed in table 1 are five foreign organizations. This is due to the strong international collaboration of researchers from the BINP. This institute is conducting research in large-scale scientific projects on high energy physics, which is well-known for its

multinational collaboration and large-scale co-authorships. BINP has the highest level of TGCS and has an average citation score per paper (CSP) of 19.6. Researchers of this institute published 41 highly cited papers and CSP was 23.55 for 2000-2010 by ESI (search done on 30.12.2010). BINP RO was stable during the years included in this study and the collaborative partners remained the same. However, this pattern of publication activity on high energy physics distorts the picture.

To obtain a more realistic picture we had to check manually the first eight hundred organizations (which published not less than 3 papers). Due to various circumstances (for which, partly, we could blame Russian authors) the WoS organization index was unable to identify a few different representations of the same organizations; we manually corrected for different versions of the same organization. After this correction 125 Russian organizations remained. We strongly advocate unified English spelling of institutional names. The top 10 Russian organizations are presented in Table 2.

Table 2. Top Russian organisations by research publication output

	Institution	*Records*	*TLCS*	*TGCS*
1	Russian Acad. Sci.	4967	2530	18262
2	Novosibirsk State Univ.	751	561	3531
3	Budker Inst. Nucl. Phys.	639	1102	12139
4	Inst. High Energy Phys	284	856	9437
5	Russian Acad. Med. Sci.	232	36	560
6	Boeskov Inst. Catalysis	224	143	1673
7	Sobolev Inst. Math.	222	84	665
8	Moscow MB Lomonosov State Univ.	92	55	722
9	Novosibirsk State Tech. Univ.	92	36	208
10	State Res. Ctr. Virol. & Biotechn. Vector	60	16	309

The State Research Centre of Virology and Biotechnology (VECTOR) is situated in Koltsovo town outside of Novosibirsk. It was the center of biological weapon activity in Soviet times. Since 1993 Vector opened its doors for international collaboration. Due to efforts by its late director, L. Sandakhchiev, VECTOR received special funding for a joint US-Russian project to investigate emerging diseases (Wilson C., 2004). We had to double-check the list of 800 organizations to verify all representations of its name and found out 25 versions. After correction the total RO was 86 papers, which received 22 TLCS and 324 TGSC. We were puzzled by the low TGSC and low CSP (3.77) because it was only a quarter of the CSP on virology for the total Russian RO in 2005 (InCites). Usually, international collaborative papers have higher citation scores. To solve this puzzle we will interview some VECTOR researchers.

The Siberian Branch of the RAMS occupies the fifth rank by RO among Russian organizations. Its share was 3.24 % in 2005-2008. At 2.5 for this four-year period CSP was surprisingly low for biomedical science..

To estimate the impact of the new government policy on research and innovation activity in higher education institutions (HEI) we focused our attention on their performance. The Novosibirsk State University (NSU) was the second leading organization by RO with a CSP of 6 in 2005-2008 (see Table 2.). It is one of four Russian universities, which were included in ESI. However, the NSU did not have any highly cited papers for 2000-2010 (search done on 30.12.2010). RO analysis by subject category demonstrated the heavy concentration on hard sciences. Its share was 83.1 and 85.6% respectively in 2005 and 2008 with a small change inside of these subject categories (see Fig.2). In 2009 it became possible, using the WoS

option “funding agencies”, to evaluate impact of funding agencies support on research output. Since 1993 Russian researchers had the possibility to get a grant from domestic and foreign funding agencies. Since 1996 there are special government programs to encourage research activity in higher education institutions. There are also joint programs by the RFBR and regional governments. The share of RO supported by various funding agencies was 54% . The leading agency was the RFBR with a 55% share.

RO by the Novosibirsk State Polytechnic University (NSPU) was 92 papers (or 1.06%) with a CSP of 2.26, which is approximately a factor 2.6 less than for the TSU. Nevertheless, RO was growing gradually, from 16 papers in 2005 to 42 papers in 2008. We checked both universities´ performance in 2010 (search in WoS on 30.12.2010) and observed a significant growth. NSPU researchers´ collaboration with the SB was less (35%) than for the NSU with the SB (75%). The performance of other HEI was at a low level: seven HEI have published 35 papers in the period 2005-2008.

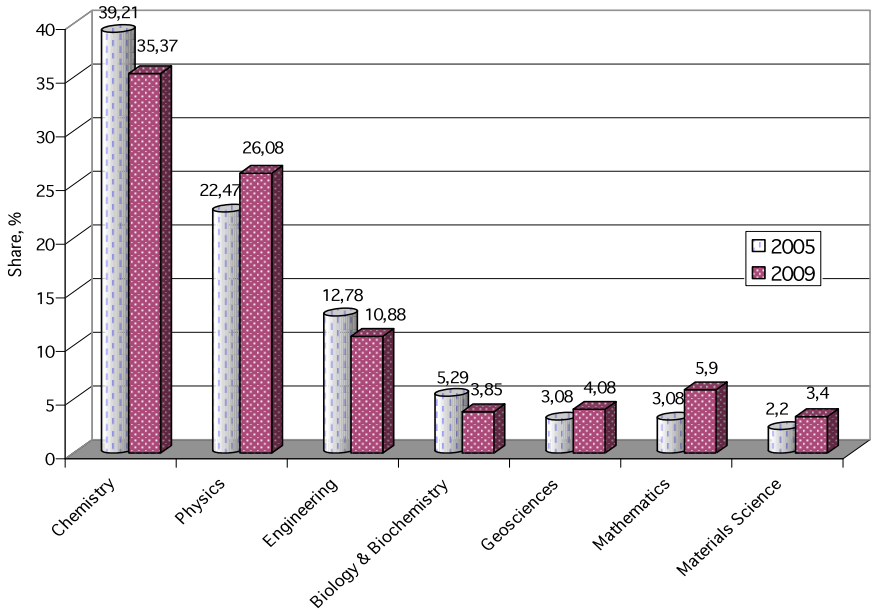

Figure 2. Trends in RO distribution by leading fields of science, 2005 and 2009 (InCites)

Histcite has a very good option to get information on an individual researcher’s performance and its impact. The total number of authors/co-authors in our study was 17,474. Users of the SCI are familiar with the difficulty in collecting data about an author’s publications when the Cyrillic alphabet is used: the author’s name may be transliterated in many different ways (Wilson, 2004). The list of more productive authors is dominated by researchers from the BINP. Among the top 200 most productive authors were only six Russian researchers: V.B. Golubev was co-author of 254; E.P. Solodov and A.P.Onuchin of 248; Druzhinin and Serednyakov of 248 papers; and four other researchers are included with 240 papers. These 200 authors obscure what happens in other, less productive sciences. Again, we have to check the author’s file manually to identify more productive authors and their impact. This is time-consuming job and we will present the results in the ISSI 2011 conference.
In ISI databases each paper is assigned to a country according to an author’s address. We found that for 1,210 publications this information was not available. 7,141 Records remained to study domestic and international collaboration. We observed a solid regional collaboration among institutions of the SB with each other and with higher education institutions in this

area. More than 75 % of the papers from the NSU were co-authored with researchers from the SB. The NSU and the NSPU had about dozen co-authored papers with Tomsk State University (TSU) and Tomsk State Polytechnic University (TPSU). These two universities received the status of innovative universities with additional government funding.
Analysis of RO distribution by country of the authors revealed that country information was missing for 1,210. The share of internationally co-authored papers (ICP) in this file was 32.1%, lower than the Russian ICP of 38 % (http://www.nsf.gov).
Novosibirsk researchers collaborated with colleagues from 77 countries. The 25 countries most frequently collaborated with are presented in the Table 3.

Table 3. Most frequently found countries in co-authored papers

№	*Country*	*Number of Novosibirsk ICP*	*Number of ICP in total Russian research output*	*Share of ICP with a country (%)*	*Share of Novosibirsk ICP (%)*	*Ratio of Novosibirsk ICP to total Russian ICP*	*TLCS*	*TGCS*
1.	USA	821	10,354	9.51	9.49	0.998	1,225	15,449
2.	Germany	762	10,267	9.43	8.81	0.934	1,116	13,848
3.	France	441	5465	5.02	5.1	1.016	757	10,024
4.	UK	406	5,107	4.69	4.69	1.000	764	9,546
5.	Italy	352	3,549	3.26	4.07	1.248	703	9,067
6.	China	347	1,592	1.46	4.01	2.747	906	10,294
7.	Netherlands	298	1,943	1.78	3.44	1.933	517	5,346
8.	Japan	295	2,923	2.68	3.41	1.272	570	7,762
9.	Spain	271	1,979	1.82	3.13	1.720	629	8,146
10.	Canada	269	1,912	1.76	3.11	1.767	630	8,255
11.	South Korea	217	1,542	1.42	2.51	1.768	493	6,907
12.	Poland	216	2,182	2.00	2.5	1.250	330	3,305
13.	Norway	211	941	0.86	2.44	2.837	455	4,371
14.	Switzerland	205	2,08	1.91	2.37	1.241	506	7,061
15.	Australia	202	840	0.77	2.33	3.026	531	7,2
16.	Austria	176	1,052	0.97	2.03	2.093	331	3,265
17.	Taiwan	157	740	0.68	1.81	2.662	315	2,947
18.	India	149	817	0.75	1.72	2.293	452	6,386
19.	Slovenia	143	342	0.31	1.65	5.323	300	236
20.	Sweden	102	1,804	1.66	1.18	0.711	214	4,296
21.	Belgium	62	1,232	1.13	0.72	0.637	43	491
22.	Ukraine	58	1,458	1.34	0.67	0.500	24	317
23.	Belarus	48	665	0.61	0.55	0.902	34	357
24.	Israel	46	857	0.79	0.53	0.671	178	3,393

To evaluate the strength of collaboration with a foreign country we used the ratio between the ICP share with that country in the Novosibirsk area and its ICP share in the total Russian research output, normalized to Russia's ICP share with that country (column 7 in table 3). Table 3 clearly shows strong collaboration from the Novosibirsk area with countries in the Asia-Pacific region. This finding, including the fact that there is more collaboration with China (5%) than with partners in Russia (3%), could be attributed to a special pattern of collaboration in regions situated at a national border (Okubo et al, 2001). The Pacific-Asian summit in Vladivostok, which Russia plans to hold in 2012 could strengthen this pattern.

All collaborative papers had a very high TGCS, except co-authored papers with the Ukraine and Belarus. The level of collaboration with the Ukraine and Belarus (both former closest allies in Soviet times) was significantly lower than with strong western economies and China. CSP are high and vary from 15.3 (Poland) up to 31.8 (South Korea).
One of the goals of a researcher is a successful knowledge transfer by publishing in top journals indexed by WoS. We have to emphasize here that the journal impact factor (IF) plays an important role in the evaluation of individual researchers under the new rules introduced by the Ministry of Education and Science (Markusova et al, 2009). RO was disseminated through 1218 journals. Highest citation scores are found for publications in the international journals on physics. The list of top twenty journals by number of papers is displayed in Table 4. These twenty journals accounted for 32.7% of the RO. Three of these journals are foreign journals on physics. Russian journals translated cover to cover into English were the main channel of knowledge dissemination.

Table 4. Top journals by number of papers, 2005-2008

	Institution	*Publications*	*TLCS*	*TGCS*
1	JOURNAL OF STRUCTURAL CHEMISTRY	260	26	275
2	PHYSICAL REVIEW D	244	368	3513
3	RUSSIAN GEOLOGY AND GEOPHYSICS	223	107	453
4	PHYSICAL REVIEW LETTERS	208	428	4453
5	BULLETIN OF EXPERIMENTAL BIOLOGY AND MEDICINE	171	6	102
6	JOURNAL OF MINING SCIENCE	159	0	16
7	NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A - Accelerators Spectrometers Detectors and Associated Equipment	153	81	567
8	RUSSIAN CHEMICAL BULLETIN	149	56	285
9	KINETICS AND CATALYSIS	142	46	234
10	DOKLADY EARTH SCIENCES	139	75	229
11	SIBERIAN MATHEMATICAL JOURNAL	133	26	107
12	RUSSIAN JOURNAL OF GENETICS	113	37	113
13	COMBUSTIAN EXPLOSION AND SHOCK WAVES	111	41	209
14	JOURNAL OF APPLIED MECHANICS AND TECHNICAL PHYSICS	111	4	55
15	RUSSIAN JOURNAL OF INORGANIC CHEMISTRY	111	22	110
16	DOKLADY MATHEMATICS	104	13	63
17	JETP LETTERS	91	68	377
18	RUSSIAN JOURNAL OF ORGANIC CHEMISTRY	75	38	139
19	PHYSICAL REVIEW B	70	45	568
20	JOURNAL OF EXPERIMENTAL AND THEORETICAL PHYSICS	64	39	127

We find that Russian journals have much lower TGSC values than foreign journals. The journal “Nuclear instruments & methods in physics research section a-accelerators spectrometers detectors and associated equipment” had the highest CSP (3.7) among the Russian journals. Analysis of the journal list shows that the main subject categories were chemistry, physics and earth sciences.
Among the top 200 hundred journals by number of publications there were only 24 domestic and foreign journals on life sciences; the list of these journals is presented in Table 5.

The Russian journal "Bulletin of experimental medicine" had the highest number of publications, but a very low average citation score per paper (CSP) -0.6. The "Journal of biological chemistry" had the highest CSP (18.3) among these journals. In general all Russian papers published in these 24 journals had a surprisingly low CSP.
About 85 % of Russian journals covered by WoS are translated into English by a private American company. Discussing the low citation scores of Russian papers on genetics Prof. A. Pudovkin (2011, in print) stressed that the English version of Russian journals are very expensive and the quality of the translation is low. As an example, the subscription to the "Russian journal on genetics" costs 4,854 Euro, while the subscription of US journal "Genetics" costs only $60. The latter publishes more and higher quality papers than the Russian Journal.

Table 5. Dissemination of Russian publications on life sciences, 2005-2008 (Novosibirsk Area)

Journal title	*Publications*	*TLCS*	*TGCS*
EUROPEAN HEART JOURNAL	8	0	0
BIOLOBICAL RHYTHM RESEARCH	8	6	19
ZHURNAL NEVROLOGII I PSIKHIATRII IMENI S S KORSAKOVA	9	0	3
BIOLOGY BULLETIN	9	0	8
CYTOGENETIC AND GENOME RESEARCH	9	12	66
EXPERIMENTAL HEMATOLOGY	9	0	0
JOURNAL OF BIOLOGICAL CHEMISTRY	10	10	183
ZHURNAL OBSHCHEI BIOLOGII	11	1	4
BIOFIZIKA	11	4	10
EUROPEAN NEUROPSYCHOPHARMACOLOGY	11	0	1
CIRCULATING NUCLEIC ACIDS IN PLASMA AND SERUM V	12	0	0
APPLIED BIOCHEMISTRY AND MICROBIOLOGY	13	2	15
GEMATOLOGIYA I TRANSFUZIOLOGIYA	17	0	5
TERAPEVTICHESKII ARKHIV	20	0	6
KARDIOLOGIYA	19	0	2
NUCLEIC ACIDS RESEARCH	19	28	249
DOKLADY BIOCHEMISTRY AND BIOPHYSICS	23	0	13
ZHURNAL VYSSHEI NERVNOI DEYATELNOSTI IMENI I P PAVLOVA	31	7	29
ZOOLOGICHESKY ZHURNAL	31	4	16
RUSSIAN JOURNAL OF BIOORGANIC CHEMISTRY	32	3	51
BIOCHEMISTRY - MOSCOW	38	10	76
FEBS JOURNAL	37	2	10
RUSSIAN JOURNAL OF GENETICS	113	37	113
BULLETIN OF EXPERIMENTAL BIOLOGY AND MEDICINE	171	6	102

Our previous research showed increased involvement of non-metropolitan universities in basic research (Markusova et al, 2010). The Novosibirsk area, however, demonstrated a stable share of grants (8%) given by the RFBR during 2000-2008. Fifty five organizations were awarded.
More than 90% of these grants were given to the institutions of the Siberian Branch. The NSU received 2.1%) and the NSPU 1.6% of the grants.

Table 6. RFBR grant distribution by year

Year	*Number of grants*	*Share (%)*
2000	241	8,6
2001	250	8,4
2002	266	8,2
2003	251	8,5
2004	230	7,1
2005	321	7,8
2006	300	7,8
2007	223	6,8
2008	315	8,2

To evaluate what part of Russian research reaches a broad audience through journals as a main communication channel we investigated the grantees' research output.
In the period studied, grantees published 723 papers in 331 journals covered by JCR (of which 20 were Russian). Among twenty most often chosen journals only four were Russian (see Table 7).

Table 7. Journals chosen most often bij RBFR grantees (≥ 10 publications)

Journal	*Country*	*Number of publications*
NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A - ACCELERATORS SP	Netherlands	24
ZHURNAL VYSSHEI NERVNOI DEYATELNOSTI IMENI I P PAVLOVA	Russia	16
JOURNAL OF PHYSICAL CHEMISTRY B	USA	15
ZOOLOGICHESKY ZHURNAL	Russia	13
CHROMOSOME RESEARCH	Netherlands	12
PHYSICAL REVIEW B	USA	12
INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER	England	11
LASER PHYSICS	Russia	11
PHYSICAL REVIEW D	USA	10
RUSSIAN JOUNAL OF NUMERIOCAL ANALYSIS	Russia	10
INORGANIC CHEMISTRY	USA	10
ANNALS OF THE NEW YORK ACADEMY OF SCIENCES	USA	10

Co-authors of these publications are found in 96 domestic institutions and 44 countries. The share of internationally co-authored papers was 39.8% (higher than for the region). 95% of the RO was produced by grantees from the SBRAS; 5 % (35 papers) originated in the NSU; 1.8% (12 papers) in the NSPU.
It is known that in general, Russian as well as Chinese journals have a significantly lower Impact Factors than journals published in English. E. Garfield (1990) has investigated this phenomenon. In 2001 an average Russian journal's IF was 0.35; since then it has steadily grown to 0.54 in 2008.

Table 8. Leading Subject Categories

Subject category (JCR)	*Number of publications*	*MWIF*	*Category median IF JCR*	*Level-aggregated*
ENGINEERING, CHEMICAL	30	2,867	0,855	1,81
ENGINEERING, MECHANICAL	18	1,633	0,724	1,52
CHEMISTRY, INORGANIC &NUCLEAR	38	2,777	1,479	1,24
CHEMISTRY, MULTIDISCIPLINARY	28	4,804	1,256	1,32
PHYSICS, MULTIDISCIPLINARY	22	3,286	0,994	1,18
MATHEMATICS	48	0,707	0,562	1,02
NUCLEAR SCIENCE & TECHNOLOGY	27	1,024	0,829	1,06
CHEMISTRY, PHYSICAL [4]	88	2,804	1,833	0,99

Grantees published in one hundred subject categories (taken from JCR–Science edition , 2008). To compare the level of grantees' publications with the world trend in a specific area, we introduce a new indicator, the Level-Aggregated Indicator (LA). This level-aggregated indicator is the ratio of the mean weighted impact factor (MWIF) of RFBR grantees' publications in a specific subject category to the aggregated impact factor (taken from JCR, 2008).

The mean weighted impact factor in 2008 was calculated for each subject category as:

$$MWIF_{k_{iM}} = \frac{\sum_{j_{k_i}=1}^{j_{k_i}=n_{k_{iM}}} IF_{j_{k_i}} * m_{j_{k_i}}}{\sum_{j_{k_i}=1}^{j_{k_i}=n_k} m_{j_{k_i}}} \quad (1)$$

where:

M is the file consisting of all RFBR grantees' articles in 2008

j_{k_i} is the number of journals belonging to a specific subject category k_i

$m_{j_{k_i}}$ is the number of articles from the file M, published in a journal belonging to category k_i.

n_{k_i} is the number of journals belonging to category k_i, in which articles from the file M were published;.

The level-aggregated indicator (LA) was calculated for 2008 as :

$$LA = \frac{MWIF_{k_{iM}}}{IF\_aggr_{k_i}} \quad (2)$$

where,

$IF\_aggr_{k_i}$ is the aggregated IF for category k_i according to JCR, 2008

Our study shows that publications from RFBR grantees in 34 subject categories (SC) had an LA value equal or higher than 1. All these SC belong to the hard sciences. We can state that in these subjects areas Russian researchers are working in accordance with world trends.

Nineteen SC belong to the Life Sciences. In two of these, "GENETICS & HEREDITY" and "BIOCHEMISTRY & MOLECULAR BIOLOGY" a substantial number of papers was published; their LA values were 0.86 and 0.83 respectively.
The list of leading subject categories is shown in Table 8.

Conclusions

The Novosibirsk region shows a high level of research performance. Its share of R&D expenditure was 2.5% . However, its research output (RO)amounted to 10% of the total Russian RO in 2004-2008. The key drivers of research performance are institutions of the Siberian Branch of the RAS.
The second place in terms of research output belongs to Novosibirsk State University. 75 % of its papers were published in collaboration with SB institutions. We observed a growth of RO, especially in the last three years (2008-2010). Research at the university is focused on hard sciences, which mirrors Soviet research base priorities. Its share of RFBR grants was stable at about 2%.
We observed a concentration of domestic collaboration in the Novosibirsk area as well as a strong international collaboration with advanced economies.
We believe that new government policy promoting research and innovation in the higher education institutions could have a positive effect if it will be done not at the expenses of the RAS where best science is done.

Notes

1. ISI is now Thomson Scientific.
2. LCS - Local Citation Score shows the count of citations to a paper within the collection; GCS - Global Citation Score shows the total number of citations to a paper in the Web of Science; T* - Total [score] any Total score represents a sum of respective scores for all records from a given author, source, other category, or all records. e.g. TLCS = Total Local Citation Scores (Glossary, InCites).
3. Institutions marked with * are affiliated with the RAS
4. This SC was included due to highest number of articles and LA indicator close to 1.

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