

Comparative innovation analysis of the regions of the Russian Federation¹

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Current interest to innovation analysis on the part of the regional authorities of the Russian Federation (RF) can be explained by the fact that in many regions innovation strategies and programs are being implemented and benchmarking exercises are regarded as sources of important information. Another powerful factor which explains interest to such analyses is the process globalization and increasing competition at the world markets of goods and services. On the other hand, comparative analysis and benchmarking of innovation activities at the regional level allow to optimize managerial efforts of regional governments. It should be noted that there are great differences between 80 regions of the Russian Federation. They are very different in their population and territory, in concentration of universities and research institutes, in their economic capacity, etc. Many regions in the framework of their innovation policies provide considerable support to innovative firms and thus improving innovation climate at their territory. At the same time some regions do not have strong grounds for regional innovation policies and rely mainly on the federal support. On the contrary some Russian regions inherit historically established R&D and higher education institutions that are supported through the federal budget allocations which certainly adds impacts of the federal R&D and higher education policies to regional efforts.

All these specific features had to be taken into consideration in order to "clean up" results of the comparative regional innovation analysis from the federal policy influence. At the same time in order to avoid the effect of the scale of regional economies only relative indicators should be used for innovation analysis.

The presented comparative analysis of innovation activities in the Russian Federation regions has been accomplished on the basis of original system of indicators according to the data of 2008 official statistical survey. Results of the analysis, which is very close by its methodology to the Regional innovation scoreboard 2009, allow to compare Russian regions by the Regional Summary Innovation Index (RSII), as well as to distinguish four clusters of leading regions: by innovation potential, by innovation climate, by efficiency of innovation activities and by efficiency of the use of innovation potential.

Historically established centres of research and higher education in Russia

While formulating indicators for the RF regional innovation analysis we should take into consideration that there are several historically established centres of R&D and higher education in Russia that have been established and developed at the expense of the federal budget and certainly cannot be regarded as results of regional efforts. At present they mainly funded at the expense of

¹ Source: V.Kiselev Comparative analysis of innovation activity of subjects of the Russian Federation. Innovation, No.4. 2010.

the federal budget allocations, though their institutions are free to carry out contract research and personnel training for regional firms and enterprises.

Main research centres in Russia (by the indicator "number of researchers, head count", 2008) are located in: city of Moscow (135611), city of St.-Petersburg (46743), Moscow region (37954)², Nizhniy Novgorod region (18591), Novosibirsk region (10784)³. Distribution of researchers between Russian regions is very uneven. For example, number of researchers in Novosibirsk region, which holds the 5-th place in the country by this indicator, is almost 13 times less than in the city of Moscow.

Main higher education centres in Russia (by the indicator "number of students per 10 000 population", in 2008/2009) are located in: city of Moscow (1249), city of St.-Petersburg (1001), Tomsk region (884), Magadan region (697), Novosibirsk region (646), Khabarovsk territory (638), Samara region (568). For comparison - the Moscow region and the Leningrad region (with the city of St.-Petersburg as its centre) had the following values of this indicator: 257 (75-th place in the Russian Federation) and 112 (80-th place in the Russian Federation)⁴ while their populations are comparable with the populations of their capital cities.

In general the above mentioned historic inter-regional distribution of R&D and higher education capacities does not distort the national innovation potential, but from the point of view of regional comparisons it may lead to wrong conclusions if not regarded correctly.

Some peculiarities of regional innovation policies

At present there is rather active process of establishing regional innovation systems in Russia and regional governments play prominent roles in the process. This process includes: a) elaboration of regional legislative framework to regulate innovation activities; b) elaboration of regional strategies and programs of innovation development; c) establishing elements of regional innovation infrastructure; d) carrying out innovation related regional studies; etc.⁵. Successful innovation projects and programs contribute to establishing positive innovation climate on the territory of the region. For this reason all initiatives of regional governments aimed at stimulation of innovation activities are important factors that determine the regional innovation climate. Regional innovation policy is an important development factor especially for those regions whose innovation potential is or in future could become an important competitive advantage.

In this connection in order to correctly assess the level of regional innovation activity it is expedient to take into consideration indicators that characterize regional innovation governments' efforts, aimed at establishing innovation promoting conditions on the territory of the region. Financial resources spent within the regional innovation programs and projects and corresponding expenses of regional firms and enterprises, number of established regional innovation infrastructure institutions, etc., should be taken into consideration as innovation promoting factors as well.

Some notes on Russian innovation statistics.

One of the problems in carrying out comparative innovation analysis of the Russian regions is poor statistical data on innovation activities at the regional level, which allows only approximate international comparisons of Russian regions. It is necessary to mention that at present the Russian

² The city of Moscow and the Moscow region are different subjects of the Russian Federation.

³ Source: Rosstat. Regions of Russia. Socio-economic indicators. 2009.

⁴ Ditto.

⁵ National innovation system and state innovation policy of the Russian Federation. Background Report to the OECD Country Review of the Russian Innovation Policy.

Federation Statistics Service (Rosstat) does not collect data on the following indicators that are usually used in regional innovation surveys in other countries: participation in life-long learning, employment in medium-high & high-tech manufacturing, employment in knowledge-intensive services and some others. One of major weaknesses of the Russian regular statistics is lack of data on innovative SMEs. So the impact and efficiency of small and medium size innovative enterprises in Russian regions cannot be assessed. No special innovation surveys have been carried out in Russia so far. There is no classification of high tech manufacturing and knowledge-intensive services in Russia either, so indicators of employment in those areas are not available and only can be approximately calculated basing on other data.

System of indicators for innovation comparison of Russian regions.

Taking into consideration the international experience⁶, the above mentioned peculiarities of regional innovation policies in the Russian Federation and shortcomings of Russian innovation statistics, it is proposed to assess the innovation activity level of Russian regions on the basis of the following system of indicators (Table 1). At this stage the indicators have not been weighted.

Table 1. System of innovation activity indicators of the Russian Federation regions.

Indicator No.	Indicator
I. Innovation potential	
1.	Population with tertiary education (ISCED 5-6) per 100 employed population
2.	Employment in knowledge-intensive services (communication, ICT, R&D) (% of employed population)
3.	Regional business R&D expenditures (RBERD) as a percentage of total R%D expenditure in the region
4.	Regional business expenditure for technological innovation as a percentage of total regional expenditure for technological innovation
5.	Organisations in communications and R&D sectors as a percentage of all firms
II. Innovation climate	
6.	Innovation infrastructure organizations as a percentage of all firms of the region
7.	Technological innovations expenditures from all sources except federal budget allocation as a percentage of gross regional product (GRP)
8.	Firms that had cooperation relations for technological, marketing and organizational innovations as a percentage of all innovative firms
9.	Expenditures on ICT as a percentage of gross regional product (GRP)
III. Innovation activities output	
10.	Number of created advanced production technologies per 10 000 regional employment
11.	Number of patent applications for inventions and useful models per 1 million regional employment
12.	Firms that had technological, marketing and organizational innovations as a percentage of all firms of the region
13.	R&D expenditures as a percentage of total volume of delivered goods and services
14.	Innovative goods and services as a percentage of total volume of delivered goods and services
15.	Exported innovative goods and services as a percentage of total volume of

6 H.Hollanders, S.Tarantola, A.Loschky Regional Innovation Scoreboard (RIS) 2009

delivered goods and services

Such a system seems to be quite convenient as it allows to carry out separate analysis and comparison of the innovation potential and innovation output of the regions under survey. Besides it allows to assess efforts of regional governments in creating innovation infrastructure and innovation climate in their regions .

Results of regional innovation analysis of the Russian Federation

The following regional innovation analysis has been carried out on the basis of official statistical data of the year 2008.

The Regional Summary Innovation Index (RSII) was used as the composite indicator of the level of innovation activity in the RF regions. The RSII calculation methodology is similar to that used in European Scoreboards⁷. In order to carry out comparisons of the RF regions by their innovation potential, innovation climate and innovation output three additional composite indices have been calculated:

- innovation potential index (IPI);
- innovation climate index (ICI);
- innovation output index (IOI).

In the Table 2 values of all indicators of a number of the RF regions are given as an example.

Table 2. Values of indicators of a group of the RF regions (2008)

Indicator No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Moscow region	33,40	4,41	14,90	63,94	0,75	0,02	0,70	0,07	1,23	24,09	809,33	7,6	4,39	9,90	2,49
Tver region	19,70	3,71	33,81	78,39	0,67	0,01	0,70	0,06	1,59	9,80	333,33	6,3	1,93	8,79	0,12
Yaroslavl region	23,80	3,34	11,82	71,09	0,54	0,03	2,40	0,08	2,62	13,41	494,56	8,0	2,13	10,20	2,30
City of Moscow	49,90	6,84	25,49	54,68	0,63	0,02	0,24	0,01	1,42	23,21	1704,33	14,9	6,49	1,72	0,33
Leningrad region	25,70	2,31	18,87	84,97	0,45	0,02	0,66	0,05	1,16	2,69	231,31	5,6	1,01	1,42	0,77
St.Petersburg	40,90	5,85	18,96	82,00	0,46	0,01	0,99	0,02	2,22	36,00	1130,21	12,5	6,40	2,84	0,52
Republic Kalmykia	25,00	2,69	0,00	0,00	0,59	0,01	0,00	0,00	0,95	0,00	34,93	0,0	2,48	0,00	0,00
Chechen Republic	21,50	0,92	0,00	0,00	1,21	0,00	0,00	0,00	0,12	0,00	37,83	0,0	1,68	0,00	0,00
Rostov region	26,40	2,77	14,75	48,64	0,66	0,03	0,93	0,07	1,11	5,18	481,72	9,4	1,47	4,18	0,05
Republic Tatarstan	25,00	2,68	27,78	81,92	0,66	0,03	3,03	0,11	0,90	4,96	580,61	14,3	0,62	14,77	7,06
Ulyanovsk region	22,60	3,25	61,29	90,04	0,76	0,02	0,81	0,13	2,07	3,31	722,19	8,7	3,11	19,39	1,24
Tyumen region	26,70	2,42	31,00	99,25	0,78	0,01	0,82	0,08	0,79	6,84	200,02	6,5	0,25	0,71	0,07
Krasnoyarsk territory	23,50	2,48	11,23	99,14	0,83	0,02	1,10	0,07	1,27	9,05	473,27	14,0	0,80	1,60	0,41
Novosibirsk region	26,90	4,06	12,41	68,25	0,48	0,01	0,63	0,02	1,93	18,09	650,57	5,4	4,61	3,40	0,20
Tomsk region	26,00	4,07	15,51	63,78	0,77	0,08	0,97	0,11	2,17	6,04	1097,90	16,0	3,11	2,87	0,18
Magadan region	24,00	4,02	0,31	98,05	0,97	0,00	1,92	0,39	2,37	64,52	43,01	26,9	3,33	3,27	0,00
Sakhalin region	21,50	2,55	32,01	97,38	0,97	0,01	0,01	0,07	1,81	10,20	47,62	3,2	0,35	0,10	0,00

⁷ European Trend Chart on Innovation. Methodology Report on European Innovation Scoreboard. 2005. p.15-16.

Calculations according to the above mentioned methodology using values of innovation indicators (Table 1) have led to the following values of composite innovation indices (Table 3).

Table 3. Innovation indices of the Russian Federation regions (2008)

		IPI	ICI	IOI	RSII	CUIP
1	2	3	4	5	6	7
	Central Federal District	0,460	0,220	0,317	0,332	0,69
1.	Belgorod region	0,273	0,279	0,344	0,299	1,26
2.	Briansk region	0,326	0,363	0,193	0,294	0,59
3.	Vladimir region	0,398	0,346	0,210	0,318	0,53
4.	Voronezh region	0,341	0,387	0,301	0,343	0,88
5.	Ivanovo region	0,252	0,244	0,231	0,243	0,92
6.	Kaluga region	0,375	0,382	0,330	0,363	0,88
7.	Kostroma region	0,302	0,264	0,146	0,237	0,48
8.	Koursk region	0,452	0,258	0,133	0,281	0,29
9.	Lipetsk region	0,370	0,217	0,160	0,249	0,43
10.	Moscow region	0,448	0,226	0,382	0,352	0,85
11.	Oryol region	0,413	0,343	0,271	0,342	0,66
12.	Riazan' region	0,368	0,215	0,156	0,246	0,42
13.	Smolensk region	0,348	0,302	0,119	0,256	0,34
14.	Tambov region	0,306	0,414	0,172	0,298	0,56
15.	Tver region	0,420	0,228	0,196	0,281	0,47
16.	Toula region	0,364	0,307	0,142	0,271	0,39
17.	Yaroslavl region	0,323	0,450	0,290	0,354	0,90
18.	City of Moscow	0,622	0,183	0,439	0,415	0,71
	North-West Federal District	0,415	0,235	0,237	0,295	0,57
19.	Republic Karelia	0,184	0,303	0,076	0,188	0,41
20.	Republic Komi	0,436	0,263	0,179	0,293	0,41
21.	Arkhangelsk region	0,483	0,211	0,124	0,273	0,26
22.	Vologda region	0,334	0,236	0,165	0,245	0,49
23.	Kaliningrad region	0,256	0,146	0,155	0,185	0,61
24.	Leningrad region	0,336	0,198	0,106	0,213	0,32
25.	Mourmansk region	0,536	0,402	0,087	0,341	0,16
26.	Novgorod region	0,483	0,445	0,341	0,423	0,71
27.	Pskov region	0,248	0,226	0,090	0,188	0,36
28.	City of St.Petersburg	0,540	0,267	0,412	0,406	0,76
	Southern Federal District	0,340	0,187	0,160	0,229	0,47
29.	Republic Adygeya	0,366	0,154	0,098	0,206	0,27
30.	Republic Daghestan	0,454	0,063	0,208	0,242	0,46
31.	Republic Ingushetia	0,304	0,003	0,017	0,108	0,06
32.	Republic Kabardino-Balkaria	0,401	0,133	0,093	0,209	0,23
33.	Republic Kalmykia	0,136	0,096	0,041	0,091	0,30
34.	Republic Karachayev-Cherkessia	0,218	0,393	0,138	0,250	0,63
35.	Republic Northern Osetia-Alania	0,403	0,192	0,079	0,225	0,20
36.	Chechen Republic	0,161	0,000	0,029	0,063	0,18

37.	Krasnodar territory	0,286	0,137	0,119	0,181	0,41
38.	Stavropol territory	0,439	0,169	0,350	0,319	0,80
39.	Astrakhan region	0,348	0,223	0,082	0,217	0,24
40.	Volgograd region	0,389	0,309	0,161	0,286	0,41
41.	Rostov region	0,305	0,250	0,174	0,243	0,57
	Volga Federal District	0,368	0,346	0,304	0,340	0,83
42.	Republic Bashkortostan	0,377	0,285	0,205	0,289	0,54
43.	Republic Mariy El	0,358	0,239	0,122	0,240	0,34
44.	Republic Mordovia	0,336	0,399	0,197	0,310	0,59
45.	Republic Tatarstan	0,401	0,358	0,424	0,395	1,06
46.	Republic Oudmourtia	0,296	0,342	0,144	0,260	0,49
47.	Republic Chouvashia	0,453	0,417	0,221	0,364	0,49
48.	Perm' territory	0,445	0,396	0,434	0,425	0,98
49.	Kirov region	0,256	0,444	0,277	0,326	1,08
50.	Nizhny Novgorod region	0,404	0,478	0,309	0,397	0,76
51.	Orenbourg region	0,368	0,243	0,175	0,262	0,48
52.	Penza region	0,287	0,300	0,236	0,274	0,82
53.	Samara region	0,408	0,277	0,454	0,380	1,11
54.	Saratov region	0,370	0,358	0,184	0,304	0,50
55.	Ulianovsk region	0,549	0,361	0,354	0,422	0,65
	Urals Federal District	0,321	0,261	0,172	0,251	0,54
56.	Kourgan region	0,407	0,329	0,154	0,296	0,38
57.	Sverdlovsk region	0,309	0,410	0,296	0,338	0,96
58.	Tiumen' region	0,468	0,187	0,087	0,248	0,19
59.	Cheliabinsk region	0,210	0,370	0,207	0,262	0,99
	Siberia Federal District	0,371	0,230	0,143	0,248	0,39
60.	Republic Altai	0,136	0,122	0,065	0,108	0,48
61.	Republic Bouriatia	0,363	0,347	0,187	0,299	0,51
62.	Republic Tyva	0,186	0,215	0,171	0,191	0,92
63.	Republic Khakassia	0,393	0,148	0,050	0,197	0,13
64.	Altai territory	0,352	0,223	0,141	0,239	0,40
65.	Zabaikalski territory	0,463	0,257	0,068	0,263	0,15
66.	Krasnoyarsk territory	0,395	0,253	0,189	0,279	0,48
67.	Irkutsk region	0,367	0,198	0,145	0,237	0,40
68.	Kemerovo region	0,338	0,171	0,101	0,203	0,30
69.	Novosibirsk region	0,352	0,232	0,245	0,276	0,70
70.	Omsk region	0,400	0,160	0,178	0,246	0,44
71.	Tomsk region	0,398	0,540	0,295	0,411	0,74
	Far East Federal District	0,397	0,258	0,119	0,258	0,30
72.	Republic Sakha (Yakutia)	0,436	0,265	0,109	0,270	0,25
73.	Kamchatka territory	0,469	0,135	0,142	0,249	0,30
74.	Primorski territory	0,358	0,211	0,174	0,247	0,49
75.	Khabarovsk territory	0,435	0,339	0,147	0,307	0,34
76.	Amour region	0,287	0,287	0,104	0,226	0,36
77.	Magadan region	0,436	0,522	0,413	0,457	0,95

78.	Sakhalin region	0,474	0,230	0,056	0,254	0,12
79.	Jewish autonomous region	0,287	0,148	0,066	0,167	0,23
80.	Chukotka autonomous region	0,441	0,052	0,077	0,190	0,17

Values of indices presented in three sections of the Table 3 allow to compare regions by their innovation potential, innovation climate and innovation output. But having such a great number of regions in a comparison exercise it is interesting to know which regions are the most efficient in using their innovation potential. The answer can be obtained via a formal indicator – the coefficient of the use of innovation potential (CUIP, column 7 in the Table 3), which shows the ratio between innovation output and innovation potential indices. The current analysis revealed only 4 regions in Russia that have the value of CUIP above 1.0 and 7 other regions that have the value of CUIP between 0.9 and 1.0 (Table 4) which means that only 11 regions have good scores in using their innovation potential. It should be noted that CUIP as a relative indicator shows only the degree of the innovation potential implementation and indicates neither scale of the regional economy nor the regional administration efforts in stimulating innovation.

Table 4. Regions with highest values of coefficient of the use of innovation potential (2008)

Belgorod region	1,26
Samara region	1,11
Kirov region	1,08
Republic Tatarstan	1,06
Cheliabinsk region	0,99
Perm' territory	0,98
Sverdlovsk region	0,96
Magadan region	0,95
Republic Tyva	0,92
Ivanovo region	0,92
Yaroslavl region	0,90

In accordance with the data of the Table 3 ranking of the RF regions by the Regional Summary Innovation Index is presented in the Table 5.

Table 5. Ranking of the RF regions by the Regional Summary Innovation Index (2008)

Rank	Region	RSII	Rank	Region	RSII
1	Magadan region	0,457	41	Zabaikalski territory	0,263
2	Perm' territory	0,425	42	Orenbourg region	0,262
3	Novgorod region	0,423	43	Cheliabinsk region	0,262
4	Ulianovsk region	0,422	44	Republic Oudmourtia	0,260
5	City of Moscow	0,415	45	Smolensk region	0,256
6	Tomsk region	0,411	46	Sakhalin region	0,254
7	City of St.Petersburg	0,406	47	Republic Karachayevo-Cherkessia	0,250
8	Nizhny Novgorod region	0,397	48	Lipetsk region	0,249
9	Republic Tatarstan	0,395	49	Kamchatka territory	0,249
10	Samara region	0,380	50	Tiumen' region	0,248
11	Republic Chouvashia	0,364	51	Primorski territory	0,247
12	Kaluga region	0,363	52	Riazan' region	0,246
13	Yaroslavl region	0,354	53	Omsk region	0,246

14	Moscow region	0,352
15	Voronezh region	0,343
16	Oryol region	0,342
17	Mourmansk region	0,341
18	Sverdlovsk region	0,338
19	Kirov region	0,326
20	Stavropol territory	0,319
21	Vladimir region	0,318
22	Republic Mordovia	0,310
23	Khabarovsk territory	0,307
24	Saratov region	0,304
25	Belgorod region	0,299
26	Republic Bouriatia	0,299
27	Tambov region	0,298
28	Kourgan region	0,296
29	Briansk region	0,294
30	Republic Komi	0,293
31	Republic Bashkortostan	0,289
32	Volgograd region	0,286
33	Koursk region	0,281
34	Tver region	0,281
35	Krasnoyarsk territory	0,279
36	Novosibirsk region	0,276
37	Penza region	0,274
38	Arkhangelsk region	0,273
39	Toula region	0,271
40	Republic Sakha (Yakutia)	0,270

54	Vologda region	0,245
55	Ivanovo region	0,243
56	Rostov region	0,243
57	Republic Daghestan	0,242
58	Republic Mariy El	0,240
59	Altai territory	0,239
60	Kostroma region	0,237
61	Irkutsk region	0,237
62	Amour region	0,226
63	Republic Northern Osetia-Alania	0,225
64	Astrakhan region	0,217
65	Leningrad region	0,213
66	Republic Kabardino-Balkaria	0,209
67	Republic Adygeya	0,206
68	Kemerovo region	0,203
69	Republic Khakassia	0,197
70	Republic Tyva	0,191
71	Chukotka autonomous region	0,190
72	Republic Karelia	0,188
73	Pskov region	0,188
74	Kaliningrad region	0,185
75	Krasnodar territory	0,181
76	Jewish autonomous region	0,167
77	Republic Ingushetia	0,108
78	Republic Altai	0,108
79	Republic Kalmykia	0,091
80	Chechen Republic	0,063

The Table 3 data allow to identify 3 clusters of the RF regions leading by the values of IPI, ICI and IOI indices. In Figures 1 to 3 corresponding clusters of leading regions are presented.

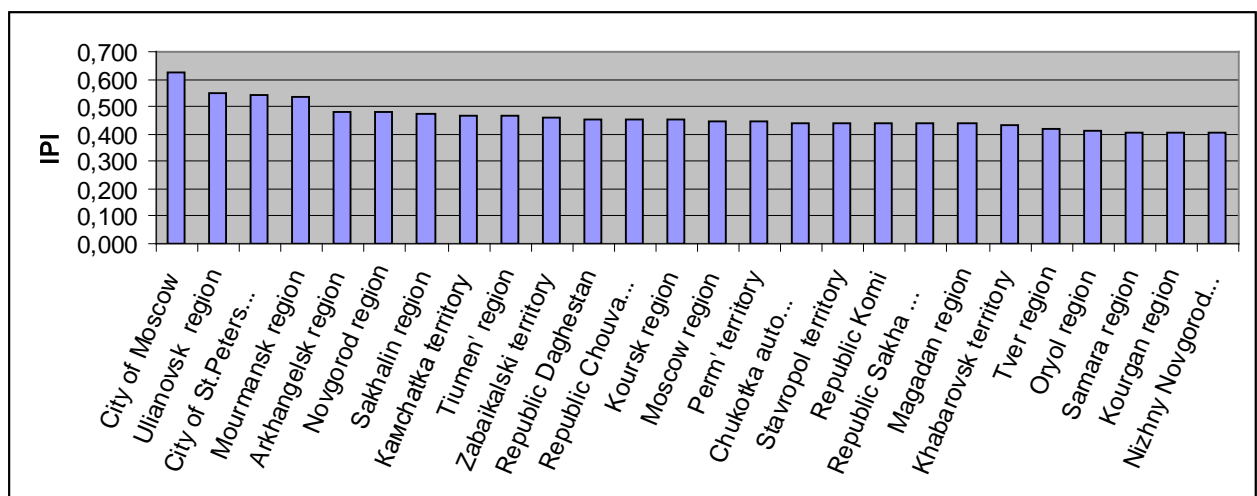


Figure 1. Cluster of regions leading by the innovation potential index, 2008.

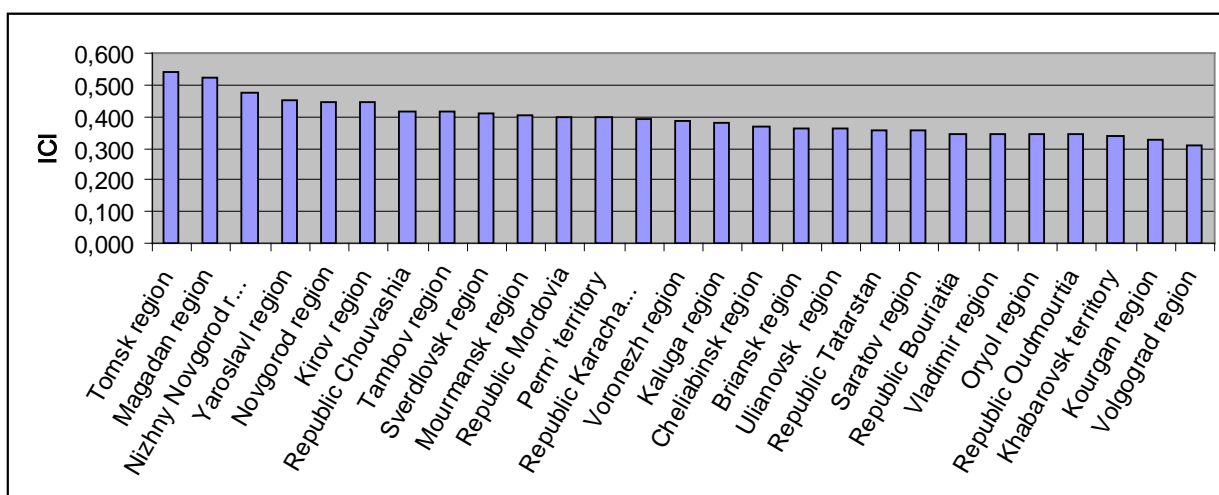


Figure 2. Cluster of regions leading by the innovation climate index, 2008.

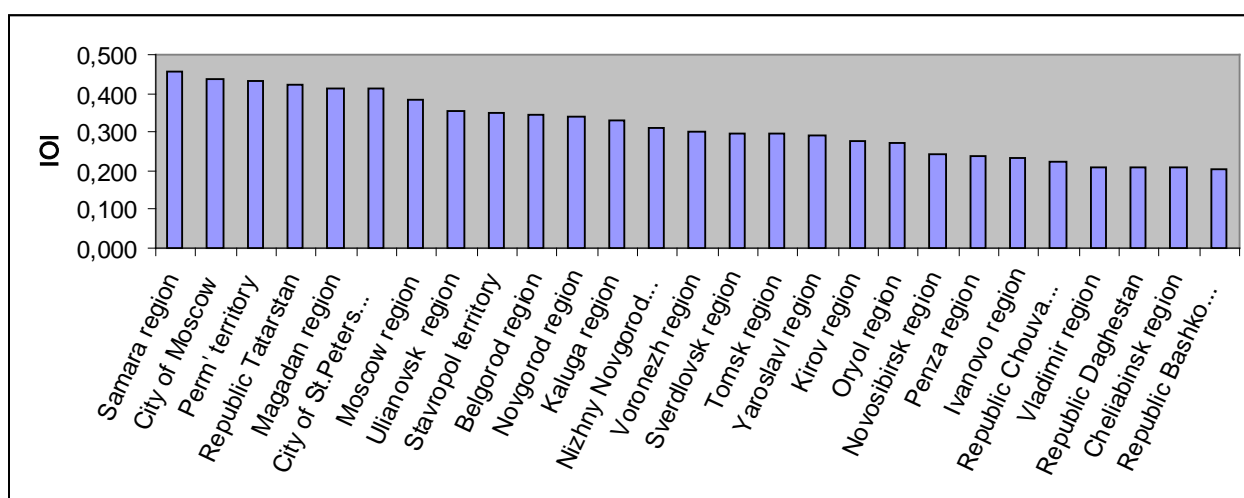


Figure 3. Cluster of regions leading by the innovation output index, 2008.

Comparing European and Russian innovating regions

The indicators system (Table 1) allows to carry out approximate analysis of Russian and European regions at least by three innovation profiles: (1) by the composite level of innovation activity: RSII (Russia) and RII (Europe); (2) by innovation potential: IPI (Russia) and Enablers (Europe); (3) by innovation output IOI (Russia) and Outputs (Europe) (Table 6).

Table 6: Performance characteristics for 5 groups of all European regions

	High innovators	Medium-high	Average innovators	Medium-low	Low innovators
# regions	50	129	62	87	74
# regions 2004	25	63	31	45	37
# regions 2006	25	66	31	42	37
2004 & 2006					
RII	0.672	0.537	0.448	0.360	0.271
Enablers	0.630	0.563	0.431	0.357	0.260
Firm activities	0.746	0.540	0.447	0.328	0.238
Outputs	0.623	0.508	0.466	0.403	0.323

Source: H.Hollanders, S.Tarantola, A.Loschky. Regional Innovation Scoreboard (RIS) 2009. Pro Inno Europe. 2009. p.18

The comparison shows that Russian regions leading by the RSII mainly correspond to European average innovators, Russian regions leading by IPI mainly correspond to European medium-high innovators and Russian regions leaders by IOI mainly correspond to European average and medium-low innovators.

It should be repeated however that the above mentioned correspondence of Russian and European innovating regions can be regarded only as approximate for the following reasons: first, the European RIS 2009 includes data of 2004 and 2006 years and the current Russian study includes data of 2008, second, shortcomings of the Russian official innovation statistics (lack of innovation indicators, no data on innovative SMEs, etc.), does not allow to make the system of Russian regional innovation indicators completely adequate to the European one.

Figures 4 and 5 present the innovation maps of Russia (2008) showing regional performance groups for the Regional Summary Innovation Index (RSII) and regional performance groups for the Innovation Potential Index (IPI) correspondingly.

Russian Federation regional performance groups for the Regional Summary Innovation index

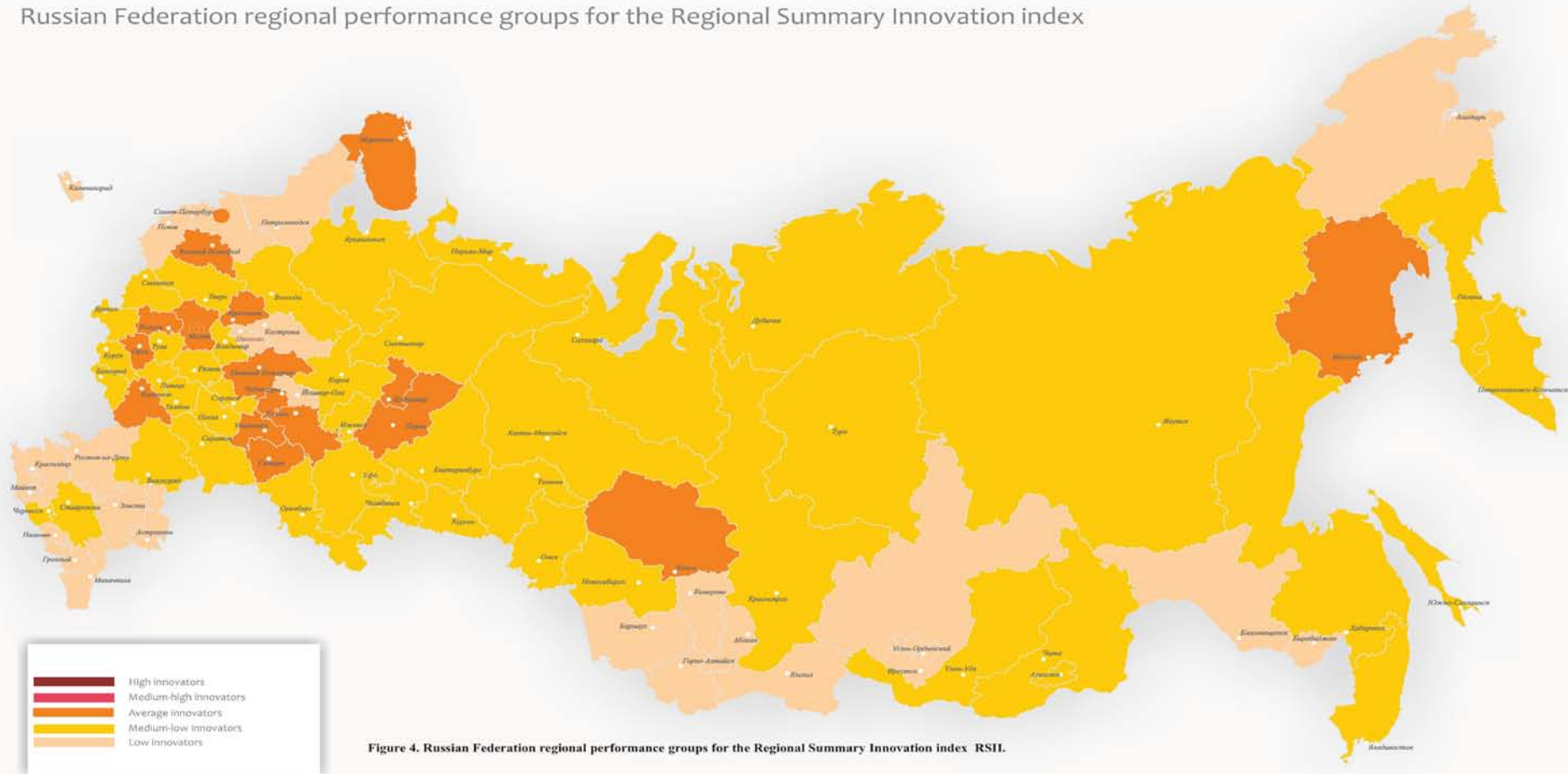


Figure 4. Russian Federation regional performance groups for the Regional Summary Innovation index RSII.

