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The Innovation Subsystem Development Level Evaluation of the Regional Social-Economic Systems

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Abstract: The stusy analyzes the methodological approaches to the identification and assessment of the innovation potential of the regional socio-economic systems. The system of indicators of the region's innovative capacity is formed. The assessment and ranging of regional social and economic systems of Russia on a level of development of innovative potential is carried out.

Key words: Region, social and economic system, innovative subsystem, level of development, ranging

INTRODUCTION

One of key tasks of the state is creating necessary and favorable conditions for intensification of social and economic development, improvement of life quality of the population. Especially sharply this problem is shown in Russia as the Russian Federation is the state with pronounced regional specifics.

A large number of the territorial educations differing from each other in the mass of indicators the number and structure of the population, its density, level of economic development, industry structure of economies, geographical conditions, etc., results in need of the differentiated approach to forming of strategy and tactics of social and economic development management of the Russian territories depending on opportunities and features of each region.

Within this study we, without calling in question the need of balanced and sustainable development of all subsystems, will recognize the fact that modern economic publications, analytical estimates and economic calculations determine the innovative potential as the main and intrinsic component of development of the region and attracting attention public authorities. It is for this purpose reasonable to consider the existing experience of an innovative potential assessment.

MATERIALS AND METHODS

First of all it is necessary to pay attention to the research by Gurie *et al*. (2010) which identify concept of innovative potential with resources of science and education as well as the number of educated citizens, number of scientists, number of higher education institutions, etc. These indicators in dynamics can be used for an innovative potential assessment, however they do not give the complete picture and characterize it only from a forming line item. Innovative potential is a system indicator which should be measured at the level of forming and use. The assessment of innovative potential forming can be based on the available statistical data analysis, on the total value of the scientific organizations, scientific personnel, discoveries, etc. and also on a basis analyses of their dynamics and structure. Use of innovative potential assumes consideration of its functioning results as well as efficiency of its potential use.

The second approach to determining innovative potential which has received the name of inclinational consists in identification of the hidden opportunities of the region for their implementation in the long term (Alekseev, 2009; Vertakova and Alpeeva, 2009; Koveshnikova and Shchepina, 2006; Kulagina, 2012; Menshchikova and Ermakov, 2011; Chushenko, 2014; Kanevsky and Chistyakov, 2005; Moskalyonov and Benner, 2010; Volkov, 2012). It allows to open yet unused opportunities and to find methods for their involvement in innovative development of the region.

Third group of researchers (Gayfutdinova, 2008; Sangadiev and Ayusheva, 2006; Filobokova, 2012 Gerasimchuk and Kutsai, 2010; Lyshchikova *et al*., 2015; Ovchinnikova *et al*., 2015; Nemchenko and Vysotskaya, 2013) holds the opinion that the innovative capacity of the region needs to be considered from two points of view: innovative process and result of this process. At the same time innovative process is understood as

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activities of the region subjects in the field of planning, developments, approbations and implementations of innovations and as result-efficiency of innovative activities of subjects in the region. If the process component of innovative potential assumes fixed maintenance at the competitive level, renewal and growth, then productive component estimates its efficiency, productivity of the region innovative activities use by subjects.

Now the fourth, generalizing approach to determining innovative potential which considers an indicator of innovative potential as a measure of capability and readiness of regional innovative system to provide continuous innovative process (Barmenkova, 2014; Vorontsova and Gubanova, 2012; Makarova, 2011 Markova and Filippova, 2014; Milevskaya, 2012; Palamarchuk, 2011; Sukhovey, 2014). This approach we put in the basis for a technique of evaluation development of an innovative region subsystem that will allow to reveal the most perspective regions of the country, as well as to designate the problem factors constraining development in the lagging behind subjects.

According to this technique, the system of private indicators of innovative capacity development of the region is created and regulation on the following Equation:

$$P = \frac{P}{P_R} * 100 \quad (1)$$

Where:

P = Rated indicator

P = Average value of an indicator in the estimated region

P_R = Average value across the Russian federation

The choice of private indicators is not universal process: their quantity and set depend on research objectives. Besides priority for the solution of some task, its reliability and ability to reflect distinctions between regions can be selection criteria of the used indicators. Rationing of indicators keeps dispersion of indicator values, thus nature of interregional distinctions on separate indicators is reflected absolutely adequately.

Further the ranging method is used, i.e., on each rated indicator a linear row in which regions are equally spaced is formed. Serial number (rank) corresponding to its place in a general series is assigned to each one. The first rank is appropriated to the region with the greatest indicator value. Ranks of regions on separate rated indicators are summed up and the final rank of the region on a innovative subsystem development level is calculated.

RESULTS AND DISCUSSION

Results of average values calculations for statistics of innovative capacity of regions () for the considered period we will display in Table 1. Thus, average value of the personnel number occupied with scientific researches and developments in Russia makes 794967 people. The average of the organizations carrying out scientific researches and developments equals to 3630 units. The average quantity of the used advanced technologies makes 17472 units.

For inventions 1690 patents have been granted on average. The specific weight of the organizations performing technological, organizational marketing innovations in reporting year, in total number of the surveyed organizations, has averaged 10.04%. The average level of costs for technological innovations of the organizations countrywide equals to 872701.4 thousand rubles. The average level of internal costs on scientific researches and developments 589873.3 million rubles. The amount of innovative goods, works, services makes 34942821300 thousand rubles. Important indicator is the number of doctoral candidates and graduate students as fixed care of preparation and education of future scientists and preserving available the major condition scientific and technical and as a result economic progress in the country. The average of doctoral candidates countrywide makes 4240 people, graduate students -142630 people.

In 2014 in Russia 3604 organizations which are engaged in scientific researches and developments worked. In comparison with 2000 total number of the organizations which are carrying out researches and developments has decreased by 12.1% (2000-4099). As for separate categories of the organizations, for the considered period the number of the research organizations was reduced by 37.1% (from 2686-1689), the project and design and survey organizations by 2.7 times (from 85-32), scientific divisions of industrial enterprises for 3.2% (from 284-275) and design offices for 0.3% (from 318-317). This reduction is caused by the policy on optimization of a subordinated network of the scientific organizations which is carried out by the federal ministries and departments. Reforming was carried out by integration or liquidation of those organizations which scientific activity has been almost stopped. The number of the project and design-and-survey organizations performing designing of technologies and occupied with scientific and technical activities directly on production was reduced more under the influence of such factor as low demand for results of scientific and technical activities from real production sector. Both the unsatisfactory financial position of production and

Table 1: Average measure values of innovative potential by federal districts of the Russian federation

Variables	Central federal district	North-West federal district	South federal district	North caucasian federal district	Volga federal	Ural federal district	Siberian federal district	Far East federal district	Crimea federal district
The number of employees engaged in research and development, people	386117	98026	26885	6654	116036	44136	53784	13311	2464
Expenditure on technological innovation of organizations (ths. rub.)	273518.80	90874.50	35251.10	5368.10	220952.20	111241.40	95683.40	39760.30	258.4
The volume of innovative products, services (ths. rub.)	792,902,200	275 607600	74259800	27697200	917 338500	159319400	118052400	297020900	158200
The number of organizations and engaged in research development, units	1386	516	272	97	575	227	425	167	20
Domestic expenditure on research and development (ths rub)	319736500	81275200	16422100	3039900	85965700	33560800	38971700	10566900	779300
The number of doctoral students, persons	1473	672	361	140	663	205	607	76	15
The number of postgraduate students, persons	58134	18435	9855	5044	21971	9922	16922	4273	623
The number of issued patents (units)	631	144	214	95	238	147	65	55	1
Used advanced technologies (units)	3330	1418	1207	492	4055	5078	1158	650	85
Innovative activity of organizations (%)	9.98	8.44	7.06	6.74	12.19	9.8	8.92	12.23	8.15

incompleteness for commercial use of scientific and technical developments is the reason for low level of demand. However, despite the general reduction of the organizations number carrying out scientific researches and developments, the number of experimental plants in 2014 has increased by 1.6 times in comparison with 2000 (from 33-53). The quantity of the higher educational institutions which are engaged in scientific researches and developments has increased by 1.8 times from 390 in 2000-700 in 2014.

Considering the scientific organizations by federal districts, it should be noted that their developed placement on the territory of the country is characterized by unevenness and on higher degree it is pro rata to the economic capacity and concentration of the organizations and entities of different types of economic activity in regions. So in 2014 in the territory of Central Federal District there were 1313 organizations which are carrying out researches and developments or 36.4% of the scientific organizations total of the country. At the same time only in Moscow 709 organizations or 19.7% of the organizations total carrying out researches and developments are placed. This tendency of placement is observed for rather a long time.

On the basis of the carried-out analysis we can conclude that the federal districts of the Russian Federation are characterized by regional and interregional fluctuations of conditions of the scientific and technical sphere essential inside. Central federal district (36.4% of total quantity of the organizations carrying out researches and developments) the strongest innovative subsystem proportions are observed, then the Volga federal district 17.2%, Northwest 12.9%, Siberian 11.8% and Ural 6.6%, Southern 6.5%, Far East 4.7% followed by North Caucasian 3.2% and Krymsk-0.6% federal districts.

It should be noted that during 2000-2014 practically in all regions the number of organizations carrying out researches and developments was reduced. There was most reduction of the organizations of this type in Northwest federal district, their number was reduced by 25.7% (in St. Petersburg by 36.0%), Central by 19.5% (in Moscow by 21.8%) and South by 11.9%. The number of the organizations in Siberian federal district was to a lesser extent reduced by 8.6%, Ural by 6.3% and Volga by 0.6%. In North Caucasian and Far East federal districts the number of the scientific organizations has increased by 58.1 and 8.3%, respectively. This increase became result of the state support programs and development of these regions, creating of the largest HEI on territories of the North Caucasian Federal University and Far Eastern Federal University. These educational institutions are not only blacksmith shop of highly professional personnel but they also perform activities for developing innovative infrastructure, supporting innovative projects and creating the small innovative enterprises.

The structure of social and economic development innovative subsystem indicators of the Russian macro regions is provided in Table 2.

Table 2: Rated frequent indicators of innovative potential (%)

Variables	Central federal district	North-West federal district	South federal district	North caucasian federal district	Volga federal district	Ural federal district	Siberian federal district	Far East federal district	Crimea federal district
The number of employees engaged in research and development	48.6	12.3	3.4	0.8	14.6	5.6	6.8	1.7	0.3
Expenditure on technological innovation of organizations	31.34	10.41	4.04	0.62	25.32	12.75	10.96	4.56	0.03
The volume of innovative products, services	32.2	19	9.2	3.5	14.3	1.3	10.5	5.8	4.2
The number of organizations engaged in research and development	38.2	14.21	7.5	2.66	15.83	6.25	11.7	14.6	0.55
Domestic expenditure on research and development	54.2	13.78	2.78	0.52	14.57	5.69	6.61	1.79	0.13
The number of doctoral students	34.73	15.86	8.51	3.31	15.63	4.84	14.32	1.79	0.35
The number of postgraduate students	40.76	12.93	6.91	3.54	15.4	6.96	11.86	3	0.44
The number of issued patents	37.34	8.57	12.66	5.6	14.11	8.7	9.76	3.25	0.01
Used advanced technologies	19.05	8.12	6.91	2.82	23.21	29.06	6.63	3.72	0.48
Innovative activity of organizations	11.91	10.12	8.45	8.07	14.61	11.75	10.68	14.65	9.76

Table 3: Ranging of SES innovative potential development indicators of the Russian federation federal districts

Parameters	The no. of employees engaged in research and development	Expenditure on technological innovation of organizations	The volume of innovative products, services	The number of organizations engaged in research and development	Domestic expenditure on research and development	The no. of doctoral students	The no. of postgraduate students	The no. of issued patents	Used advanced technologies	Innovative activity of organizations	The overall level	The final rank
Central federal District	1	1	1	1	1	1	1	1	3	3	14	1
North-West federal District	3	5	2	3	3	2	3	6	4	6	37	3
South federal district	6	7	5	5	6	5	6	3	5	8	56	6
North caucasian Federal district	8	8	8	8	8	7	7	7	8	9	78	8
Volga federal district	2	2	3	2	2	3	2	2	2	2	22	2
Ural federal district	5	3	9	6	5	6	5	5	1	4	49	5
Siberian federal district	4	4	4	4	4	4	4	4	6	5	43	4
Far East federal district	7	6	6	7	7	8	8	8	7	1	65	7
Crimea federal district	9	9	7	9	9	9	9	9	9	7	86	9

According to the performed calculations, in the Central federal district prevalence of over other districts on all indicators, except for use of advanced technologies and innovative activity of the organizations is observed. At the same time it should be noted that the largest weight in structure of innovative capacity of the Central federal district has the number of personnel occupied with research and development and internal costs on scientific researches and developments. Besides, the Volga federal district in which structure the number of the personnel occupied with scientific researches and developments also prevails has the high level of innovative potential.

Speaking about spatial fluctuations of innovative capacity development of the Russian districts by this moment, on one hand, leading regions (The Central, Volga and Northwest federal districts) which are characterized by rather high level of innovative development and on the other regions outsiders (The North Caucasian and Crimean federal districts) were formed (Table 3).

CONCLUSION

The conducted research allowed to determine the district standard by each indicator, as well as to determine which districts develop intensively and which lag behind on an innovative subsystem development level.

IMPLEMENTATION

Stimulation of innovative activities requires implementation of complex measures, performed at the level of state bodies, basic of which are:

- Increase of an innovative complex efficiency, accomplishment of applied researches, development and finishing them to the result suitable for practical use and implementation in the market
- Creation of the innovative environment providing implementation of scientific and technical-and-innovative developments and technologies in applied industries and production of the knowledge-intensive competitive products
- Forming of development strategy of the innovation-active territories, special economic zones of technology development type
- Support of forming and development of regional innovative clusters

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