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INNOVATIVE COMPETITIVENESS OF RUSSIAN REGIONS[1]

The article analyses the competitive challenges of Russian regional economies and proposes ways of selecting competitive priorities. The author assumes that selection of priorities for improving a region's innovative competitiveness should involve not only its innovative R&D potential but also the effects that innovative and socio-economic development of the regions have on each other. This is because a region's innovative competitiveness manifests itself in both its ability to create innovation and its increased resistance based on such innovation, and, therefore, it is closely related to its industrial and technological type from the outset.

The analysis of research and innovative potentials of Russian regions shows that their innovative competitiveness has been deteriorating largely for the reason that modern Russia lacks any significant groups of political influence whose interests would be closely related to the development of the engineering industry, high technologies, and restoration of a sound industrial structure. The article shows mutual dependence between the socially required level of support to the regions' innovative competitiveness and the innovation requirements of the industries with prevailing levels of technological efficiency.

The author proposes a methodological approach to the selection of priorities for increasing the innovative competitiveness of Russian regions. Such priorities should take into account maintenance and enhancement of the research and innovative potentials of the country, on the one hand, and the need to improve regions' sustainability, on the other hand. With the contemporary statistic base in mind, the author has created an integrated development priority index for regional innovation centers intended to increase the resistance of the manufacturers with various research intensity levels. The article rates Russian regions according to the technological complexity (high, mid, low, resource-extracting) required by the innovation centers to be created taking metallurgy as an example. The author suggests ways to increase the innovative competitiveness of Russian regions of various industrial and technological types.

The article is intended for experts in theoretical and practical management of innovation.

Keywords: innovative competitiveness, regional innovation system, region's industrial and technological type

Introduction

The aggravated international situation and devaluation of the ruble at the turn of 2014 and 2015 have again highlighted Russia's need to restore its own processing industry and to increase the competitiveness of Russian goods, first of all, by their technical and technological properties. This objective requires a proper environment that would boost innovation, which being a part of the general public production, serves to create opportunities for technical improvement and further technological development of socio-economic systems. Further globalization makes a significant contribution to the role that innovation factors play in the internal sustainability of country and regional economies [1].

It appears that one of the key notions in the development of methodological principles of selection of areal priorities for creating a feasible innovative system in Russia in the context of its diversified industrial and technological landscape, quality of the human potential and the existing challenges of socio-economic development is the concept of a region's innovative competitiveness.

Relevance of Research on Regional Innovative Competitiveness in the Context of Creating a National Innovation System

Unfortunately, commodity markets and high oil prices have been heavily discouraging the country's innovation system over recent decades [2]. Authorities' sporadic initiatives to support innovation, such as high-tech parks, special economic zones for technical innovation or innovation venture foundations, etc. are still pending. Innovation facilities that were created on foundations set up as long ago as during the Soviet era are underdeveloped and stagnating. For instance, according to the

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FRCPECS statistical digest[2], the key innovation indicators of the Russian naukograds (science cities, such as Dubna, Korolyov, Obninsk and other cities formerly well known for their innovations) coincide to one decimal place with the average for Russian manufacturers and service providers. Specifically, innovator shares in the total number of analyzed Russian naukograds are only 9.1%, and the shares of innovative goods in the total volume of shipments made-up by innovators are 15.1%. The reason is not only that the government is constantly under-financing these projects and that their budgets are minimal (though this is absolutely the case as well), but, primarily, this is due to the decision makers' long lasting focus on a Russian resource-oriented economy, and consequently their lack of interest in any innovation or reproduction of research and engineering staff in the country [3].

Table 1 shows that Russia has fallen far behind the majority of Western Europe both by quantitative and qualitative indicators of innovative activity. Our advantage over the United Kingdom in terms of the amount of innovative goods in the total volume shipped to Russia can only be explained by different understanding of what is new (new for the Russian market but old for the British or the global market). We can clearly see it by comparing the amount of technological exports (the United Kingdom exports 70 times, and France 15 times as much as Russia). This meager volume of technological exports is a direct consequence of the country's degraded research and innovation spheres.

Table 1

Innovation activity indicators of Russia and some European countries (as of 2012 or most recent years where data is available)[3]

Country	Newly implemented or significantly modified innovative goods, works, services, % of the total amount of goods shipped, works, services performed			Revenue from export of technologies, bn USD	Payments under import of technologies, bn USD
	Total	incl.:			
		new for the market	new for the organization, but not for the market		
Russia	5.6	1.3	4.3	0.7	2.0
Austria	11.9	5.1	6.8	9.2	5.5
Belgium	12.4	6.0	6.4	12.6	10.5
UK	5.2	1.4	3.8	49.2	27.2
Germany	15.5	3.7	11.8	61.1	53.1
Spain	19.0	8.9	10.1	9.9	9.0
Finland	15.3	8.4	6.9	10.8	8.0
France	14.8	3.5	11.3	5.2	3.2
Sweden	8.3	4.2	4.1	20.9	11.5

Russian innovation is currently dominated by foreign technologies (77% of implemented or significantly modified innovative goods are the goods that are new to the company but not new to the market). However, the assimilation of foreign R&D achievements is extremely suppressed as well; payments under import of technologies only amount to USD 2 bn.

The figure shows that Russia has never used its opportunities that appeared after the 1998 default to create an innovative manufacturing sector. Rosstat's most recent available (2013) official data shows that Russian expenses on technological innovation only amounted to 2.7% of the total shipments in Russia and in the Ural Federal District only to 1.8%.

The share of innovative goods in the total volume of goods shipped, works and services performed in the Ural FD over the relatively favorable period of 2000–2006 displayed growth, albeit extremely slow (from 2 to 3%); however, the economic crisis that followed suppressed even these slight innovative developments. The overall Russian situation, at first glance, seems to be more positive: according to Rosstat, the share of innovative goods amounted to 9.2% as of 2013. However, the in-depth analysis shows that this happened largely due to increased government investment in the defense and aviation industries, and a number of oil and gas export expansion projects. Also note that about 10 to 20% of reported increment of use of innovation in Russia is fraudulent, as the numbers include the goods

[2] Russian Science in Numbers. 2013: stat. digest. Moscow, FSBSI RDI FRCPECS, 2013 p. 102, 121.

[3] Compiled from: Innovation Activity Indicators. 2014: stat. digest. Moscow, NRU HSE, 2014. p. 455, 457; Indicators of Research. 2014: stat. digest. Moscow, NRU HSE, 2014. p. 394.

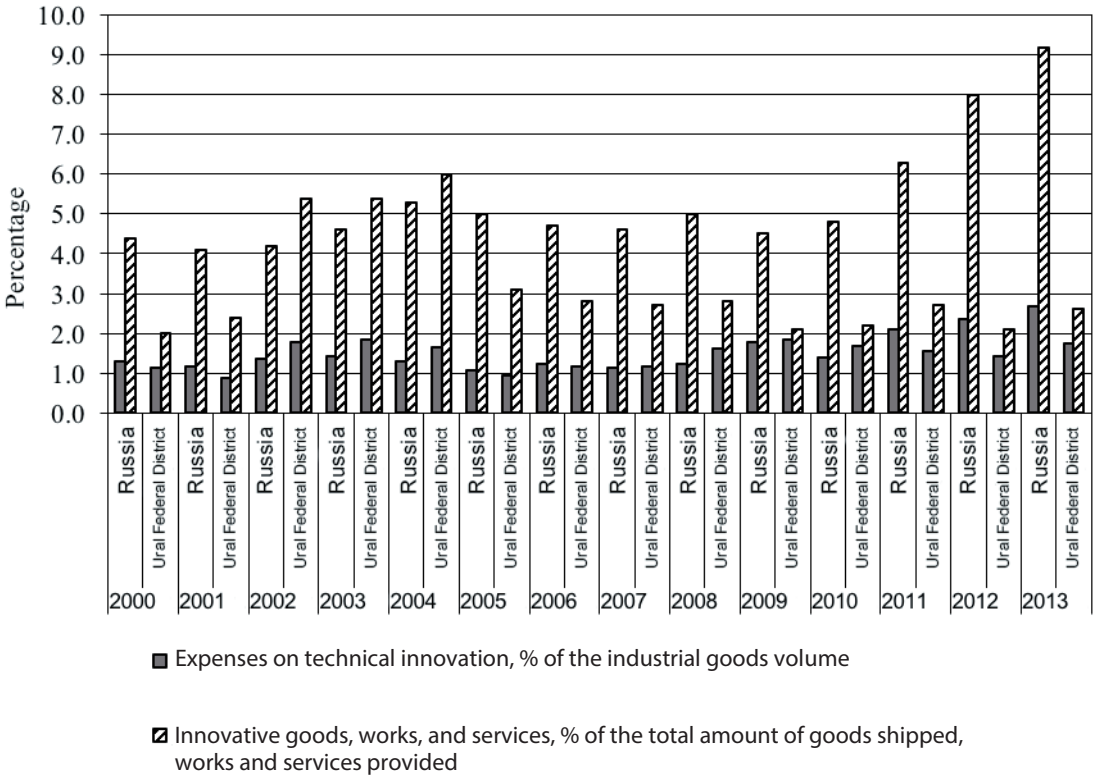

Fig. *Innovative trends of industrial production in the Ural Federal District and in Russia in general (compilation of the data from Rosstat's Socio-Economic Indicators of Russian Regions, annual statistics digests for 2001–2014)*

whose production has long been routine but pro-forma classified as innovative (new to the company but long in extensive use by other companies; or known to the company but produced with upgraded or more advanced equipment; the latter being most typical of resource extracting sectors). This accounts for the phenomenon that, according to Rosstat, the third Russian region by the amount of innovative goods produced is Sakhalin Region, where, relying on the reported numbers, the share of innovative goods, works and services amounts to 57.8% of the total volume[4], which is significantly higher than that of the so-called developed countries.

The recent default, given qualitative changes in the economy over this period, far gone degradation of the processing sector and the resulting absolute dependence of all national manufacturers on foreign technologies and components, will have a much deeper impact and can, unless the government takes adequate action, cause abrupt destruction of the production industry of the country. Remediation of the current situation requires that decision makers shift from dominating ad hoc management to creating a reasonable state policy in the long term intended to improve the welfare of people and ensure the country's economic independence. This is the only framework where the government can set a viable innovation system as one of the major goals in rehabilitating the national environment with the relevant efforts and expenses becoming feasible on the national scale.

The creation of an innovation system is one of the most challenging objectives of areal development management, especially for Russia with its regions that are extremely diversified by resources, opportunities for various types of production, and people's quality of life. As for the innovation component of development, regional differences are significant. Suffice it to say, the median share of those employed in R&D across Russian regions as per 10,000 employees currently amounts to only 30 people, with the maximum of 357 people, and the share of expenses on technological innovations is RUB 51 k and RUB 1.1 m (as calculated by the author).

Furthermore, note that apart from the significant regional constraints on innovative development with regard to its scale and quality, various industrial types regions (as the author commented in a recent article written together with A. F. Sukhovey [4]) markedly set different requirements to the development level of innovation systems which is due to the specific features of the leading manufacturers of the

[4] Russian Regions. Socio-Economic Indicators. 2014: stat. digest. / Rosstat. Moscow, 2014. p. 735.

region and their competitive dependence on innovation. That means that the development level of an innovation system socially acceptable to support sustainable regional development is largely determined by the current production structure and its adjustments that are presumably feasible in view of the current changes on the global manufacturing scale, employment issues, and improvement of human potential.

Therefore, the ideal innovation system should be initially linked to current area development plans, and its construction should be anticipatory as accumulation of innovative potential in society is highly complex and slow. Certainly, this by no means should eliminate spontaneous bursts of innovation like Silicon Valley that often introduce radical changes to the habitual economy. However, as occasional discoveries are only typical of skilled researchers and developers, the more cultivated should be the ground for innovative businesses to boom. Such a boom requires a proper social environment to raise and educate talents and foster an environment that favors the business ambitions and requirements of talents.

In view of the above, a sustainable innovation system is a priority that is impossible to achieve if we ignore the obvious fact that Russian economy, as noted by Acad. A. G. Granberg, is not a monolith but a multi-regional organism whose functionality is based on vertical and horizontal interaction being part of the global economic relationships [5].

In the context of the specific features and challenges of development of innovation activities in the country [6], the economic need for upgrading, and the global experience in building up national innovation systems [7], general principles that should guide government's policy for building Russian innovation system might be as follows:

— Actualize, maintain and support R&D potential of the regions with traditional research and innovation institutions;

— Encourage interaction between researchers and businesses and create technology transfer channels within and between regions;

— Generate innovative environment for continuous upgrade of basic production facilities of Russian regions and diversification of production and services in the context of global trends in research and development;

— Use innovation to mitigate the social disparity between regions, including by way of creating new innovation centers in Russia as required for successful and sustainable socio-economic development of the country in terms of its area and changing geopolitical realia;

— Expand regional and municipal authority and budget headroom with regard to climate management investment;

— Assist in human resourcing of innovation processes and building people's innovation awareness.

We have yet to try and test relevant methodologies of applying these principles to solving practical issues of innovative development management of the regions in the context of Russian social and economic realia.

As a matter of actual practice, the government is considerably spontaneous in selecting its support priorities in view of the remaining Soviet era centers with rather high, by Russian standards, research and/or in activity and lobbies [8]. Apart from failing to be advantageous, this approach, especially in crisis, threatens with the accelerated decay of innovative R&D potential beyond "privileged" regions. According to the author's calculations, while R&D personnel in Kaluga Region decreased by 11.4%, in Moscow—by 14.3% (which is alarming per se) over 2000–2013, Sverdlovsk Region experienced a 24.3% drop, Yaroslavl Region—33.6%, Samara Region—35.3%, and Kemerovo Region—41.1%. These trends sabotage the competitiveness of regional manufacturers, many of which are involved in strategic security and restoring the country's manufacturing sector; given slow recovery of innovative human resources, this sabotage is going to have a long lasting effect.

In this respect, one of perspectives for the development of decision-making methodologies with regard to innovative management is an enhanced study of the phenomenon of innovative competitiveness of a region as a specific phenomenon of innovation economy created by the synergy of innovation and production factors. In view of its specific socio-economic features, the concept of regional competitiveness allows us to analyze the development of regional components of the national innovation system in close connection with the perspectives of increased sustainability and efficiency of development of particular local communities. Such an analytical approach to regional innovative development gains even more importance in the context of accelerated globalization and emerging

globalization which brings together companies' global businesses and cooperation within local economy (cluster) [9].

The Concept of Innovative Competitiveness of a Region

Regional innovative competitiveness as an individual social and economic phenomenon with a significant impact on the welfare and development perspectives of local communities took shape in the last quarter of the 20th century. This is a result of general qualitative changes in the global economy influenced by IT and closer involvement of the world's countries in innovation and globalization.

Regional innovative competitiveness is attracting attention of more and more researchers as the subject of their research work and discussion. However, the term itself has not been properly defined yet and needs further elaboration.

For instance, A. Yu. Davankov and M. V. Usynin [10] give a comprehensive description of the factors that affect innovation processes in a region, but they define innovative competitiveness of a region as "a region's position on competitive markets as defined by the capacity to efficiently apply innovation results to increase social welfare." That means they focus on the application of the results of innovative activity. As is known, it is exclusive innovation, not assimilation, that usually ensures maximum competitive advantage to local economy. Furthermore, there seems to be no practicable way of extracting the part of general competitiveness that results from a region's ability to use innovation, no matter how efficient it might be.

L. N. Safiullin and A. A. Pikulev [11] define innovative competitiveness as "the ability of regional economic entities to set up regional innovation-based competitive advantages in a competitive institutional environment, innovative system and infrastructure provided by regional authorities." This definition, following a western world approach to the management of regional development, focuses on regional authorities as actively involved setting up an innovative environment. However today, Russian regional authorities have the extremely limited power to create a favorable environment for it. The reasons for such limits are discussed in [12]. Suffice it to say, Russian manufacturers' innovation expenses as of today are only covered by 64.3% by own funds, 6.3% by the federal budget, 0.5% by foreign investment, and only 0.2% by regional budgets.[5] The idea of defining competitiveness through the ability to create competitive advantages does not seem reasonable either.

Note that, in terms of methodology, innovative competitiveness of an area can only be a reasonable subject of discussion within the concept of non-price competitiveness based on innovation ideology. This approach was suggested and promoted by M. Porter who was able to prove that national welfare is created rather than inherited, and that it depends on national industry's ability to upgrade and renew [13]. M. Porter and his followers' research had a positive impact on government policies of developed and developing countries and promoted social institutions that ensure consistent regulation of accumulation, actuation and reproduction of innovative potential.

Today, the non-price approach underlies practically every definition of competitiveness used in global practices of managing regional development. There is still a certain difference between the American and European economic schools as to what regional competitiveness is, the difference is due to their different cultural and historical backgrounds. The USA, for instance, and some other countries and international organizations define competitiveness with more emphasis on the ability to produce goods and services that comply with international market requirements [14]. Note that this ideology also underlies the Global Competitiveness Index used by the Global Economic Forum (authored by X. Sala-i-Martín) [15], where the main criteria that defines a country's competitiveness is its ability to ensure GDP growth, which the authors believe to be the main indicator of welfare [16].

EU policies require that the primary focus in solving regional competitiveness issues be the human itself rather than human as an instrument. This view is shared by many European types of research, particularly, in France [17]. This basic provision was once included in the Lisbon Strategy (albeit in an excessively idealistic way) and is implemented today with certain amendments that provide for a tighter connection of strategic mechanisms and priorities to present day economic realia, as provided for in EU's Europe 2020. A European strategy for smart, sustainable and inclusive growth, issued in 2010 [18].

[5] Russian Annual Statistics 2014: stat. digest. / Rosstat. Moscow, 2014. p. 502.

This position reflects the understanding that a higher GDP is not the absolute prize, whether for a country or a region; and that maintenance of a region's competitiveness, in the long run, should take into account the factors that generate GDP, the way it affects the welfare of various social groups, natural resources and environment, etc. This approach defines a region's (or country's) competitiveness as its ability to supply global demand for goods and services, at the same time, provide sufficiently high and sustainable income for those employed. In other words, competitiveness, when applied to areas, is regarded as an integral property of local communities' capacity of sustainable welfare and existence.

This understanding of competitiveness can provide significant assistance in defining a region's innovative competitiveness, as it provides a proper insight in the region's competitiveness as such and, to greater extent, accords with personal creative nature of assimilation, augmentation, and dissemination of knowledge and creation of innovative goods and technologies based on them. Of course, in view of the current social situation in general and, in particular, the research and development environment, this kind of approach might seem premature for Russia. Nevertheless, no rehabilitation of the country, including its economy, seems possible without humanizing the ontological grounds of life of Russian society or consistent elimination of the destructive ideologies inherited from the Soviet and Perestroika era. As the protagonist in M. Bulgakov's famous "The Heart of a Dog" said: "Ruin is in the mind, not in the lavatory." In this respect, Russian state management must re-focus on laying down the grounds for the welfare of particular citizens living in particular territories maintaining unconditional respect to human personality, no matter where the person is on the social scale—this is a critical objective that opens the door for Russian to evolve from what it has become, including in terms of research and innovation.

The definition of the concept of innovative competitiveness should also take into account the main regularities of the rise of development and the reproduction of innovation processes and innovation functions in providing the sustainable existence of local communities. This is because long-term innovative competitiveness of large territorial entities must be able to both create marketable innovations and accept waves of innovations to all spheres of life (no matter where such waves are generated: in or out of the region), which is an essential condition for maintaining and enhancing region's internal capacity for technological development and structural economic reform in line with global trends and innovation challenges.

In other words, innovations created and/or sold in a region over a period are by far not only factors that define the innovative competitiveness of a region; more importantly, it is defined by the quality of the regional innovation system, primarily, its capacity for creating a proper environment and encouraging people to keep learning throughout their entire lives, business involvement in innovation processes, availability of channels for transfer of new knowledge and technologies, development of relationships between various contributors to the innovation, etc.

Lack of the environment and stimuli for active interaction and exchange of knowledge and technologies between businesses involved in production of goods and services of various research intensity will inevitably result in isolated hi-tech sector, fewer opportunities for the accumulated potential to boost other economy sectors and, consequently, accruing technological degradation of the latter.

We are still experiencing the consequences of this kind of strategy that was implemented in the USSR: we were the first to reach outer space but failed to produce high-quality domestic appliances, cars, and other everyday goods. As of today, Russia exports 210,000 metal cutters, including 700 machines to non-CIS countries, but imports 845,000 machines, which is 4 times as many; 99% of them being from non-CIS countries. We export 6,100 tractors (of which 92% is to CIS), and import 79,000 (13 times as many), mainly, of course, from non-CIS countries (58,300).[6] There is no need to show the statistics for light vehicles: just go out and look at the streets of any Russian city or town. As for the foreign trade in computers and mobile devices that are an integral part of our life, Rosstat provides no data for these positions (either because Rosstat does not find it proper to classify these goods essential for Russia or to avoid discouraging their fellow countrymen), however, the disaster is obvious. The new development strategy of innovation system should by all means avoid this mistake; otherwise, we will never resolve our import substitution issues.

[6] Russian Industry. 2014: stat.dig./ Rosstat.—Moscow: 2014.—p. 207, 313.

Given the above information, we suggest defining the innovative competitiveness of a region as its capacity for creating, promoting, and accepting innovative technologies, goods, and services that comply with the requirements of global hi-tech markets, thus ensuring sustainable increase of the living standard and improvement of region's technological landscape.

By technological landscape we mean a generalized description of the region's existing engineering and technological mode of life and economy. Such a landscape is shaped by a region's technological level and goods and services production structure, prevailing types and methods of economic activity, level of sophistication of its life support systems, transport and communications, their development, diversity, security and comfort, household, medical, educational equipment etc.

Substantiation of the Priorities of Increasing the Innovative Competitiveness of Russian Regions

Priorities of increasing the innovative competitiveness of regions in Russia should take into account both the accumulated research and development potential, and the specific features of interaction and mutual dependence of region's socio-economic and innovative developments. This is because the innovative competitiveness of a region, where it is defined by the ability to create novelty and, therefore, increase the region's resistance, is closely connected with its engineering and technological type.

Production facilities of various technological levels have different requirements for the state of the region's innovation system, and, sometimes, to its ability to exist in the area (the latter being attributable to the hi-tech sector). At the same time, they set certain restrictions for innovation in the region explained by their needs for innovation and structure of demand. For example, while a group of hi-tech production facilities require their own exclusive developments and technologies, constant involvement in joint breakthrough projects with research and development organizations, upstream industry can support innovation as little as is necessary to stay in the technical mainstream of its sector, and, given their real need for maintaining innovative susceptibility, their main interests vested in mid or low level of technical novation. That is why, a drop in the hi-tech sector share of the production structure for any reason inevitably aggravates the quality of innovation [19], and such trends being lasting over a long period, gradually suppresses innovation, research, and educational potential of the area, what we have to observe in this country.

That said, a region's research potential, by nature, cannot help manifesting itself in the sphere of innovations and can become a source of new perspective research-intensive businesses per se. But this potential is very sensitive to the socio-economic environment, and long lasting research-unfriendly environment can boil down to a substantial loss of human resources that can only be restored over decades given a natural succession of a generation. Today, in the environment of extensive research exchange, these consequences occur fairly soon.

The analysis shows that over the recent decades Russia has been experiencing a constant shift of innovation vector from hi-tech sphere to downstream industry, a situation that can hardly maintain any potential for future development of the country. Current share of expenditures on technological innovation of hi-tech and mid-tech facilities is much less than in oil and gas extraction industries (engineering, 9 times less; production of electrical, electronic and optical equipment, 2.6 times less). Over the years 2005 through 2013, the cumulative total of expenses on technological innovation in extracting processing industries, production of power, gas and water amounted to about RUB 900 bn at 2000 values, of which 15% were invested in natural resources extraction, 14% in production of gas carbon and oil products, 18% in metallurgy. Production of transport vehicles, including assembly units of foreign automobile concerns, only received 11% of the total expenses on innovation in the industry, and machinery and equipment production (mainly, the domestic sector by the origin of the assets) only 3% (as calculated by the author based on Rosstat data). Given that the more research-intensive a particular business is, the more important the factors are that ensure competitiveness, current abnormal situation and its adverse effect on national economy become even more so obvious.

In the context of regional profile, national innovation rating is not dominated by the regions with traditionally research-intensive production and high R&D staffing, as required to maintain and develop national cultural and, consequently, innovative potential, but rather by the areas specialized in oil and gas extraction and/or involved in expansion of oil, gas and petrochemical products and construction of supporting engineering facilities. Rosstat's most recent available (2013) official data show that the

largest funds on technological innovation per 10,000 employees were allocated in Leningrad Region, followed by (in decreasing order): Sakhalin Region, KhMAD-Yugra and Krasnoyarsk Territory. The region that ranks the first by specific volume of innovative goods, and per 10,000 employees, is Sakhalin Region (RUB 11 m), well ahead of Arkhangelsk Region (RUB 2.2 m), and Tatarstan (RUB 1.8 m). After the take-over of some areas of Moscow Region, the City of Moscow was able to move from the top-30 to the 6th place; Nizhny Novgorod Region ranks in 7th place (RUB 1 m), Sverdlovsk 15th (RUB 0.5 m), and Kaluga is as far behind as on the 23rd place (RUB 0.3 m). As a result, despite it being rather high, even in a down economy, the average annual growth of expenses on technological innovation (14% in general across manufacturing industry over 2006–2013), fundamental deterioration of national innovative competitiveness has only been accruing.

Russia's perspectives for maintaining its ability to create and accept innovation, the fundamental differences in the nature and quality of regional innovation, largely affected by the existing production structure and their role in successful national development require that Russia shift to building up its innovation system on gradual, step by step on a multi-level basis.

The definition of the development level of Russian innovation systems and substantiation of the strategy for increasing their innovative competitiveness should involve assessment on two levels: a) assessment of innovative competitiveness compared with regions (countries), globally recognized leaders in the same or similar industry. This group of assessments is extremely important to create a clear view of the actual lag of the innovation component of socio-economic growth, existing problems, and scale of the tasks that require solution, in order to reach an acceptable, in global terms, development level of the innovation system. b) assessment of their innovative competitiveness compared to other Russian regions of similar industrial and technological type. These assessments shed light on the comparative advantages and weaknesses of a region as a contributor to the multi-level national innovation system. In particular, they can be used as an objective criterion to substantiate the priorities and measures of support to Russian regions out of federal funds and programs.

In view of the existing situation and selection of priorities of the future areal architecture of Russian innovation system, the most appealing are the regions of the following industrial and technological types: a) the ones that are focused on developing hi- and mid-tech production facilities of high level (electronics, machinery, pharmaceutics, etc.); b) the ones that have the highest concentration of mid-tech production facilities (metallurgy, oil refinery, etc.); c) resource extracting regions. As has been said, each of these types has its own publicly acceptable development level of innovation system to ensure a sustainable development.

It may be difficult to select global benchmarks as various countries have significant differences in their innovation systems and their approaches to the statistical description of innovation, and Russia has a specific environment for the development of innovation. We should understand that, as a matter of principle, there is no way that it would allow us to theoretically calculate a region's optimum development level of innovation system due to the high complexity of this socio-economic phenomenon. Furthermore, the development level of innovation required for successful development of regional systems will keep growing at a high pace over time due to the general acceleration of technological advancement.

At the same time, with all conventionality of international comparisons, they allow us to make certain evaluations of the actual state of innovative competitiveness of Russian regions as participants of the global economy. For example, the share of organizations involved in technological innovation in the countries with a high share of research-intensive production in their economies is as follows: Germany: 64.2%, Switzerland: 52.3%, Sweden 48.5%.[7] A similar indicator for the Russian leading hi-tech regions is: Moscow: 18.3%, Saint Petersburg: 8.0%, Sverdlovsk Region: 11.5%, Samara Region: 5.4%. The leading mid-tech regions with targets to achieve the levels of China, leader of the global metallurgy market, should target innovation activity at 28.8%.

These figures give substantial food for thought, especially in view of strained issues of import substitution, and prove that the Russian innovation system is impotent and cannot face global technological challenges. As for Russia's shift to innovative development promised by the government from time to time, this shift is impossible without real freedom of enterprise and protection of private property as businesses can only opt in innovation as a major business tool to increase their margin

[7] Innovation Activity Indicators. 2015: stat. digest. Moscow, SU HSE, 2015 p. 446.

in an environment with low corruption of the authorities and high but fair competition between manufacturers.

We should understand there will hardly be any return on minor amendments to innovation law and even on extensive injection of funds in the military sector that the government is making a stack on. As the military sector CEOs noted at a recent meeting in Chelyabinsk Region, these plants' import substitution potential is rather low.[8] The problem is comprehensive, lack of solutions to fundamental issues related to equality before the law and effective protection of human rights, rehabilitation of business environment, banking sector, support to establishment and development of civil hi-tech manufacture etc. makes it hardly possible to seriously improve the situation in a particular innovation sphere.

When it comes to selecting the priorities to increase the innovative competitiveness of regions in Russia in the context of substantiation of areal priorities of building a national innovation system (and establishing such a system in modern globalized world is an objective need for Russia to preserve economic and political sovereignty), such priorities must be based on enhancing and developing the remaining research and innovation potential of the country, on the one hand, and increasing viability of the regions, including strategic production facilities, and formation and development of hi-tech on the other hand.

This is a rather difficult socio-economic task that by nature does not have a single solution. Innovative competitiveness is a versatile phenomenon that can hardly be formalized, especially in terms of development of relationship between research and production, sensitivity of environment to innovation, conformity of locally produced and imported new technologies with best global specimens etc. Certain complexities are related to lagging Russian statistics of innovation which has been stagnating over the recent years due to government's lack of interest in boosting innovation. In particular, we have not set up a state system to account for innovation infrastructure items. As a result, there is no accurate data on their numbers today, not to speak of regularly collected official data that would provide for an objective evaluation of their performance; and in fact if the government allocated funds to development of the innovation infrastructure. However, now that Russian business is adapting to the new environment influenced by the sanctions against Russia and the recent default, it is a bad time for enquiring CEOs with regard to innovation development.

Nevertheless, the present-day statistical base allows us to get a certain view of the top priorities for setting up Russian innovation system.

The author proposes a method of selecting priorities to increase innovative competitiveness that can be used in developing governmental innovation policy on federal and regional levels. The method is based on assessment and comparison of the development level of research and innovation potential of Russian regions and their industrial and technological type given areal differentiation of various types of production that are of highest importance for Russia's economic welfare.

Assessment of an area's ability to carry out innovation activity can involve the author's innovation activity index. It is based on sub-indices of research and development and innovation activity, innovation infrastructure, and innovation-friendly environment as a factor of economic growth. The structure of the indices is sufficiently clear and is based on global practices of forming indices of competitiveness and innovation (e.g., see [15, 19]). The research and development index is based on Rosstat's data on region's number of R&D employees, expenses on R&D, patenting activity; innovation index is based on the information about the expenses on innovation, production of innovative goods, use of new technologies. See more details on these indices in [20]. The index of innovation-friendly environment as factor of economic growth is based on the indicators describing the development level of region's processing industry, including hi-tech sector (by number of employees and production volumes), and development of higher education system. The resulting index is calculated as a weighted average. Weighted coefficients of all sub-indices are equaled to one, except the innovation infrastructure sub-index whose coefficient is equaled to 0.2. As has been said, this is due to poor and insufficiently reliable information on the state of the innovation infrastructure (according to the survey conducted by the author with Ural regional officials, the latter often cite different figures that don't match related to the innovation infrastructure facilities on their areas) and very low performance of these facilities [21].

[8] Dubrovsky called for defense sector to increase import substitution. Manufacturers: There are just no Russian substitutes // znak.com [electronic resource, in Russian]. Available at: http://znak.com/chel/news/2015-03-17/1036884.html.

The calculation results for the top-15 Russian regions by the consolidated index of innovation activity are in Table 2. 2. The table displays that the regions of different industrial and technological types reach high values of this consolidated index due to fundamentally different factors. While Moscow, Saint Petersburg, Moscow Region are far ahead of other regions due to their traditionally high research potential, Leningrad and Sakhalin Regions are ranking high due to procurement of equipment and technologies for oil and gas corporations projects. The latter regional type does not have any grounds for maintaining innovation in the long run; just as they broke through (in 2008, Sakhalin ranked 77th, but in 2009 hit the 2nd), so fast they can fall behind, unless they take prompt measures to enhance internal prerequisites for innovation development. Note that these expenses can hardly be attributed to innovation activity per se, as they are not intended to create new goods or technologies.

Table 2

Russian regions rating by consolidated innovation activity index and development level of production of various research intensity

Region	Innovation Activity Index		Sub-indices				Ranking by level of		
			R&D		innovation				
	value	rank	value	rank	value	rank	hi-tech manufacturers	metallurgy and metal processing	resource extraction industries
Moscow	0.65	1	0.95	1	0.19	13	1	7	3
Saint Petersburg	0.59	2	0.81	2	0.21	10	2	9	4
Moscow Region	0.53	3	0.70	3	0.20	12	3	4	7
Nizhny Novgorod Region	0.42	4	0.52	5	0.28	5	8	8	11
Samara Region	0.41	5	0.34	9	0.28	4	4	11	8
Tatarstan	0.40	6	0.29	11	0.29	3	5	14	6
Kaluga Region	0.39	7	0.47	6	0.20	11	9	26	14
Sverdlovsk Region	0.34	8	0.28	12	0.17	17	6	1	10
Tomsk Region	0.32	9	0.53	4	0.14	22	43	58	15
Perm Territory	0.32	10	0.24	16	0.23	8	7	15	13
Leningrad Region	0.32	11	0.18	24	0.47	2	16	28	18
Chelyabinsk Region	0.28	12	0.26	15	0.15	20	11	2	19
Sakhalin Region	0.28	13	0.08	65	0.72	1	70	69	12
Ulyanovsk Region	0.28	14	0.41	7	0.08	41	18	29	22
Yaroslavl Region	0.26	15	0.27	14	0.16	19	14	32	25

In view of the fundamental differences in the nature of high innovation activity of Russian regions of different industrial and technological types, the quality of their accumulated R&D potentials and regional economic needs for in innovations of various complexity and novelty, selection of priorities of areal innovation policy appears to require that the consolidated indicators that describe the innovation activity level achieved be considered in conjunction with the data that shed light on the industrial and technological types of production facilities that are essential in provision of substantial economic development of Russia in the long run.

For this purpose and given real official Rosstat data, the author has created development indices of Russian production facilities of different technological complexity. These indices are based on the quantity and structure of the employees and the production volumes by types of production in Russian regions in accordance with the same scheme as the innovation activity index.

Given the requirement to enhance Russia's technological safety fundamentals and rehabilitate production structure, on the one hand, and the importance of the metallurgy and oil and gas sectors in Russia's economic welfare, we calculated the development indices of high-, mid-, and low-tech production facilities (taking metallurgy as an example) and resource extractors (low-tech) in Russian regions. Table 2 shows Russian hi-tech leaders in descending order: Moscow, Saint Petersburg, Moscow

and Samara Regions. Metallurgy and metal processing show highest development level in Sverdlovsk Region followed by Chelyabinsk Region. The integral development priority index for Russian centers of innovation activity intended to increase the resistance of various types of production is the arithmetic average of normalized indices of innovation activity and development level of certain type of production in the region. The introduction of weighted coefficients to the resulting formula, given the precision of present-day statistics, does not seem practicable.

Table 3 shows the calculation results for the top 15 Russian regions by priority of developing centers of innovation activity of various technological levels as of 2013. 3. They both help select areal priorities in enhancing innovative competitiveness in Russian in general, and, given the requirement to enhance socio-economic resistance, define preferable properties of regional innovation systems given their research and innovation potentials, and production needs for innovation of particular areas.

Table 3

Rating of Russian regions by the priority of developing centers of innovation activity intended to increase resistance of production of various research intensity levels

Economy Sector	Region	RF ranking 2006–2103	
		2006	2013
Hi-tech	Moscow	1	1
	Saint Petersburg	4	2
	Moscow Region	3	3
	Samara Region	2	4
	Tatarstan	5	5
	Nizhny Novgorod Region	6	6
	Kaluga Region	17	7
	Sverdlovsk Region	7	8
	Perm Territory	8	9
	Chelyabinsk Region	9	10
	Bashkortostan	10	11
	Leningrad Region	23	12
	Yaroslavl Region	12	13
	Ulyanovsk Region	11	14
	Kaliningrad Region	18	15
Metallurgy and production of finished metal products	Sverdlovsk Region	1	1
	Chelyabinsk Region	2	2
	Moscow	3	3
	Moscow Region	5	4
	Saint Petersburg	7	5
	Krasnoyarsk Territory	4	6
	Nizhny Novgorod Region	8	8
	Samara Region	6	8
	Tatarstan	10	9
	Lipetsk Region	12	10
	Perm Territory	11	11
	Kaluga Region	19	12
	Vologda Region	9	13
	Bashkortostan	17	14
	Leningrad Region	36	15

Ending Table 3

Economy Sector	Region	RF ranking 2006–2103	
		2006	2013
Resource extraction	Tyumen Region 1	1	1
	KhMAO-Yugra	2	2
	Moscow	5	3
	Saint Petersburg	8	4
	Kemerovo Region	3	5
	Tatarstan	4	6
	Moscow Region	9	7
	Samara Region	6	8
	YaNAO	10	9
	Sverdlovsk Region	7	10
	Nizhny Novgorod Region	12	11
	Sakhalin Region	61	12
	Perm Territory	11	13
	Kaluga Region	20	14
	Tomsk Region	14	15

As for the existing centers of production of goods and services of various types in Russia, in the interest of maintaining social and economic stability of the country through innovative factors in conditions of the instability, absolute priority should be given to the formation of centers of innovation activity in highest level of high-tech sector areas.. Currently, the top three regions in this group are Moscow, Saint Petersburg, Moscow, Samara and Nizhny Novgorod Regions, and Tatarstan. Taking into account that these regions are going to maintain a significant share in allocation of hi-tech production in Russia due to objective reasons, innovation management in these regions should focus on setting up an environment for the development of an innovation system intended to enhance region's position as an R&D and hi-tech leader. If a region intends to create innovation of high degree of novelty and perfection, it should create an environment that favors fundamental science, encourages innovative MSE to commercialize universities R&D results in a number of ways; it should also solve import substitution issues for key research-intensive products and technologies, provide incentives for R&D and experimental productions under enterprises, assist in setting up technological platforms, etc.

Table 3 shows that major hi-tech production facilities are in old industrial areas. In this respect, Russian areal development is facing the challenge of setting up new centers of manufacturing given present-day geopolitical realia. First of all, this is about industrial complex projects with a significant share of hi-tech production in the Far East as an important component of counteraction to Chinese and Japanese expansion, and in Siberia [22]. Furthermore, we urgently need to update and diversify the production and technological image of the depressed areas, which should also be taken into account in shaping their innovation systems as a mandatory condition that will ensure region's need for technical development.

The innovation systems of the regions with a marked prevalence of low-tech production need to enhance R&D and staffing prerequisites to develop and assimilate latest production technologies and promptly upgrade their production facilities. Additionally, given Russian realia, these regions' innovation systems should focus on setting up prerequisites for the rehabilitation of major monotowns inherited from the socialist era [23].

Sverdlovsk Region is a complex type region: by Russian standards, it has a sufficiently high potential for developing hi-tech economy (ranking 8th, but, at the same time, when shaping factors of innovative competitiveness we should pay no lesser attention, and probably even more, to setting up R&D and human resources factors of developing and assimilating latest production technologies and promptly upgrade of basic production facilities, it ranks first by development of innovation activity centers intended to increase regional resistance in metallurgy and metal processing among Russian regions).

The rating of the regions in urgent need of creating innovation activity centers intended to increase resource extractors resistance is dominated by Tyumen Region, in general, KhMAO-Yugra, Kemerovo Region. Innovative competitiveness in these regions should be mainly increased by increasing innovation sensitivity of the manufacturers and the socio-economic environment.

Particular socio-economic mechanisms that enable satisfactory growth of the innovative competitiveness of regions are currently well known and have been tried and tested by many countries that work on their innovative development. Article [4] written in conjunction with the author, classifies these mechanisms by their properties and the mission of innovation systems of Russian regions of various industrial and technological types. Today, their implementation probably only requires a political will or, in other words, a significant group of influence in the state bodies, whose members would have an essential personal interest in restoring Russia's sound production structure and developing hi-tech sector.

Moscow, Saint Petersburg, and Moscow Region's high rankings in development of metallurgy and especially resource extracting innovation centers are mainly explained by the specific features of the Russian statistics (the statements are submitted in the location of companies' headquarters) and the existing distribution of property and business management in these sectors (high degree of monopoly and prevalence of vertically integrated structures). However, on the other hand, given that these types of production are highly centralized in present-day Russia and peripheral research and development is ruined, setting up relevant R&D departments next to the top management of this kind of production seems quite logical.

Conclusion

The research proposes a definition of the innovative competitiveness of a region that is based on recent understanding of areal competitiveness as such, reflects major aspects of innovation activity and the state of regional innovation systems of major importance for successful development of large regions in current realia, and takes into account the need for the involvement of innovation potential in the development of human resources, technologies, and methods of productions as one of the mandatory conditions for improving social stability and maintaining social capacity for development. The research shows the perspective application of the suggested concept of the innovative competitiveness of a region in the substantiation of areal priorities for creating country's innovation system.

The author reveals methodological approaches to substantiation of priorities for increasing innovative competitiveness of Russian regions based on joint examination of regions' problems of research, innovation and production spheres in the context of enhancing the internal socio-economic stability of regions given the requirements of innovation economy and globalization.

The author proposes a method of assessing priorities in creating innovation centers in Russian regions intended to increase the resistance of production of various research intensity levels. The author has calculated priorities for creating innovation activity centers in Russian regions providing for stable development of the hi-tech sector, metallurgy and resource extraction.

The above results assist in selecting major priorities in the innovative competitiveness of a region given the properties of the production of prevailing technological efficiency in reforming the industrial and technological landscape of a territory in the long run.

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