



## **Russian Innovation System on a Decaying Trajectory: A Case Study of the Novosibirsk Region**

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### **Summary**

*This paper analyzes and projects the most likely future of the Russian innovation system based on a case study of the regional innovation system (RIS) of the Novosibirsk region. Using SWOT and PEST analyses to identify strengths and weaknesses of RIS, as well development trends, results indicate that in the current political, economic, sociocultural and technological contexts, risks are significant. The most probable vector in the development of RIS is its gradual decay, thus accelerating the marginalization of the Russian economy and possibly provoking serious complications for Russian society. This may, in turn, trigger negative global consequences.*

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### **Background**

According to widespread and consensus opinion among analysts, national innovation systems (NIS) in the latter half of the twentieth century were fundamental to the economic progress achieved by the leading countries of the world. The Soviet Union was largely absent from this technological race. While it possessed the most advanced scientific and technological capacities, these were focused almost exclusively on the military sphere and were thus not able to provide for a wider and more effective NIS. It is now clear that systemic failures in the USSR's efforts to establish a competitive economy based on innovation became one of the key reasons for its collapse in 1991.

Russia's more recent economic development based on unpredictable energy markets has also proved problematic, placing the country into an "institutional trap." Strong emphasis on production and export of energy resources has only reinforced an outdated economic structure, threatening further marginalization and driving a peripheral economy. As has been the case with other countries, the situation can only be changed with an effective NIS and accompanying RIS subsystems. In addition, since Russia comprises a vast territory, innovative upgrades to the Russian economy must depend on a balanced and functioning NIS-RIS. Nonetheless, it seems that so far Russia has not properly accepted the experience of

most developed countries. Its model remains a centralized innovation system ill-equipped to embrace an innovation system based on proper consideration of regional development and interests. The politics surrounding innovation also remain top down, preventing a structure that would support the vibrancy and openness needed to spark ideas. These political and economic realities have led to a decaying trajectory even for those RIS systems created in the Soviet Union that had previously been centers of excellence for science and technology, such as Novosibirsk Akademgorodok. As a means to verify this thesis, this paper focuses on the RIS of the Novosibirsk region as a case study.

## **Definitions and Methodology**

The NIS encompasses a set of political and economic actors and institutions focused on implementation and/or support of innovation activities. From a structural point of view, NIS includes knowledge generation; education and training of professionals; production of innovative goods and services; and infrastructure supporting innovation, including funding. The core element of NIS is a system of knowledge generation, which is represented by institutions engaged in research and development (R&D). The RIS is territorial segment of NIS.

The RIS of the Novosibirsk region is one of Russia's leading regions for science, professional education, and production systems possessing advanced innovation capacity. At the same time, the region has no substantial natural resources; specifically, the energy resources needed to prevent reliance on traditional Russian development strategies.

This case study below employs two types of analysis: Strengths, Weaknesses, Opportunities, and Threats (SWOT); and Political, Economic, Sociocultural, and Technological (PEST). The PEST analysis outlines and weighs a combination of factors capable of becoming drivers of development—whether to stimulate or hamper—while the SWOT analysis looks at the running of the system itself. The outcomes of both the PEST and SWOT analyses provide a basis for crafting a variety of scenarios and subsequent “views of the future,” which may result in the event that the forecasted scenarios come to pass.

## **RIS of Siberia and the Novosibirsk Region**

The selection of socioeconomic strategies is especially important with respect to Siberia. For decades, Siberia has operated as “a security deposit” for the economic well-being of Russia based on its raw materials and energy resources. The Novosibirsk region in Western Siberia, in addition, is one of Russia's key regions in terms of its innovation capacity, since it hosts the “science town of Akademgorodok,” the largest regional science and technology (S&T) hub in the country, which includes a powerful science and education complex as well a unique concentration of academic research institutes and universities. The center for the Siberian Branch of the Russian Academy of Sciences (SB RAS) with 33 academic institutes is located there, and is supplemented by the State Research Center of Virology and Biotechnology, Vector, and more than sixty applied R&D institutions and design bureaus.

The capacity of the Novosibirsk research center gave birth to the image of Akademgorodok as the greatest potential source of innovation for the region and for the country at large. Novosibirsk has a reputation as the information technology (IT) capital of eastern Russia; some commentators used to call it “Silicon Taiga” to reflect its status as something akin to Silicon Valley. The largest regional technopark, “Akadempark,” named after its location in

Akademgorodok and in connection with the research institutes of the SB RAS, is also situated in the Novosibirsk region.

Novosibirsk’s 2007–2025 regional development strategy was based on the assumption that, in the short run, the region would become the key innovation center in the east of the country. Setting up an effective RIS [1] was a key component in the strategy.

### SWOT Analysis of RIS in Novosibirsk

#### *Part I: Strengths and Weaknesses*

The strengths and weaknesses of RIS in the Novosibirsk region are indicated in the following table.

<b>Strengths</b>	<b>Weaknesses</b>
<p>Powerful complex of R&amp;D institutes engaged mostly in basic science and represented by the institutes of the SB RAS.</p> <p>High-level academic staff qualifications in local research institutes and universities; and unique regional concentration.</p> <p>Some segments of updated innovation infrastructure represented first by technopark Akadempark.</p> <p>Substantial number of small and medium enterprises engaged in S&amp;T business.</p> <p>Positive image of Akademgorodok as an advanced center of world class research.</p> <p>One of the best Russian universities—Novosibirsk State National Research University (NSU)—operates in Akademgorodok. NSU graduates have a positive reputation among R&amp;D institutions in Russia and worldwide.</p> <p>Well-developed cooperation of SB RAS and NSU with the leading research centers of the world.</p> <p>Well-developed connections with Asian countries: NSU’s status as a part of the Shanghai Cooperation Organization (SCO) university.</p> <p>Consensus among local administration,</p>	<p>Poor image of science, as well as scientific, educational and innovation activities in Russian society.</p> <p>Remote location of the region from the center of the country and from the largest global centers of science, education and innovation activity.</p> <p>Limited share of resources in the Russian GNP channeled for funding R&amp;D and innovation.</p> <p>Low responsiveness of real sectors of the Russian economy to innovations, lack of demands for innovations from enterprises.</p> <p>Substantial gaps between basic research and professional education (with possible exception of NSU), as well as between R&amp;D institutions and intensive business.</p> <p>Unsatisfactory integration within the global system of knowledge production, as indicated by science citation indices.</p> <p>Low international ranking of Russian universities (including those located in the Novosibirsk region).</p> <p>Some legal constrains limiting the integrated activity of R&amp;D institutions and universities; high departmental barriers between institutes of the SB RAS and local state universities.</p>

<p>business, science, education concerning transformation of the region into a seat innovation development.</p> <p>High attractiveness of Akademgorodok as a residential area and a workplace.</p> <p>High attractiveness of Akademgorodok for a new generation of innovators, since NSU possesses one of the best campuses in the country.</p>	<p>Substantial emigration of academic personnel in previous years and increasing present-day intent to emigrate.</p> <p>Imbalanced demographic structure of research personnel in the institutes of the SB RAS and local universities skewed towards an aging cohort.</p> <p>A shortage of funding for R&amp;D and a very bureaucratized system of obtaining and allocating funding.</p> <p>Outdated research equipment, a shortage of laboratory space in the academic institutes and universities of Novosibirsk.</p> <p>Shortage of residential area in Akademgorodok that limits an inflow of new professionals to SB RAS institutes.</p> <p>Lack of financial resources of local administration to stimulate innovation business and further develop innovation infrastructure.</p>
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The second part of the SWOT analysis is based on a PEST analysis of the external environment. (See table below.)

## **PEST Analysis of NIS and RIS Development**

### *1. Political and Legal Factors*

During the past year, the protest mood has grown in Russia, despite the fact that the authorities have done everything possible to push protest activity into the shadows. Society has become weary of decreasing living standards owing to the ongoing economic crisis; ideological campaigns connected with the search for a “fifth column” within the country and other enemies abroad; as well as the worsening international stature of the country. Russian intellectuals are also growing tired of the irremovability of power and are seeking political and economic changes. These tensions have become especially acute on the eve of the forthcoming elections for the State Duma in September 2016 and the presidential elections in 2018.

Most experts predict that a number of anticorruption actions initiated by the state will continue, implicating representatives of business and regional elites, especially those who have demonstrated political ambitions. Public attention to these issues will be channeled into “show trials” presented as consistent policy focused on the elimination of corruption. Broad propaganda campaigns will ensue in the mass media while the policy of vilifying non-state opposition will also continue.

In summarizing these political factors, it is clear that their impact will be unfavorable for the development of NIS and RIS. No substantial political reforms will occur. As for center-periphery relations, the focus will be on further strengthening of the center. Political pressure on opponents of the regime will gradually increase, pro-imperial propaganda campaigns will expand, and international politics will remain unpredictable. Even if some anti-Russia sanctions are cancelled, tense relations with the United States and many EU countries will remain, as well as a very low level of trust in Russia's international actions and its eagerness to flout the principles of international law. Russia, meanwhile, will carry on efforts aimed at the search for allies in the East, and the formation of alliances with the SCO and the Eurasian Union. Taking into consideration the fact that the West is the world's lexicon of innovation, moves to the East will also negatively affect the country's ability to nurture a viable innovation development strategy.

Only innovation in the military sector can be viewed as an exception given the current political climate and foreign policy directives. Innovation and stimulation of industries independent of import of parts and components in the military sphere are almost certain to occur, and it is not difficult to predict that budget reductions will be less significant in this sector than in others.

Evolution in the legal space for the development of innovation activity is likely to be problematic. Current normative frameworks have been plagued by gaps and contradictions; and some new initiatives, for example, the concept of the new Law on Science and Innovation recently announced by the Ministry of Science and Education, do not properly consider changing realities. At the same time, Russian economic laws, including those that apply to science and innovation, are not duly enforced. Recent legislative initiatives on strengthening control of information also do not contribute to increasing the effectiveness of science and innovation activities.

## *2. Economic Factors*

Russia's GNP decreased by 3.9% in 2015, correlating with a decrease in capital investments by 10% owing to higher prices for resources, growth in debt levels, and a tightening loan market—all of which resulted from the sanctions and general economic uncertainty felt by potential investors.

Socioeconomic development, as forecasted by the Russian government, assumes that the major contribution to increasing rates of economic growth in 2016–2020 will be achieved by the following factors: growth of investment in production and production infrastructure; growth of investment in the export of non-raw material goods and stimulation of hi-tech exports; increase in cumulative productivity as a result of growing investment in innovative sectors of the economy; implementation of measures for saving resources and cost reductions, including those connected with labor costs and tariffs on natural monopolies; development of small business and improving conditions for business, etc. [2]

However, in the current socioeconomic and political milieu, nearly all of these measures, positioned as economic drivers, are impossible to achieve. Economic crisis in Russia has produced a long recession, and the ongoing uncertainty in both the political and economic realm is leading to a further decrease in investment and a retreat from modernization of industry and economic innovation. The innovation system will become one of the first

victims. RIS segments, which are the most remote elements in the mechanism of resource distribution, will suffer more than others.

### *3. Sociocultural Factors*

The economic crisis in Russia is accompanied by a rather tense sociocultural situation. Sociocultural fracture is becoming more and more evident, while social uplift has proved ineffective. Ruslan Grinberg, Director of the Institute of Economics of RAS in Moscow, describes this state of affairs as “asocial capitalism with some feudal coloring being set up in the country.” [3]

The situation with migration remains rather complicated, particularly with respect to imbalances in qualifications between emigrants and immigrants, which, at present is not positive for Russia. Those who emigrate are mostly highly trained specialists who are generally in demand in Western labor markets; while those immigrating are natives from former republics of the Soviet Union who lack advanced professional qualifications. Furthermore, according to many experts, researchers and academics belonging to the most active social strata are considering options for emigration. As a result, the quality of technological and management processes in the country will only worsen. [4] At the same time, difficulties with the sociocultural adaptation of migrants and the active formation of national diasporas stimulate xenophobia and nationalism in Russian society. Also worrisome is a fragile sociocultural climate aggravated by aggressive propaganda, sometimes in the form of “hybrid war” against some strata of the population.

Against the background of recent economic and technological failures, a skeptical attitude toward science remains widespread in society and even extends to representatives of the academic and engineering community. Engagement in R&D is not seen as prestigious and attractive for the general population. This image of science and engineering is supported by information (at least partially based on rumors) on corruption scandals among university management and in innovation companies, such as ROSNANO.

A feeling of social apathy and the lack of demand is spreading through the academic community of Russia. This is enhanced by the unsatisfactory status of science in society, relatively low incomes, and increasing restrictions on international cooperation. Further, a lack of understanding and growing contradiction between the ethos of academia (after R. Merton) and the ethos of bureaucracy imposed on science by the state administration are now present and having a negative impact on R&D. In summary, sociocultural factors do not contribute positively to the development of innovation capacity in Russia.

### *4. Technological Factors*

Technological factors generally follow the same trend, despite authorities’ slogans to the contrary dating from the Soviet era—which promise to promote economic development through modernization and technological advancement. The Alexei Kosygin economic reform of the mid-1960s, which remained unimplemented in its major components, and Mikhail Gorbachev’s politics of modernization based on fostering science and technological progress in the mid-1980s, were aimed at this. The same applies to Putin-Medvedev-Putin declarations about the necessity to restructure Russian economics, which have resounded continually since the beginning of the 21<sup>st</sup> century and have been formulated in a number of strategy development documents. Nevertheless, even the Russian government has now stated,

more realistically, that “current trends in private funding and strict budgetary limitations at the level of the state do not provide for increasing funding for R&D as related to GNP in the medium term.” [5]

In the sphere of innovation policy, the country is walking in circles. The principle of forced innovation as formulated in policy statements is highly reminiscent of Soviet politics in “introducing achievements of science and technological progress into economic practice.” As a result of all these, post-Soviet economics in Russia is still anti-innovative in nature. The upside-down approach now dominates state innovation overwhelmingly. Innovation processes in the economy as well as the atmosphere of “innovation competition” remain blocked. Private business has done little either to stimulate the innovation process or to transfer outputs to the broader economy.

The focus remains on setting up state initiatives for innovation infrastructure such as Skolkovo in Moscow, and analogous, but much smaller projects partially supported from regional budgets such as Akadempark in Novosibirsk. All of these divert substantial resources without, thus far, providing clear outcomes. Military innovation, whenever implemented, remains hidden and thus prevents diffusion and technology transfer to a wider economy.

Serious issues impede the development of the innovation cycle, namely, support for basic science and training of highly qualified personnel. After a long and painful collision, reform of the RAS took place in 2013. The government set up the Federal Agency on Scientific Organizations, which is now responsible for all property of the RAS, including research institutes. However, in reality, the Academy of Sciences not only lost its assets but also forfeited many instruments critical to success in the fields of science and innovation. So far, the federal agency has also not demonstrated adequate managerial skills.

In summary, all key elements of the PEST analysis put into question the appropriateness of politics aimed at establishing an effective NIS in Russia in both the short and medium term. This applies to RIS as well, since the balance of center-periphery relations in the country, which is so far centripetal, is becoming more and more center-oriented with respect to all political issues, including economic and innovation policy. Under such circumstances, the ability to move forward with an effective RIS, even in such regions as the scientifically and technologically advanced Novosibirsk, are seen as ephemeral, especially when faced with both budgetary and political restrictions.

## SWOT Analysis of RIS Novosibirsk

### *Part 2: Opportunities and Threats*

<b>Opportunities</b>	<b>Threats</b>
Formal support for integration of science, professional education, and innovative business demonstrated by federal and regional authorities in political strategy documents.	Increasing political instability in the country.
Synergies between R&D, professional education, and innovation activity within structural elements of RIS.	Contradictions and segmentation of the legislative basis for innovation activity.
	Strengthening control of information and regulation of scientific activity.
	Decreasing economic capacity and negative

<p>Ability of the NSU research university to satisfy demands for qualified professionals who work across interdisciplinary technologies to solve complex theoretical and practical issues in R&amp;D and innovation.</p> <p>Ability of regional universities to satisfy demand for highly qualified personnel in engineering, biotechnology, pharmacology, medical, IT, geo-information, and some other profiles.</p> <p>Implementation of “Akadempark” project based on cooperation with regional academic institutes and universities.</p> <p>State support for innovative military enterprises widely represented in the region.</p> <p>Broadening interaction between the elements of RIS with educational, R&amp;D, and industrial enterprises and businesses in neighboring countries as in the federal policy focus shifts to SCO and Eurasian Union.</p>	<p>international climate for the state.</p> <p>Negative impact of Western sanctions and Russian counter-sanctions on the socioeconomic situation of the region and the country as a whole.</p> <p>Increasing conflicts in society. Disintegration of the academic community, as it becomes a target in the search for “internal enemies.”</p> <p>Decreasing attractiveness of R&amp;D activity and poor image of science and engineering in society.</p> <p>Weak professional and territorial mobility in the country.</p> <p>Aging of academic personnel and increasing emigration intentions among younger scientists.</p> <p>Worsening professional education and decreasing level of general education.</p> <p>Anti-innovation character of the Russian economy as a whole with continued upside-down approach in politics of innovation.</p> <p>Decreasing state resources to finance R&amp;D. Unwillingness of private sector to invest in science and innovation.</p> <p>Closed character of military innovation and limitations for diffusion and transfer of technologies.</p> <p>Contradictory character of reforms in the spheres of fundamental sciences, university system, and establishment of platform for innovation.</p> <p>Worsening opportunities for international cooperation in R&amp;D and innovation with Western countries.</p>
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Given such conditions, it is difficult to foresee a realization of the major strategic goal of RIS, as formulated in the official documents: “to create in the Novosibirsk region a world-class innovation infrastructure, which will provide for dynamic development of the hi-tech sector

in the regional economy on its own basis” [6], particularly in reference to the second part of this statement. The underlying causes of fragmentation in the innovation cycle in Novosibirsk, as well as in the country as a whole, lie at both ends of the innovation market—at supply and at demand. It is impossible to start up the innovation process in a society with numerous limitations on the freedom of economic performance and under extremely monopolized economics without innovation demand. Moreover, a constant inflow of venture capital from the open global markets is not available. Appropriate conditions to support and nurture innovation remain but dreams for contemporary Russia.

As far as the Novosibirsk region is concerned, despite its relatively high science and technology capacity, investment risks concerning the innovation sector now prevail substantially over potential advantages. Historical experience of the creation of superior centers of S&T indicates that investments are not enough for changing the situation around innovation; the macro environment must also change. Thus far, the innovation complex of the Novosibirsk region does not work properly for the interests of the region.

In contrast to official policy, the task should not be in the creation of a huge and expensive innovation infrastructure. What is really needed is to change radically the overall principles of economic activity and formulation of economic and S&T policy in the country, which is impossible without substantial political transformation. An innovation economy can scarcely develop without democratic institutions in which the principles of civil society function in real ways, not just what is read about in textbooks.

## **Conclusions**

What conclusion may follow from these assumptions and any related scenario forecasts? The most probable is an extrapolation of trends from the recent past leading to gradually worsening political and economic outcomes. In such circumstances, it is highly probable that the decreasing capacity of RIS will result in degradation of the former centers of superior S&T capacity such as Novosibirsk Akademgorodok. This does not exclude achievements in specific fields of fundamental research, from which a good basis has been established. At the same time—because of difficulties with R&D funding, questionable reforms in the system of management of science connected with the discrediting of RAS as a management unit, and the creation of the Federal Agency that caused fragmentation of the Siberian Branch of RAS—the general trend will be a gradual weakening of scientific potential of this previously integral research complex. Difficulties can also be anticipated with innovation and implementation of complex and integral research, which yield the most promising results in modern science.

The development of an innovation infrastructure in the region, first represented by “Akadempark,” has not yet catalyzed any breakthroughs in the sphere of innovation. First, the technopark is not comparable with the Skolkovo project in terms of funding, image, and lobbying capacity, and cannot claim even a fraction of the investment assigned to Skolkovo. Its funding depends on the regional budget, which cannot be expected to grow during a time of crisis and under current mechanisms of inter-budgetary relations in Russia. Second, it has not managed to become a part of the integrated RIS with what should otherwise involve logical connections to academic institutes and universities. Third, it has not proven its ability to generate any meaningful income through innovation. The regional (as well as national) economy has thus far not created the conditions for market demand for innovative RIS products

The true state of RIS development differs drastically from the ways in which it is described in political declarations and statements. Observable trends now point to decreasing contribution to GNP from regions such as Novosibirsk, which are considered innovation leaders. This will symbolize a failure by Russia to implement structural reforms in its national economy and to stimulate innovation processes; and it will, in fact, lead to a preservation of the current logic driving the economic performance of the country.

### **Future Scenario**

In losing the next stage of the technological race, Russia will find itself in a “Mexican standoff” as its role as an “energy superpower” and provider of raw materials to the international markets becomes fully discredited. A further worsening of global market conditions will inevitably lead to a new wave of crisis in the country, greater marginalization of the economy, impoverishment of the population, and rising protests. The future may well lead toward autarky, a more closed society or isolation from the international community, as well as an acceleration of trends toward violence and unpredictable political adventurism in foreign policy. Put in simple terms, further disorganization in Russian state and society could very likely lead to significant geopolitical complications.

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### **Notes**

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