

Innovative Development and Commercialization of Technologies: Experience of Technopark “Novosibirsk”

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This article is concerned with analyzes of experience of Technopark “Novosibirsk” as an important part of the innovation infrastructure of the Novosibirsk region. In this article the authors are formulated priorities for the development of an innovative economy: The promotion of investment growth in production infrastructure and innovation, increasing the orientation of research institutions to the needs of the real economy, the development of entrepreneurship in all sectors of the economy and the creation of necessary conditions. The article considers the key elements of innovation infrastructure. Also this article is given a brief description of the complex target program “Development of high-tech industry and innovation in the industry to the city of Novosibirsk in 2020”, in which Technopark “Novosibirsk” implements the concept of technopark of distributed type, when the Technopark is built in the form of structural and autonomous innovation and technology centers established by the territorial-branch principle in conjunction with partner organizations. The analysis of the stories of success (and failure) of residents of Technopark is described in this article. Based on this analysis, which highlights the main factors contributing to the achievement of commercially meaningful results. These include training as an essential component of the innovation infrastructure. Describes the international educational programs implemented by the Innovative Technology Center “Education” at the Novosibirsk State University of Economics and Management. It is noted that the most important result of the operation of Technopark “Novosibirsk” was working out a model of public-private partnership that has allowed Technopark flourish, creating a network of specialized centers of innovation and technology. Finally the authors conclude that at the present time in Russia on almost all the basic elements of support for innovative entrepreneurship are created. At the same time a significant part of the difficulties cause problems originating from the external environment of business innovation.

Keywords: innovation infrastructure, start-up projects, technology transfer, experience of technopark, public-private partnership, technology commercialization, Gate2RuBIN project

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Introduction

There are several effective organizational forms of the infrastructure development to support innovation in world practice. First of all, it is technopolises, development zones of new and high technologies, science and technology parks, innovation and technological centers and centers of technology commercialization, business incubators. Thus the state is not confined to the role of an independent observer for the development of such associations, it has a policy that encourages the transfer and commercialization of hi-tech developments and technologies.

American academic community recognized that the main achievement of the United States in the 20th century was the creation of a national innovation system. The main impetus for this was the decision of the State in the late 1940s of the 20th century to grant authors the right to use commercial developments created in public institutions. As a result, the proportion of successful commercial projects of scientific and technological development has increased over half a century from 6%-8% to 15%-16%.

Construction knowledge-based economy in Russia involves the creation of conditions for the scientific and technical transformation of Russian potential into one of the major resources for sustainable economic growth.

In May 2006 president of the Russian Federation formulated the paradigm of construction an innovative economy and the need of the decision of following problems:

- stimulation of investment's growth in industrial infrastructure and innovation development;
- focused of scientific organization on the requirement of the real economy;
- the development of entrepreneurship in all sectors of the economy and the creation of necessary conditions.

For the decision of these problems are necessary:

- structural institutional changes that promote innovation;
- more efficient use of scientific potential;
- diversification of the economy and the active development of knowledge-intensive industries.

Creation of national innovation economy also includes:

- presence of the accurate state innovative policy that combines a wide range of areas, including prioritization and identification of policy instruments;
- development and implementation an effective strategy for the commercialization of research effort;
- creation of innovative infrastructure and commercialization centers as its key element;
- formation and development of human capital in innovation.

In addition, state intervention in the innovation sphere should not restrict the freedom of action in a competitive marketplace. The state should encourage the transition from the system controlled by offer to the system driven demand and requirements.

We have successfully mastered how to make knowledge from money during the directive economy. How to make money from the knowledge and what knowledge and what kind of competence in the first place to generate it is still necessary to master.

Innovation Infrastructure

The Main Elements of Innovation Infrastructure

Innovative infrastructure covers a variety of organizations providing a complete cycle of innovation from

the generation of innovative ideas to the production and commercialization of high technology products and services. Basic elements of innovation infrastructure are represented in Table 1 (Lenchuk & Vlaskin, 2009).

Table 1

The Elements of Innovation Infrastructure

Engineering and manufacturing infrastructure	Consulting infrastructure	Financial infrastructure	Training infrastructure	Information infrastructure	Marketing infrastructure
Innovative technological centers and technoparks	Centers of technology transfer	Budget funds	Personnel development in the innovation sphere	State system of scientific and technical information	Foreign trade association
Innovation and industrial complexes	Consulting in the economics and finance sphere	Budget and non-budget funds of technology development	Training specialists in the field of technological and scientific management	Resources of the support small business entities	Specialized intermediary firms
Technology clusters	Technology consulting	Venture capital funds		Regional Information Networks	Internet
Technology development zones	Marketing consulting	Planting and early-stage funds		Internet	Exhibitions
The centers of collective using the high-tech equipment	Consulting in the field of foreign economic activity	Warranty structures and foundations			

According to some Russian authors, there are serious problems in the formation of the balanced development of innovation infrastructure, and along with fairly developed areas are areas in which work is hardly begun. Therefore, urgent measures are needed to build such an infrastructure of innovation, which allows providing the necessary balance of innovative enterprises resources (Shepelev, 2005; Golushko & Shokin, 2003; Shokin, 2005).

The Complex Target Program “Development of High-Tech Industry and Innovation in the Industry of the City of Novosibirsk Till 2020”

Novosibirsk region is a region which has no oil deposits, hard-coal deposits and other minerals. Novosibirsk is known as a city of science. Akademgorodok, which includes about 30 research institutes, and the Siberian Branch of the Academy of Medical Sciences and the Siberian Branch of the Academy of Agricultural Sciences are located here.

The industrial complex consists of about 200 large and medium-sized enterprises, and about 3,000 small enterprises. In general, industrial production has a positive trend since 1999. Industrial output had increased by 3.3 times from 2004 to 2008.

An important condition for sustainable development of Novosibirsk is the formation of an innovative economy through the development of high-tech industry. The program “Development of high-tech industry and innovation in the industry of the city of Novosibirsk till 2020” is aimed at it. In this program, following problems are formulated (Complex Target Program, 2010):

- creation of institutional and economic conditions for structural and technological modernization of industry, development of production of high technology products and improve production efficiency;
- creation of a favorable investment climate and formation of growth mechanisms of investments values;
- promotion the development of innovation system infrastructure to ensure the transfer of scientific developments in the real economy;

- promotion the development of vocational education for the development of innovative staffing industry.

Technoparks as a Key Element of Innovation Development

At the present time in Russia's regions, there are more than 100 organizations that perform functions of technoparks. Their formation began in the late 1980s to early 1990s. These technoparks did not have teams of highly skilled managers, infrastructure, real estate and did not solve the problems of creating and supporting small innovative enterprises.

The main activities of technoparks include:

- promotion in the formation and development of firms that use the results of scientific research organizations and universities to create a high-tech products;
- introduction of new technologies and creation of new jobs as an indicator of regional development;
- development of cooperation between universities, research organizations, and industry;
- promotion of training system for the innovation economy;
- stimulation of research organizations and universities to identify and use new sources of income;
- promotion of the commercialization of intellectual property;
- business incubation;
- development of technology transfer.

Unfortunately, until today a large proportion of technoparks is not working as an incubator of innovative businesses. They see their mission in the protection against hostile environment that firms which are located in it. Dates of stay small firms in technoparks are 10 years or more, while in Europe and China, this period ranges from two to four years.

Technopark “Novosibirsk”: History, Facts, and Experience

Technopark “Novosibirsk” was created in accordance with the Enactment of the Government of the Russian Federation from March 16, 1996, the order of the president of the Russian Federation from June 10, 1996, the order of the Russian State Committee for the Administration of State Property from November 25, 1996.

Executive Directorate of Science and Technology Park “Novosibirsk” was created in December 1996 in the form of a public research institution, which passed a building with total area of 16,512 m².

The main objectives of Technopark are:

- promotion to small businesses in the science and technology;
- support of innovative programs and projects;
- commercialization of intellectual property;
- business incubation;
- transfer of knowledge, knowledge-intensive products, and technologies.

Currently, the Executive Directorate implemented the concept of Technopark of distributed type in the form of structural and autonomous innovation and technology center (ITC), which are created by the territorial-branch principle in conjunction with partner organizations (universities, foundations, regional administrations, etc.). Autonomous innovation centers receive support from the directorate of Technopark and organizations co-sponsors (Shokin, 2004a). Directorate of Technopark Novosibirsk is also the co-founder of the non-profit partnership “Sibacademsoft”, which brings together two dozen leading infocomm companies in Novosibirsk.

A total of 80 small and medium-sized innovative enterprises, as well as structural and autonomous units of Technopark “Novosibirsk” are located on its premises. Approximately 30% of high-tech companies who began to work in the Technopark in the late 1990s, grew up to be steadily working firms. Currently, 24 firms with 500 employees are in the industrial park areas of Executive Directorate. These included 15 companies that work in the development and provision of technical services for enterprises of raw materials, transport, and communication sectors of the Siberian Federal District. These companies are leaders in their industries, not only in the Siberian Federal District, but also occupy a leading position in the country as a whole. Some of them were in the path from the Technopark business incubation to large production units.

Analysis of the success stories (and failure) of technopark residents allows you to emphasize key points that contribute to the achievement of commercially meaningful results. It is:

- a highly skilled team of entrepreneurs and effective manpower policy, covering recruitment, placement, and training;
- an adequate assessment of the external environment, internal resources, opportunities, and threats;
- accurate orientation to requirements of the market and business planning to the long-term perspective;
- effective policy of development and use of intellectual property.

Personnel Training as a Major Component of the Innovation Infrastructure

According to the concept of Technopark in the field of high technologies in Novosibirsk Akademgorodok scientific and educational community of the city should focus on the following tasks (Technopark of Novosibirsk Akademgorodok, 2006):

- coordination of scientific and educational plans and programs with requirements of staffing companies of technopark in order to increase of demand for their services in the market;
- provision of load scientific and educational sectors in terms of the demographic crisis and lack of public funding, increasing the attractiveness and competitiveness of educational services for students from other regions and countries;
- attracting extra-budgetary funds (investment, income from new orders) for the operation and development of scientific and educational base, as well as additional orders from technopark to participate in commercial projects, training, and retraining of specialists;
- involvement of the scientific and educational organizations in the process of commercialization of innovative potential of the region as an equal partner in a chain of cooperative government-science-education-businesses;
- creation of the necessary level of the educational process with modern equipment and licensed software;
- development of postgraduate education, the youth system design offices, pre-incubators, and business incubators;
- raising the status and prestige of employees of scientific and educational spheres with respect to the commercial sector, improving the conditions of their salaries to a level comparable with successful commercial entities;
- improving the quality of the teaching staff as a condition of competitive educational centers.

Interests of the business community operating in sphere of innovation and high technology consist in the following:

- presence in the labor market, the required number of specialized professionals with appropriate qualifications, including in the narrow profile of subject areas;
- getting young professionals tailored to meet the requirements of commercial structures;
- the availability of modern teaching facilities and teaching staff, capable of tracking and transfer new knowledge in a dynamic high-tech development areas;
- possibility of using training facilities of educational institutions to continuously improve the skills of commercial structures;
- reduced staff turnover and the creation of conditions preventing the mass migration of health personnel in the large foreign companies that offer significantly higher starting conditions;
- presence in the labor market adequate number of qualified professionals (executives, marketers, financiers, project managers, logistics, etc.), which can effectively manage innovation and high-tech business, professionally guided with a modern information technologies and applied subject areas.

At the same time, many successful companies of technopark “Novosibirsk” and the association “Sibacademsoft” note the following issues of education and training (Shokin, 2004b):

- an extreme shortage of qualified personnel;
- reducing the quality of education;
- requirement of additional training of graduates coming to work in innovative firms;
- “brain drain”—the best professionals seek work abroad.

Today, the concept of transformation in education since high school knowledge (classical Humboldt University) for school competence has not yet given a clear business results and Russia is losing its competitive edge in science and education. It is therefore necessary for the development of competence model of education to focus on strengthening existing and partially continuing competitive advantage of national science and education.

The most important result of the functioning of technopark “Novosibirsk” was to working out a model of the public-private partnership, which actually allowed the technopark not only to survive in difficult times in conditions of extreme deficiency of financial resources, but also successfully to develop, creating a network of specialized centers of innovation and technology. Collaboration with the university environment has resulted in the establishment of Technopark Innovation and Technology Center “Education” at Novosibirsk State University of Economics and Management (NSUEM) and joint development of international educational programs focusing on training and retraining for the sphere of high technologies, including (Bobrov, 2009):

- the president (on behalf of former Russian President Boris Yeltsin) training program for Russian executives, providing for the passage of the practice of students (up to three months) in European companies (implemented in partnership with the European institutions, companies, and organizations);
- the program “*Master of Business Administration*”—implemented in partnership with the Management College of South Africa;
- Russian-American program, providing for the issuance of bachelor of Economics State University of New York (SUNY), and focused on the Russian students (learning takes place in parallel with their studies at Russian universities, graduates receive a diploma, along with a Russian diploma Associate of Sc. SUNY diploma or a Bachelor of Sc. SUNY);

- training programs for professionals in the field of information technology (multimedia technology, IT-management, programming, etc.);
- children's computer school program targeting secondary school students;
- of special note is the joint (NSUEM—Technopark “Novosibirsk”) master program in a direction “Applied computer science in the delivery of high-tech solutions” to which Kazakh National University named after Al-Farabi acceded.

Experience in the Generation of Start-Up Projects

Supporting of these projects is carried out in various ways, including through the program “START” the Russian Foundation for Promotion of Small Enterprises in Science and Technology. Representative of the fund in the Siberian Federal District (SFD) is one of the Innovation and Technology Centers of Technopark “Novosibirsk”.

Results of the program “START” for the period from 2004 to 2010, which reflect the activity and performance of firms of the Novosibirsk Region (NSR), represented in Table 2.

Table 2

Results of the Program “START” for the Period From 2004 to 2010

	2004	2005	2006	2007	2008	2009	2010	Total
Received bids, RF	2,762	1,651	1,563	1,354	1,392	1,679	2,070	12,471
Received bids from firms, SFD	333	262	174	136	151	141	171	1,368
Received bids from firms, NSR	104	62	42	36	35	28	41	348
Recognized as winners, RF	474	428	461	36	330	360	496	2,869
Recognized as winners, SFD	59	62	49	32	42	44	56	344
Recognized as winners, NSR	23	21	12	9	16	12	16	109

Unfortunately, the distribution of bids submitted to the SFD by the degree of protection of intellectual property shows that only 40% of applicants have protected their intellectual property patents, and 11% of firms have filed for patents. Thus in 49% of firms that claim to support fund assistance, intellectual property is not protected.

Distributions of winners in the SFD on the types of organizations are those commercial organizations—39%, schools—22%, the organizations of the Russian Academy of Sciences—20%, temporary labor groups—14%, and other organizations—5%.

Technology Transfer

Directorate of Technopark “Novosibirsk” and its subsidiary—Innovation center “Koltsovo” is one of the organizers and active members of the Russian Technology Transfer Network (rttn.ru). Over the past few years, Technopark “Novosibirsk” provides services for technology transfer within the project “Gate2RuBIN” (Gate to Russian Business Innovation Networks). This large-scale long-term project participation of Russian organizations in the largest European network of business support, which brings together some 250 regional consortia (technology transfer centers, innovation centers, etc.) from 40 countries including 27 EU countries.

Russia in the European network is represented by a consortium of three organizations: the union of innovation and technology centers in Russia, Russian technology transfer network and the Russian agency for small and medium businesses that provide technology information exchange between Russian (RuBIN) and

European (EEN) networks. The structure consists of 40 Russian RuBIN innovative infrastructure organizations, selected on a competitive basis with the support of the promotion of small enterprises in scientific-technical sphere and the Ministry of Economic Development (www.gate2rubin.ru).

As part of the problem of transfer of knowledge, knowledge-intensive products and technologies Technopark provide the following services free of charge (Shokin & Golushko, 2002):

(1) services to establish technology partnerships, including:

- providing informational support (including provision of information on existing Russian and regional programs and open competitions in support of innovation, knowledge, and technology transfer);
- identify and describe the technological capability (offers) and/or technology needs, focused on European search and/or Russian partners;
- assist in the organization of working contacts between Russian and European partners—redirection information, clarification of issues;
- assisting in the negotiation of contracts.

(2) services to establish a research partnership—promoting companies and research organizations to participate in research programs of the European Union and bilateral international projects of applied research, including:

- providing information support and advice on the rules of participation in the 7th Framework Program and bilateral international projects;
- preparation and implementation of search queries relevant European/Russian partners to participate in international research projects;
- description of the competencies of partners in the prescribed format suitable for further work in this direction;
- the involvement of small and medium enterprises in the Fund's program to promote science and technology, focused on the support of international cooperation (consultation and assistance in the preparation of applications);
- liaising with thematic Russian national contact point for international programs and projects (including the lines "biotechnology, agriculture, and food").

Experience shows that in practice, the Russian authors are in the innovation chain from idea through R&D and manufacturing for commercial distribution in the market. In western economies, by contrast, many authors have "begin" with the last stage—evaluation of commercial success in the market, with priority emphasis on the duration of the life cycle of a commercially successful product/service and scalability. Therefore, in Russia, on a request for technology accounts for 20 technology proposals, and in European networks inquiries only slightly smaller than the proposals.

Experience in Technopark "Novosibirsk" in terms of provision of services described above suggests the usefulness of this work, initiating some additional tools of technology transfer (Shokin & Grishnyakov, 2009). In particular, recorded five stories of success, when a joint venture and/or projects with European partners. The figure is small, but it is only the first small steps toward the integration of Russian small and medium enterprises in the global economy in the new economic system.

Conclusions

It is possible to ascertain that currently in Russia almost all necessary basic elements to support innovative

entrepreneurship have created.

At the same time, a significant part of the difficulties cause problems originating from the external environment of business innovation. These include: inadequate legal framework, lack of effective financial and credit facilities, inadequate tax systems, and administrative barriers, etc..

However, these problems are not insurmountable. The fact that awareness of these problems and fixing them in the program “Development of high-tech industry and innovation in the industry of the city of Novosibirsk till 2020” and other important documents are the basis for the optimistic scenario in the development of an innovative economy in the region and the country as a whole.

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