

## The Russian Federation: A New Innovation Policy for Sustainable Growth

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Over the last two decades, the Russian Federation has completed its transition to a market economy, and for a range of macroeconomic and social indicators it is now comparable to countries of the Organisation for Economic Co-operation and Development (OECD);<sup>1</sup> its integration into global chains of production and knowledge flows has become more established and has deepened along with the country's economic and social changes. However, the model of such integration proves to be highly unsustainable: the emphasis on exports of raw materials makes social welfare strongly dependent on external economic conjuncture instead of depending on, and establishing, internal sources of growth. The country's overall share of machinery and equipment accounts for just 13% of exports; the rest is represented mainly by raw materials.<sup>2</sup> Under these conditions, even the large financial reserves spent to compensate for the 2008–09 global crisis effects appear to be insufficient to revitalize the country's economic growth at pre-crisis rates.

Global technology trends also challenge further socioeconomic development if that development continues within the traditional carbon-hydrogen paradigm that is based predominantly on oil and gas extraction. Widely endorsed contre-carbon efforts have already resulted in convincing advances in alternative energy technologies

backed by large-scale national public procurement programmes, direct and indirect incentives for energy-efficient producers and users, corporate initiatives for technological and organizational innovation, and international actions. Disruptive technologies in these and other areas may damage the positions of companies in established markets—including specific high-tech niches such as nuclear energy, aircraft, space, armaments, and so on—both globally and domestically.

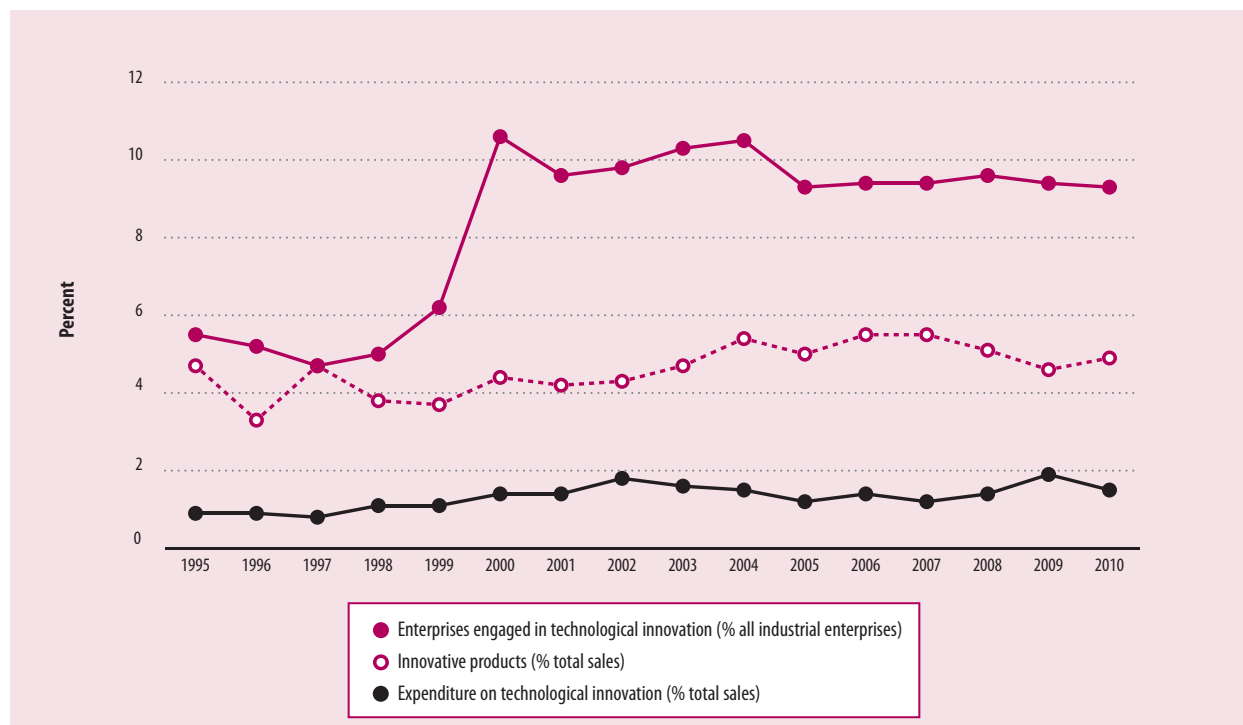
Lower productivity and inefficient resource utilization have also been among the endogenous factors hampering the country's economic development. In certain sectors of the economy, technological gaps with leading industrial nations have accumulated during the last decades. Furthermore, the monopolistic structures of most local markets that serve to suppress incentives to increase competitiveness, the persistent barriers to entrepreneurship and innovation, the achieved quality of corporate governance, and inadequate protection of ownership rights all limit the potential of extensive sources for improving the Russian Federation's socioeconomic performance. The consequent deficit of trust results in lower incentives for encouraging a pragmatic coalition among business, state authorities, and society, and eventually decreases the effectiveness of public governance.

The above-mentioned challenges demonstrate an obvious need for a new model of innovation policy aimed at strengthening nation's positioning in the global economy and at knowledge flows that would allow the Russian Federation to benefit from the available high-quality human capital and scientific potential, while meeting tight constraints related to the demand for social stability and a GDP-per-capita ratio exceeding that of most rapidly developing economies.<sup>3</sup>

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### The Russian national innovation system: Trends and problems

Recent years have been notable for the substantial changes in innovation policy in the Russian Federation. Innovation has become a central part of the top-level policy agenda: coordination committees chaired by the President and Prime-Minister were established, key strategy documents were published, and a network of development institutions (the Technology Fund, the Russian Venture Company, the Development Bank, etc.) providing an 'innovation lift' was put in place. Earmarked programmes to promote university research and development (R&D) and the enforcement of innovative activities at state-owned companies were launched, and the scope of tax incentives for R&D and innovation was widened.

**Figure 1: Innovation activity of industrial enterprises in the Russian Federation**

Source: HSE, 2011.

However, all these actions have not yet resulted in increasing the impact of innovation on economic growth and social welfare. At present, innovation activity in Russian industry is still marked by its limited scale and limited performance over a broad range of indicators (Figure 1).<sup>4</sup> The percentage of innovative enterprises here has not exceeded 10–11% since 2000. This is considerably less than that for both developed European countries and a number of developing economies. Innovation intensity related to total sales (1.9% in the Russian Federation, compared with 5.5% in Sweden and 4.6% in Germany) as well as the output of innovation investment (innovation products comprise roughly 5–6% of total sales for 1995–2009) is similarly low.

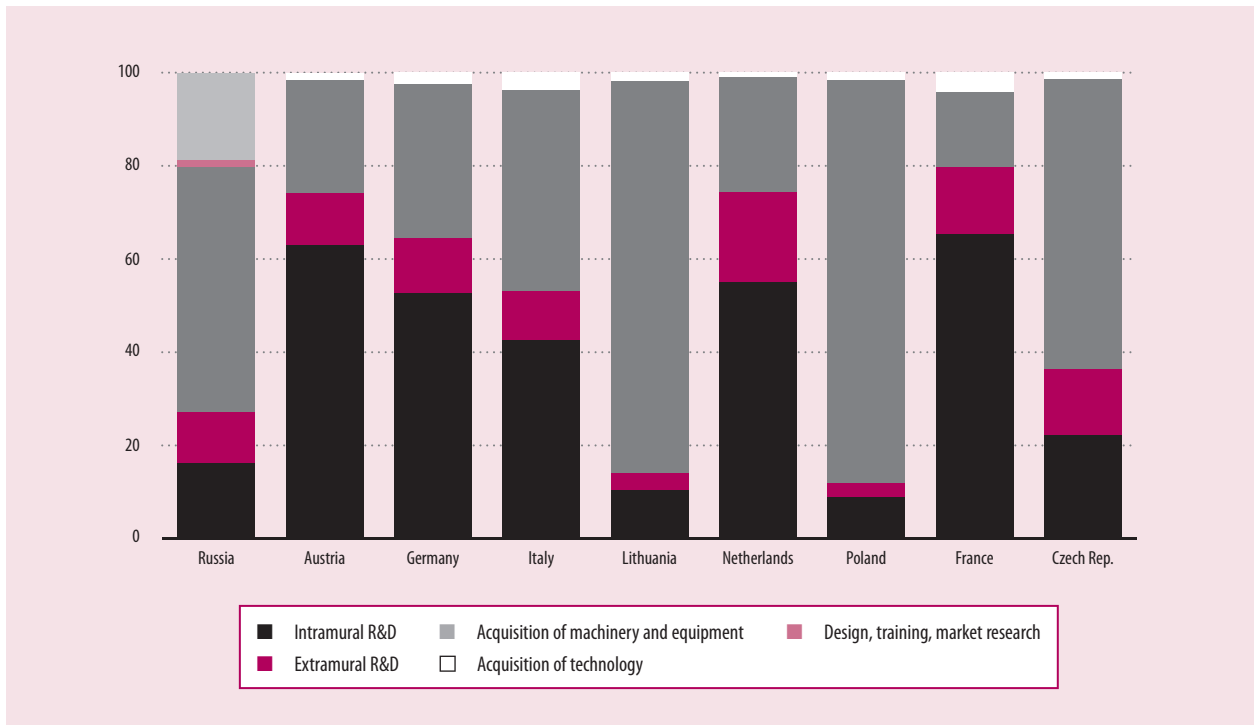
The poor aggregate performance of the national innovation system (NIS) is explained by a number of

structural and institutional imbalances—the *innovation cleavages* that diminish synergetic effects and discourage innovation-based growth.

- *Science-industry split-offs.* Business exhibits little demand for innovation, which has not become a priority for domestic companies. International markets are targeted by only 2% of manufacturing enterprises. A typical business model focuses on local markets with lower competitive pressures, non-economic entry barriers, and subsequently limited incentives for longer-term investment in science and technology (S&T) and innovation. As a consequence, a usual innovation strategy of Russian companies is based on technology adoption via acquisition of machinery and equipment, while spending on R&D and technology lags behind that of the leading European Union

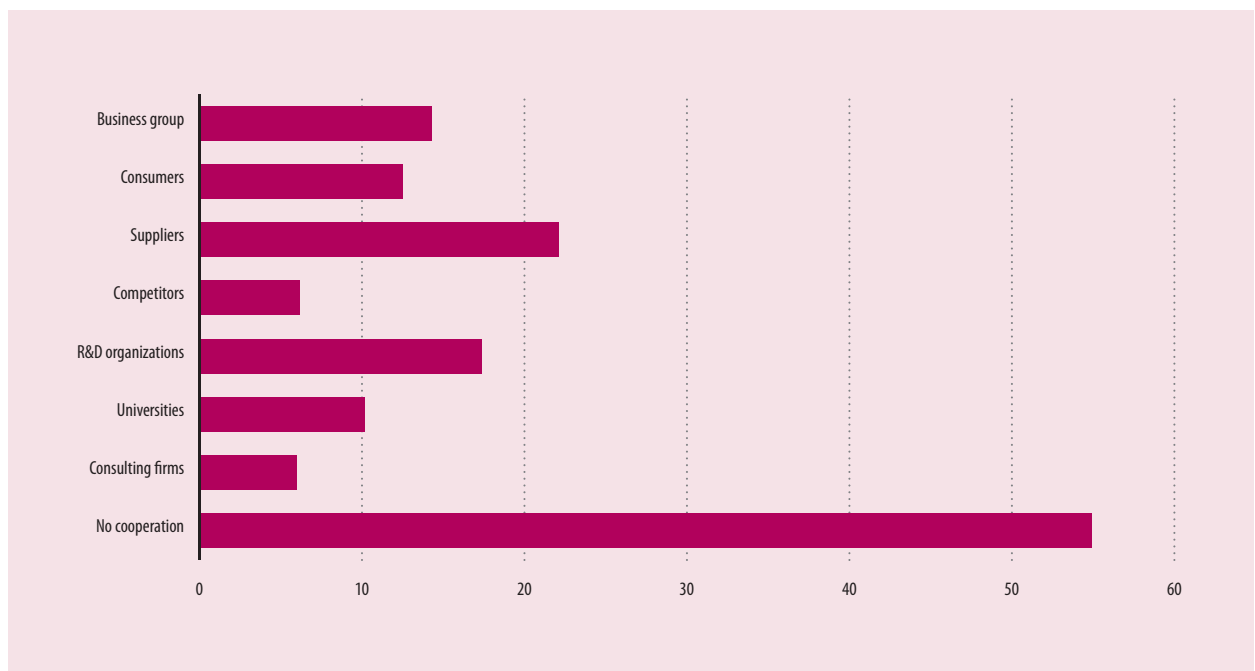
(EU) economies (Figure 2). At the same time, R&D organizations tend to fail to provide technologies at the required level of readiness, novelty, and competitiveness. Against the background of rapidly growing public appropriations for R&D, these factors have led to a decline of business enterprise contribution to gross (domestic) expenditure on R&D (GERD) from 33% to 27% during 2000–10, versus the averages for the OECD area at 65% and for the EU-27 at 55%. The outcome has been underdeveloped linkages in the NIS (Figure 3) and, finally, a minimal proportion of new-to-market innovative products (0.8% of the total industry sales, compared with 3.3% in Germany and 6.3% in Finland) attributed to a follow-up model of technological development.

**Figure 2: Expenditure on technological innovation in industry by innovative activity, %**



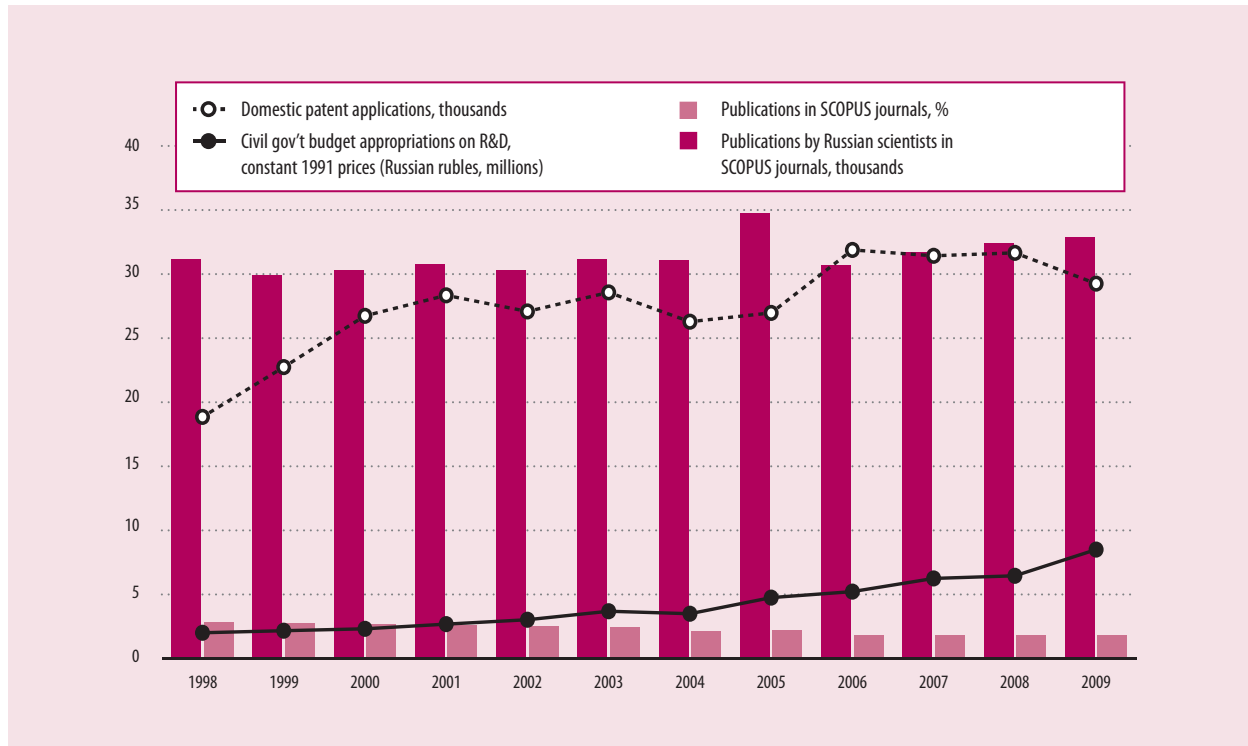
Sources: HSE, 2011; Eurostat, 2008.

**Figure 3: Innovation cooperation in industry, % of innovative companies cooperating with particular types of establishments (2010)**



Source: HSE, 2011.

**Figure 4: Government expenditure on R&D and S&T output in the Russian Federation**



Source: HSE, 2011.

Note: SCOPUS is the Elsevier SciVerse Scopus citation database.

- Institutional model and the performance of the R&D sector.* The Russian R&D sector still retains the Soviet institutional model in terms of its organizational structure and state participation.<sup>5</sup> It is heavily biased towards research institutes and allied R&D-performing organizations legally independent of both universities and enterprises. These organizations concentrate over 80% of GERD; the remaining share is nearly equally divided between the two latter. Because of the deterioration of R&D activities at some public higher education establishments and the rapid growth of a respective private network during the last two decades, only 45% of universities

are involved in R&D. The gap between science and education has been affecting the quality of teaching staff and educational programmes, and hampers the competitiveness of university graduates in the labour market.

Government funding of civil R&D has increased fourfold since 1998 (Figure 4) and amounted to US\$14.9 billion (at purchasing power parity),<sup>6</sup> thus achieving the level of similar indicators for France, the Republic of Korea, and the United Kingdom (US\$14–17 billion), and outpacing Italy and Canada (US\$8–12 billion).<sup>7</sup> This intensive influx of funding has not been reflected in adequate performance trends, however, either in

scientific articles or patents. Given the intensive efforts of other nations to improve their S&T and innovation capacities, the Russian Federation's ranking in related scores has declined (Table 1). Furthermore, the R&D sector in the country remains underfinanced, reaching only 54% of the 1990 GERD level, and its R&D-to-GDP ratio is 1.16% (2010). These tendencies result in a low competitive NIS experiencing difficulties in producing and exporting high-tech products to global markets.

- Sectoral discrepancies.* Different sectors of the economy tend to differ significantly in all major S&T and innovation indicators. The percentage of innovative enterprises varies from 23 to 36%

in pharmaceuticals, computers, telecommunications equipment, and aerospace (which matches the EU industry average) to 2% in specific extracting industries. Service sectors also demonstrate lower levels of innovativeness than they do in the EU. Inter-sectoral and sometimes intra-sectoral differences in the novelty of technological bases, quality of the labour force, and efficiency of corporate governance lead to the fragmentation of Russian industry into technologically and economically incompatible segments.

- *Regional polarization.* The regional dimension represents one more vector of NIS fragmentation. Regions are characterized by diverse business climate conditions, competition regimes, and availability and accessibility of both innovation and non-innovation (standard) infrastructures (e.g., energy, transportation and logistics, healthcare, education, etc.). Particular combinations of such factors could result in a self-retaining deadlock hampering regional development and prosperity.

Our analyses suggest that this situation requires a shift towards a new regulatory model expressed by a comprehensive and well-balanced policy. Such a policy should have a long-term focus, and should identify and promote prospective priorities with particular attention to emerging post-industrial markets. It should not necessarily be linked to a traditional earlier-obtained understanding of economic growth.

### Russian S&T and innovation policy: A new model

Learning from over 20 years of the post-Soviet evolution of the

**Table 1: Competitive positions of Russian S&T**

Basic Research	
Publications in Thomson Reuters Web of Science journals: ranking, 2010	Citations, ranking, 2010
Russian Federation: 16 (1995: 7)	Russian Federation: 27
China: 2 (1995: 14)	Brazil: 18
	India: 15
	China: 4
Applied Research	
Triadic patent families, 2009	Export of technology, 2010 (billions)
Russian Federation: 63 (1995: 63)	Russian Federation: US\$0.6 (2010)
United States of America: 13,715 (1995: 12,361)	Hungary: US\$2.7 (2009)
China: 667 (1995: 21)	Finland: US\$9.1 (2009)
Israel: 339 (1995: 161)	United States of America: US\$89.1 (2009)
Share of new-to-market innovative products in total sales, 2009 (%)	Share in global high-tech exports, 2009 (%)
Russian Federation: 0.4	Russian Federation: 0.20
Germany: 3.3	Hong Kong (China): 8.94
United Kingdom: 2.0	Singapore: 6.61
	Republic of Korea: 5.27

Sources: Gokhberg and Kuznetsova, 2011a, 2011b.

Russian S&T and innovation policy framework (see Box 1), several key principles for efficient regulation at a new stage of socioeconomic development can be derived:<sup>8</sup>

- Since the state remains the key actor of innovative development, prompt and consistent efforts should be made to increase the efficiency of allied policies on both demand and supply sides. One of the areas that must be addressed is the innovation-oriented public procurement system, possibly differentiated along the phases of the innovation cycle. To be successful, it is necessary to ensure the coordination of innovation strategies of state-owned companies, public R&D organizations, universities, and governmental agencies. Regular monitoring and evaluation of the initiatives launched is crucial to

identify and disseminate successful practices.

- Indirect instruments (tax incentives, innovation-friendly customs and export regimes) should be carefully evaluated to determine their efficiency and actual administering practices. A revised taxation system is needed for start-up companies and transactions involving intellectual property rights (IPR) that takes innovation costs into account (e.g., costs of allied technology acquisitions, design, engineering, and training activities), exporters of innovative products and services, and so on.
- One of the most important functions of the state is the facilitation of networking and collaborative initiatives among NIS actors. An unfavourable business environment in a combination with high commercial risks of

innovation can halt or postpone self-governed interactions. Under these conditions, specific public-private partnership regimes prove to be an efficient instrument for easing interaction barriers.

- To increase performance of the national R&D sector, reforming its institutional structure is essential. Identifying and promoting the centres of excellence and best-performing research groups in different fields of S&T and in various forms, and fostering of their communication and cooperation should become a principal focus of this policy domain.
- Proper sectoral specialization of the innovation policy seems to be crucial for the Russian industry, at least in the mid term. Limiting policy measures primarily to high-tech sectors, as it used to be, results in the excessive concentration on the technology aspects of innovation, restricting its scope and applications. Addressing mass-scale innovation processes across all sectors can ignite more significant effects for the economy and quality of life.
- Incorporating social interests and concerns into the innovation policy design process can significantly increase its impact. Leveraging the uneven access to innovation for different social groups and understanding the specific needs of those groups can produce extra drivers for both demand and supply of innovation. Ignoring such heterogeneity creates severe obstacles for the public perception of innovation and enabance of innovation-driven growth.

Recent official initiatives indicate a new step towards efficient and systemic policy making for S&T and innovation. Strategy-2020,<sup>9</sup> which

intended to complete the transition to sustainable evolution of the Russian Federation's economy and society, contains a chapter entitled 'From Stimulating Innovation Towards Innovation-Based Growth'.<sup>10</sup> It presents scenarios and recommendations for systemic policy mix focusing on the following key areas:

- fostering mass innovation activities in all sectors of the economy rather than an excessive and myopic focus on high-tech;
- ensuring modernization and activation of innovation in the existing industry sectors and facilitating the growth of emerging technology-based markets;
- increasing the impact of innovation policy via particular efforts to stimulate resource efficiency; to promote networking and outsourcing services for innovative companies; and to decentralize decision-making in favour of regions, businesses, and development institutions;
- combining stimuli to both demand for innovation and quality of innovation supply; and
- facilitating social aspects of innovation (by developing human resources and promoting the creative class, by including vulnerable social groups, and improving the public perception of innovation).

The recommendations of Strategy-2020 have already been widely communicated and have contributed to the adjacent activities at different levels of the government. These recommendations are also strongly linked to the above-mentioned Strategy for Innovation Development. Importantly, the newly promoted mechanisms of S&T and innovation policies are considered within an integral framework of

broader economic reforms aimed at improving the business climate, fighting corruption and removing administrative barriers, privatizing state-owned companies, stimulating investment and exports, and so on, thus distinguishing it from previous stages by a horizontal synchronization towards a whole-of-the-government policy.

One of the principal outcomes of such synergy is the broadly accepted importance of linkage-stimulating instruments. The next section provides an overview of some of the most recent initiatives in this regard.

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#### **Priority focus: Promoting linkages and managing interfaces**

Networking within the NIS appears to be not only a factor of efficiency, but also the prerequisite for its proper functioning.<sup>11</sup> Encouraging dynamics of knowledge, ideas, technologies, and competences is a subject of appropriate state intervention and facilitation.<sup>12</sup> A particular set of the latest policy initiatives in the Russian Federation is targeted at covering persistent innovation cleavages discussed earlier by fostering collaboration between various NIS actors.

#### **Integrating science and education**

- A network of national research universities was established by nominating leading higher education establishments with a competitively granted status. The selection was held in two rounds (in 2009 and 2010) distinguishing 27 national research universities on the basis of the multi-criteria performance evaluation, including the quality of education they provide, the level of research they undertake, their available human capital, international acknowledgement, their



financial sustainability, and the validity of proposed development plans. The status of ‘national research university’ allows recognized universities to access additional public funding in order to support new academic programmes, international mobility, and research infrastructure. It has a limited span of 10 years and can be cancelled ahead depending on annual performance monitoring.

- Support provided to Science-Education Centres introduces another flexible option for promoting the integration of R&D and educational activities within universities and research institutes. The support envisages involvement of students into R&D activities, boosting internal and international academic mobility, and facilitating the diffusion of competences. Research groups consisting of senior scientists and junior scholars (post-graduate and graduate students) are encouraged to apply for earmarked grants that provide support for three years.
- Attracting the world’s leading scientific competences to Russian universities is another direction of state intervention. A large-scale programme launched in 2009–10 provides 79 grants in the range of up to US\$5 million each to integrate internationally acknowledged scientists into university research labs. These grants cover a wide spectrum of S&T areas such as astronomy and astrophysics, mathematics, physics, nuclear energy, chemistry, biology and biotechnology, information and communication technologies, space, energy efficiency, medicine, nanotechnology, Earth sciences, advanced materials, electronics, ecology,

### Box 1: Periods of S&T and innovation policies in the Russian Federation: 1990–2012

*Post-Soviet ‘market romanticism’ (early 1990s):* Drastic changes in governance and economy resulted in a striking decrease of R&D funding; the disintegration of human resources; and the disturbance of established linkages and networks, production, and technology chains caused by dissipation of the centralized planning system and execution flaws. Hopes for efficient self-reorganization of S&T and innovation by market drivers were never realized. The first attempts to establish new mechanisms of R&D funding and governance (public science foundations, state research centres, etc.) were made.

*Stagnation (‘market formalism’, mid 1990s):* The key focus of government initiatives concerned principal economic reforms overshadowing S&T and innovation policy. Actual measures were fragmentary and targeted mainly at slowing down further NIS disorganization.

*Recovery (‘market pragmatism’, end 1990 to early 2000s):* First efforts to specify strategic policy objectives took place, accompanied by a gradual increase in budgetary R&D financing, experimentation with competition-based public funding, and further development of innovation infrastructure. The overall focus of actual S&T and innovation policy was narrowly targeted at short- and medium-term issues. Delayed-effect initiatives were limited. Debates on reforming the institutional structure of public R&D institutions and funding schemes continued without much progress, while innovation remained a marginal activity for enterprises that faced economic and ownership-protection challenges.

*Agenda for transition to the knowledge economy (2004–09):* The ideas of innovation development had been rooted deeply

within the official policy discourse. Much effort was devoted to creating a structured policy framework and efficient regulation. National S&T foresight became a basis for the identification of priority S&T areas, and included a list of critical technologies. Major national development institutions for technology commercialisation and innovation were established—for example, the Russian Venture Company Vneshekonombank to support investment projects, and so on. This period also is associated with the launch of the Russian Nanotechnology Programme and the creation of Nanotech Corporation (RUSNANO) to foster development of nanotech goods and services and their market penetration.

*Post-crisis ‘innovation-based growth’ (end-2000s to present):* Responding to the effects of the world economic crisis and reacting to the limited performance of existing measures, the government has introduced a number of initiatives to increase the regulative potential of S&T and innovation policy framework. Specific actions started to improve efficiency of the R&D sector (national research centres, national research universities), strengthen university research and its cooperation with industry, intensify innovation activities of state-owned companies, provide indirect incentives to innovative enterprises, and revitalise innovation initiatives at the regional level. The Strategy for Innovation Development adopted by the government in December 2011 and the innovation policy chapter of a new Socio-Economic Strategy till 2020 (Strategy-2020) were designed for the forthcoming decade on a more systemic basis.

**SOURCES:** Gokhberg et al., 2009, 2012; Gokhberg and Kuznetsova, 2011b; OECD, 2011b.

psychology, cognitive sciences, economics, sociology, and so on. The main requirements that need to be met to obtain one of these grants are the presence of a research leader at the university for least four months a year, independent external evaluation, and publication of results in international, peer-reviewed journals.

#### Encouraging university-industry linkages

- The facilitation of university spin-offs by promoting innovation infrastructure (business incubators, techno parks, engineering centres, and the collective use of research equipment and S&T information) was initiated in 2010 via a competitive subsidies programme. Subsidies provide support to IPR protection, advanced training of personnel, and consultancy by Russian and foreign experts in the area of technology transfer and innovation management. Two contests allowed the selection of 78 universities for three-year-long projects.
- A co-funding scheme for research cooperation between industrial companies and universities began in 2010. The scheme is intended for technology projects resulting from university R&D. Companies should provide the same amount of financing as the government, and no less than 20% of the public subsidy must be spent on R&D, while the rest should be invested in tooling-up and implementation.

#### Fostering industry demand for R&D

- An agenda for altering the regimes of the innovation behaviour of major business actors in Russian industry is reflected in the 'innovation enforcement' initiative, implying obligations for

the mandatory elaboration and execution of innovation-development strategies for 46 large state-owned companies (including, for example, Gazprom, Rosneft, Transneft, Rosatom, Federal Electricity Company, Aeroflot, and Russian Railways) since 2011. Coupled with annual evaluation, these strategies pursue a significant increase of R&D expenditure, the adoption of technologies meeting state-of-the-art efficiency and ecology standards, and an increase of labour productivity and exports. Particular attention is attributed to enhancing companies' cooperation with universities and R&D institutes, innovative small and medium enterprises, and development institutions. Companies are encouraged to facilitate spin-offs and corporate venture funds in collaboration with external investors. A twofold increase of the total R&D spending of the companies involved in 2010–13 is envisaged, and their funding of university R&D is expected to grow by 64%. Ten other large companies were encouraged to participate in the initiative in 2012.

#### Promoting S&T networking

Technology platforms—networks based on partnerships—launched in 2011 are targeted at fostering communication and pre-competitive collaboration among leading producers, suppliers, research organizations, universities, and engineering companies.<sup>13</sup> These platforms are organized as public-private partnerships. Currently, the list approved by the government includes 30 technology platforms selected out of over 200 initial proposals according to the criteria of legibility of collaboration objectives, market prospects,

involvement of key players in S&T and business. Listed among the listed technology platforms are Medicine of the Future, Bioindustry, Supercomputer Technologies, Laser and Optical Technologies, National Software Platform, Aircraft, Space, National Information Satellite System, Radiation Technologies, Intellectual Energy System, Green Thermal Power Engineering, Renewable Energy, Distributed Energy Generation, Intellectual Railroads, New Polymer and Composite Materials and Technologies, Mineral Resources Extraction, Deep Processing of Hydrocarbons, Mechatronics and Embedded Systems, Exploration of the Ocean, and Technologies for Eco-Development.

Two types of technology platforms can be distinguished. The first is represented by those platforms notable for higher business concentration ratio and centred around large companies. Their primary focus is pre-competitive research to meet the demand for technological modernization. These activities are closely connected to companies' innovation strategies. The second type comprises other platforms marked by a lower involvement of large companies but an approach that unites research organizations, universities, and small and medium enterprises and that focuses on establishing and communicating a joint long-term vision of thematic priority areas. The role of the government in both these platform types lies in maintaining favourable conditions and removing administrative barriers.

#### Technology and commercialization interfaces

One of the most resounding projects is the presidential initiative that resulted in founding the Skolkovo Innovation Centre<sup>14</sup>—an



ex-territorial innovation centre with the objective of concentrating intellectual resources and business competences, and promoting Russian innovation activities internationally. It is based in a suburb near Moscow and includes a technology university (SkolTech) that is being developed in collaboration with the Massachusetts Institute of Technology (MIT). It also includes several thematic clusters (information technology, space, biomedical, energy efficiency, and nuclear) and a technopark. The participants of this agglomeration enjoy special taxation and customs regimes while benefiting from communications with investors and fellow innovators. Companies from all regions are encouraged to propose innovation projects, and the contest winners receive funding and allied services (project consultancy, IPR protection, and promotion of international visibility). There are 19 joint R&D centres established by Skolkovo in partnership with leading global companies (such as SAP, IBM, Intel, Microsoft, Siemens, Nokia, etc.). Other forms of alliances with transnational and domestic businesses include corporate venture funds, co-investment in start-ups, and co-financing of research and education infrastructure. The accumulated best practice experiences are supposed to be implemented in some other regions of the Russian Federation notable for high-class R&D and innovation capacities. Time will show whether this approach will be a success or failure.<sup>15</sup>

A regional innovation clusters initiative was announced in March 2012. This initiative implies the bringing of appropriate infrastructure towards specific locations with already-established innovative production or with promising technology chains. Clusters involving

closely located and interlinked companies, R&D organizations, and universities will be supported from both federal and regional budgets on the basis of matching funds to resolve existing infrastructure bottlenecks. The clusters are expected to ensure positive externalities to the overall innovation system of the region, attracting employees to intellectually intensive jobs. At the same time, the cluster participants are encouraged to join related technology platforms in order to amplify the effects of within-cluster advancements and broaden their cooperation networks.

Altogether, the described innovation policy measures provide some specific evidence of the ongoing transformation of the NIS. In some cases, certain particular impact of particular incentives has been immediate and visible (such as, for example, absolute growth in university and business R&D, venture capital, and regional efforts), but it is too early to judge their major socioeconomic effects. The newly designed overall Strategy-2020 policy framework will be launched by the country's new government in the second half of 2012, and its outcomes will depend heavily on the coordinated and systemic actions of the government pursuing forward-looking objectives and meeting the needs and interests of businesses and civil society. The rule of law, a positive business climate and competition, incentives for foreign direct investment, policy transparency, and trust are among the key factors required for such goals to be achieved.

#### Notes

- 1 Åslund, 2007; OECD, 2011c.
- 2 Rosstat, 2011.
- 3 Gokhberg and Kuznetsova, 2011b.
- 4 See also Gokhberg and Kuznetsova, 2010.

- 5 Gokhberg et al., 2009.
- 6 A 'billion' is 1,000 million.
- 7 OECD, 2011a.
- 8 Gokhberg and Kuznetsova, 2011a, 2011b.
- 9 This document resulted from a dialogue among a wide group of leading experts, both domestic and international, with top-level government officials. See <http://2020strategy.ru/g5>.
- 10 Gokhberg and Kuznetsova, 2011b.
- 11 Powell and Grodal, 2005.
- 12 Hekkert et al., 2007.
- 13 Rudnik, 2011.
- 14 See <http://www.sk.ru/en/>.
- 15 For a discussion of design and implementation problems related to government policies for entrepreneurship and venture capital, see Lerner, 2009.

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