The Present State of Science, Technology and Innovation Policy in Russia

Irina Dezhina
D.Sc., Economics of Science Division
Institute of World Economy and International Relations
Russian Academy of Sciences
dezhina@imemo.ru
Contents

- Major trends in R&D complex
- Human resources policy
- Structural challenges
- Technological priorities and innovation policy
- Big Infrastructural Project (Skolkovo)
- Conclusions
Major Trends in Financing R&D

- Government remains the major source of R&D financing and its share is growing (60.9% from the total expenditures on R&D in 2005, 63.1% - in 2008, 66.5% - in 2009).

- Business enterprise expenditures on R&D are low (26.2% of the total in 2009 – the highest share ever).

- Foreign financing has decreased from 16.9% of total expenditures on R&D in 1999 (this was maximum) to 6.5% in 2009.

- Government claims growing competitive approach in distribution of government funds; however share of competitive funding is low (Academy – 16.7% in 2009).

- Very low share of grant form of financing.

Source of data: HSE.
Types of Government Financing of R&D, % to total

- Block funding
- Government contracts
- Grants
- Other

<table>
<thead>
<tr>
<th>Year</th>
<th>Block funding</th>
<th>Government contracts</th>
<th>Grants</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>47.3</td>
<td>33.7</td>
<td>6.9</td>
<td>6.1</td>
</tr>
<tr>
<td>2007</td>
<td>47.5</td>
<td>35.8</td>
<td>6.1</td>
<td>10.6</td>
</tr>
<tr>
<td>2008</td>
<td>47.4</td>
<td>34.1</td>
<td>6.7</td>
<td>11.8</td>
</tr>
<tr>
<td>2009 (preliminary)</td>
<td>45.0</td>
<td>34.8</td>
<td>5.6</td>
<td>14.6</td>
</tr>
</tbody>
</table>
## Expenditures on R&D, by Country (data for 2008)

<table>
<thead>
<tr>
<th>Country</th>
<th>Expenditures on R&amp;D, % GDP</th>
<th>Share of the Federal Budget in total expenditures on R&amp;D, %</th>
<th>Expenditures per researcher, thousand USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>3.44</td>
<td>15.6</td>
<td>208.2</td>
</tr>
<tr>
<td>USA</td>
<td>2.68</td>
<td>28.3</td>
<td>279.3</td>
</tr>
<tr>
<td>France</td>
<td>2.08</td>
<td>38.3</td>
<td>198.2</td>
</tr>
<tr>
<td>Russia</td>
<td>1.03</td>
<td>63.1</td>
<td>50.0</td>
</tr>
</tbody>
</table>
Major Human Resources Problems

- Continuing outflow of researchers from science
- Structural changes: overall aging of researchers, decreasing share of “middle-aged” researchers
- “Channeling” youth through science
- High speed of outflow of personnel assisting in R&D
- Low mobility, “brain drain” instead of “brain circulation”. Low number of Russian-speaking researchers returning back to Russia
Changes in R&D Personnel, % to the Previous Year

2002 2003 2004 2005 2006 2007 2008 2009

-1.7 -1.4 -2.2 -3.1 -0.8 -0.7 -5 -2.5

All categories in R&D

Researchers
Age Structure of Russian Active Researchers

Age Structure of Russian Science

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Younger than 29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 and older</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent
Average Age of Scientists in Russia
## Russian Publications by Field

(average – 2.6% in the total number of world publications)

<table>
<thead>
<tr>
<th>Field</th>
<th>Share in total world publications, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>9.68</td>
</tr>
<tr>
<td>Space Research</td>
<td>7.66</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>8.07</td>
</tr>
<tr>
<td>Chemistry</td>
<td>6.15</td>
</tr>
<tr>
<td>Mathematics</td>
<td>5.68</td>
</tr>
<tr>
<td>Material Science</td>
<td>4.73</td>
</tr>
<tr>
<td>Engineering</td>
<td>3.84</td>
</tr>
<tr>
<td>Molecular Biology</td>
<td>2.48</td>
</tr>
<tr>
<td>Clinical Medicine</td>
<td>0.70</td>
</tr>
</tbody>
</table>
(Source: S&El-2010)

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of articles in international co-authorship</th>
<th>% of increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1998</td>
<td>2008</td>
</tr>
<tr>
<td>China</td>
<td>4228</td>
<td>19300</td>
</tr>
<tr>
<td>India</td>
<td>2022</td>
<td>5209</td>
</tr>
<tr>
<td>UK</td>
<td>18360</td>
<td>33948</td>
</tr>
<tr>
<td>USA</td>
<td>43254</td>
<td>78348</td>
</tr>
<tr>
<td>Germany</td>
<td>19869</td>
<td>33541</td>
</tr>
<tr>
<td>France</td>
<td>15293</td>
<td>25097</td>
</tr>
<tr>
<td><strong>Russia</strong></td>
<td><strong>6865</strong></td>
<td><strong>7809</strong></td>
</tr>
</tbody>
</table>
Recent Science and Innovation Policy Directions

- Structural changes: strengthening research in universities, start of reform in government sector of science
- Attracting best scientists to Russia
- Diversification of financial instruments (State Corporations, Venture Funds) to boost innovation
- New Law allowing to create start-ups
- Big Infrastructure projects (Kurchatov, zones, Skolkovo)
Organizational Changes in R&D Complex

- Preferential support of best universities (new status of “research university” was given to 29 Russian universities in 2009-2010). Total additional government financing – 1.7 billion USD for 2009-2014.

- Creation of 7 “Federal universities” by joining several higher educational institutes. Government financing for program development – 0.6 billion USD for 2010-2012.

- Special status to MSU and SPbSU – as to “unique research-educational complexes”. Federal financing for 2011-2013 – 1.75 billion USD.

- Russian Academy of Sciences (468 organizations) – 3.2 billion USD for 2011-2013. Start of reform – 2011 (3 groups of institutes will be identified).
Research and Federal Universities: What is Missed?

- Flexibility in spending budgetary financing
- Possibility to invest in campuses and infrastructure
- Changes in teaching loads
- More flexibility in curriculum
- Ability to hire foreign highly qualified specialists on a long-term basis is limited
New Legal Environment to Attract Highly Qualified Foreign Citizens

- Highly qualified specialist: the one whose salary for a period up to 1 year is 2 million RUR (67 thousand USD) or more.
- Such specialist may work under 3 year contract and pay 13% income tax (instead of 30%)
- Problems:
  - Real qualification is not checked
  - Salary is not connected to calendar year or to monthly payments
  - Taxes underpaid in Russia should be paid in home country
  - Preferential conditions are not applicable for family members accompanying specialist
Grants to Universities to Establish Labs Chaired by Leading Scholars

**Conditions of award:**
- **0.4 billion USD in 2010-2012**, up to 5 million USD per project for 3 years. Possible prolongation – for 1-2 years
- Award is given to university; researcher and his team may get up to 60% for salary. Researchers from Moscow can not apply to work in Moscow universities; the same is true for all regions.
- Invited scholar has to spend **4 months** annually in Russia.

**Results:**
- 40 awards (planned – 80)
- Level of competition: 13:1
### Competition Results (Grants to Establish Labs)

<table>
<thead>
<tr>
<th>Origin of a Scholar</th>
<th>Applications, % to total (N=507)</th>
<th>Grants, % to total (N=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian researcher living in Russia</td>
<td>43%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Foreign citizen</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>Russian-speaking diaspora</td>
<td>22%</td>
<td>52.5%</td>
</tr>
</tbody>
</table>
Grants to Establish Labs: Limitations and Problems

Limitations:
- 4-months stay in Russia – difficult for professors in Universities and scholars from National labs.
- Weak research infrastructure in universities (technical; material; personnel).

Problems:
- Too much money for a short period of time (especially for 2010).
- Short period for establishing the lab – 2 years (NIH – 5 years).
- Low requirement to labs output (at least one article per 18 months and/or 1 patent).
- Absence of government vision on how the labs should look like after 2012.
# Diaspora: Most Attractive Forms of Cooperation (in descending order)

<table>
<thead>
<tr>
<th>Natural and Technical Sciences</th>
<th>Social Sciences and Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending conferences in Russia; consulting</td>
<td>Joint research conducted in parallel in home countries</td>
</tr>
<tr>
<td>Expert evaluation of research projects, articles review</td>
<td>Joint publications</td>
</tr>
<tr>
<td>Joint research conducted in parallel in home countries</td>
<td>Lecturing in Russian universities</td>
</tr>
<tr>
<td>Lecturing in Russian universities</td>
<td>Attending conferences in Russia; consulting</td>
</tr>
<tr>
<td>Establishing joint labs, and other organizations</td>
<td>Writing reviews in Russian journals</td>
</tr>
<tr>
<td>Visits of Russian students to foreign labs chaired by Diaspora</td>
<td>Guidance to Russian graduate students</td>
</tr>
</tbody>
</table>
## Initiatives to Strengthen Research and Innovation in Universities

<table>
<thead>
<tr>
<th>Goal</th>
<th>Volume of financing</th>
<th>Conditions of award</th>
</tr>
</thead>
</table>
| Development of innovation infrastructure in state-owned universities | 0.27 billion USD for 2010-2012  
No of awards in 2010 - 56                                                   | Financing may be spent to create incubators, TTOs, for IPR protection, development of skills, consulting services provided by Russian and foreign experts |
| Large collaborative projects with universities aimed to create high tech industry | 0.63 billion USD for 2010-2012, up to 3.3 million USD per project annually  
Grantees in 2010: 107 companies; 99 universities (112 projects)  
Companies: existing linkages + affiliated companies.  
Government counted on collaboration with state-owned companies (Gazprom (0), United Aircraft Building Corp.(0), Russian Railroads (1)) | Financing is given to companies that have to outsource at least 60% of R&D to universities. Company co-share – 100%.  
From the co-share at least 20% should be spent on R&D (i.e. university gets 120% of the total project cost). |
## Place of Russia in International Ratings of Innovation Activity

<table>
<thead>
<tr>
<th>Global Innovation Index</th>
<th>Number of indicators in index</th>
<th>Top 5 countries</th>
<th>Position of Russia</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSEAD</td>
<td>94</td>
<td>Iceland, Sweden, Hong Kong, <strong>Switzerland</strong>, Denmark</td>
<td>64</td>
</tr>
<tr>
<td>Boston Consulting Group</td>
<td>24</td>
<td>Singapore, South Korea, <strong>Switzerland</strong>, Iceland, Ireland</td>
<td>49</td>
</tr>
<tr>
<td>Economy Finance Development</td>
<td>61</td>
<td>Sweden, Finland, USA, <strong>Switzerland</strong>, Netherlands</td>
<td>49</td>
</tr>
<tr>
<td>Economist Intelligence Unit</td>
<td>52</td>
<td>Japan, <strong>Switzerland</strong>, Finland, Germany, USA</td>
<td>39</td>
</tr>
</tbody>
</table>
Technology Development: New Presidential Priorities

In June 2009 President Medvedev announced new priorities of “Technological Breakthrough”:

- Energy efficiency
- Nuclear technologies
- Space technologies including telecommunications
- Medical equipment
- Strategic information technologies including supercomputers

Government agencies, foundations, state corporations and Academies are reorienting to these priorities. RAS: 23% (2009) and 36% (2010) of financing in fundamental research is within 5 priority areas. Russian Foundation for Basic Research – 14%. Russian Venture Company – 83%. **Loosely formulated.**

Total government spending for these 5 priorities in 2010 is 12.04 billion USD or 33.3% of the total federal expenditures on innovations.
Distribution of Federal Expenditures by Presidential Priorities

- Energy efficiency: 39%
- Space and telecom: 27%
- Strategic Information technologies: 19%
- Medical equipment: 8%
- Nuclear technologies: 7%
## State of Innovative Infrastructure (data for 2010)

<table>
<thead>
<tr>
<th>Organization (company)</th>
<th>Number of projects</th>
<th>Total financing, billion USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUSNANO</td>
<td>94</td>
<td>10.1 (share of RUSNANO – 40.6%) (data for Nov.3, 2010)</td>
</tr>
<tr>
<td>Russian Venture Company</td>
<td>29</td>
<td>0.15</td>
</tr>
<tr>
<td>4 high-tech development zones</td>
<td>162</td>
<td>4.1</td>
</tr>
<tr>
<td>Russian Development Bank (loans to small companies)</td>
<td>214</td>
<td>1.4 (in loans)</td>
</tr>
</tbody>
</table>
RUSNANO Special Status

Rights

- Selects R&D projects for financing
- Finances educational activities
- May conduct entrepreneurship activity
- May create nonprofit organizations
- May create own funds
- Law on bankruptcy is not applicable to the Corporation
Activity of RUSNANO (2008-2009)

- Government has released 130 billion rubles (4.8 billion USD) for 2007 – 2015
- Corporation received 1445 applications-requests for financing in 2008-2009.
- Total 61 projects were approved; 17 projects are receiving financing (equal to 1.1 billion USD). It is on schedule.
- Foreign applicants: 76 from 22 countries.
- 83% of submitted projects are in area of reconstruction of existing or building new industries; 4% - in R&D; 3% - infrastructure projects; 1% - educational projects.
- By the end of 2010 RUSNANO should be transformed into public corporation with 100% government share (Law on reconstruction of RUSNANO from July 26, 2010).
State of Innovation Activity in Business Sector

- Official statistics: 9.4% of industrial enterprises conduct innovations (sample – about 36,000 enterprises; 2009). From them 31% invest in R&D.

- Survey (2009, HSE, 1000 manufacturing industry): 83% conducted innovation activities. But:
  - Invest in R&D - 36%;
  - Majority enterprises are oriented on domestic market;
  - Only 3% developed products (technologies) that are new at international market; 19% - new at domestic market; others – develop new for their company or imitate.

- Survey PWC (2010) of 100 large companies: among private companies the share of innovative ones is 4 times higher then among state-own or controlled.

- EU countries: level of innovation activity differs from 27% (Greece) to 75% (Israel).
Government Policy to Stimulate Innovations in Industry

- Big government-owned companies (total about 55) – 31 of them have to develop strategies for innovation development. Requirement: cooperation with universities.
- Start-ups: Law 217-FZ of August 2, 2009 allowing universities and R&D institutes to found small innovative companies. A number of problems identified related to application of the law. As a result:
  - Planned to create to the end of 2009 – 929 small companies;
  - Fact (October 2010) – 560.
- Start-ups for further venture financing: government estimations – in order to have 1000 venture deals – there should be about 10,000 start-ups annually. Fact: about 2,000 start-ups are created annually. USA: 50,000.
  Budget allocations to Fund for Assistance will be decreasing.

- In February 2010 President D. Medvedev announced the intention to create a modern science-technological complex aimed at development and commercialization of new technologies in 5 priority areas.
- Decision making: pure “governmental” project - its concept, location and other basic questions were discussed in a narrow circle of government officials. Regional leaders were not included in the discussion.
- Federal financing of Skolkovo will be 1.7 billion USD for the next 3 years.
Skolkovo: Basic Government Assumptions

- Open project (because it is not quite clear in details how it should be designed)
- Skolkovo should become a replication of the U.S. Silicon valley
- University built from the scratch should be a centerpiece of the inno-city
- Orientation towards “import of brains to Russia” (V. Surkov)
- There should be privileged economic conditions within the borders of a new city (the Law 244-FZ ‘About Innovation Center “Skolkovo”’ outlining all economic benefits came into force on Sept. 28, 2010)
Skolkovo: Concerns and Hopes

Concerns:
- According to Mandate, government sees innovation is a linear process (science, R&D, prototype development, production chain).
- Skolkovo is an imitation project but it is combined imitation – a little bit of different (Silicon valley; technopolis; Masdar city). Therefore synergy is questionable.
- Skolkovo will become “intellectual outsourcing” while new technologies will be produced abroad.

Hopes:
- Government is ready to accept foreign assistance to adapt best practices.
- Networking will create new environment for innovation.

But:
- Decision-making process: good advice may be given but not heard.
Conclusions: Positive Aspects

- Government announces innovation development as a priority:
  - financing from the federal budget was increasing for selected organizations (universities) and projects (Skolkovo)
  - new technological priorities were set by the President
  - new institutions established
  - changes in legal environment aimed to strengthen R&D and stimulate innovations came into force.
Conclusions: Concerns

- The decision-making process may be called situational, often choices are made on the basis of political considerations rather than economically justified criteria.
- Lack of monitoring and evaluation of previous initiatives.
- There is a certain degree of misunderstanding of foreign experience (Silicon Valley).
- In R&D complex – absence of organizational reforms lowers possible impact of implemented measures (research universities).
- In innovation area – demand side is weak and not properly encouraged. Business enterprises continue to be a passive actor of innovation system.