**R&D Institutes in ECA: A Reform Strategy**

Jean-Louis Racine, Itzhak Goldberg, John Gabriel Goddard, Smita Kuriakose, and Natasha Kapil

**Key Messages**

- Research and development institutes (RDIs) in Eastern Europe and Central Asia (ECA) need to develop commercial applications in order to boost economic growth in the region. Many of them have not been reformed since the era of central planning and continue to operate in isolation from the productive sectors.

- ECA RDIs can be reformed mainly by introducing selective changes in their ownership and management, and by increasing the role of the private sector in their operation.

- RDI restructuring needs to be accompanied by public funding reforms, with an emphasis on results-based funding and funding that leverages private sector demand.

**Introduction**

In ECA countries, the states own and operate most of the RDIs. These institutes often play an important and even dominant role in conducting research and development (R&D). In high-income economies, however, the private sector typically dominates R&D. Private sector research usually responds better to market incentives, resulting in more useful innovations than public sector R&D, although the two are complementary.

In general, the economic impact of RDIs in ECA has been low. Although several ECA RDIs are able to publish and patent as much as their high-income economy counterparts, the quality of their research and ability to diffuse knowledge is lagging and their international publications are not highly cited. In addition, their patents are not translated into commercial applications through licensing or contract research with industry.

**History**

The RDIs in ECA are a legacy of Soviet-era central planning and have not been restructured for the most part. During the socialist period, most R&D was not done in-house within enterprises and, therefore, was not directly driven by production needs or market demand. The lack of any feedback mechanism from the end users to the sources of innovation further limited the diffusion of technology and innovation. The separation between the supply and demand for innovation was particularly visible in the Soviet Union where industry-research linkages were mediated by the responsible ministries. Funding for all the RDIs was provided directly or indirectly by the state.

Figure 1 shows how the public sector plays a much larger role in ECA than in comparator countries even today. In Bulgaria, Azerbaijan and Kyrgyzstan, for instance, more than 60 percent of R&D personnel in each country are state employees.

**Figure 1: Gross R&D Expenditures by Sector of Performance**

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**Note:** 2004 data used for Croatia, Romania, Malaysia, and Turkey. 2005 data used for all other countries.

**Source:** UNESCO
The Role and Performance of R&D Institutes in ECA

Case studies of RDIs from several ECA countries (Russia, Ukraine, Croatia, Serbia, Poland, and Bulgaria) are used here to investigate the current status of RDIs in ECA, the role they play in providing R&D services to industry, and the challenges they face. The case studies show that, two decades into the transition, many of the RDIs that are still operating as stand alone entities have made limited progress in improving quality and in intensifying their interactions with the overall innovation systems in their countries. They also lag significantly in the range of services provided to industry, knowledge management, licensing, incentive structures, staffing, etc.

Figure 2 illustrates how ECA region RDIs (light blue) have fewer financial resources per staff compared to their OECD counterparts (dark blue). If staff salaries, which usually account for a significant share of expenses in the running of an R&D institute, are adjusted for purchasing power parity, the adjusted income of several ECA region RDIs would still be comparable to that of RDIs like Sintef and TNO in OECD. However, roughly a third of the ECA region RDIs have incomes which, even when adjusted, are a fraction that of RDIs in OECD; the ECA region RDIs are highly under-resourced, which reduces their capacity to retain and attract skilled personnel.

Reform Strategy

A reform strategy is proposed here for RDIs in ECA, based on their relevance to national priorities, expected role as providers of public versus private goods, performance levels, and relation to relevant markets and users. When deciding on the appropriate ownership and management structures for the RDIs, governments need to distinguish among RDIs that provide mainly public goods, RDIs that sell or could possibly sell mainly private goods and services, and RDIs that produce public and private goods. Another essential distinction is between RDIs whose products and services are developed in responding to concrete demands in the market (‘market pull’) and RDIs whose R&D is self-initiated or supply driven, leveraging a core capability to come up with a technology (‘technology push’). This latter dimension is of particular interest to the ECA region RDIs because it strongly differentiates them from RDIs in OECD countries, which tend to be more demand-driven. In ECA, some industrial research RDIs are still dominated by ‘technology push’ strategies, which means that little of their R&D finds its way to the market, for lack of demand. Others provide mostly private goods through ‘market pull’ strategies, which puts into question their public ownership and management structures.

Diagnostic Tools to Guide RDI Reform and Funding

RDIs can be classified in terms of optimal management and ownership structure using two sets of characteristics. Figure 4 shows the continuum between private and public goods production on the vertical axis, and a classification of RDIs by their relation to relevant markets/users on the horizontal axis. Within this continuum, the RDI classification can serve as a basis for governments to decide which RDIs should remain government-owned and government-operated (quadrant I), government-owned but operated by contractors or organized as autonomous non-governmental entities (quadrant II), restructured or closed (quadrant III), or privatized to insiders or to outsiders (quadrant IV).
If RDIs are producing a large share of public goods (quadrants I and II), then public support through institutional/strategic funding (for example, block grants) is probably needed to partially subsidize recurrent expenditures such as salaries of researchers and strategic assets. RDIs mostly producing private goods (quadrant IV) should not have access to such funding streams. At the same time, competitive funding allocated based on peer review and public procurement can help to top-up the budgets of RDIs for high-quality projects in more experimental areas; in the case of RDIs in quadrant IV. This should preferably be through matching grants that provide incentives for collaboration with industry from early on. Figure 5 summarizes the questions that ECA policy-makers need to address for each RDI.

**Figure 5: RDI Reform Decision Tree**

Options for Restructuring RDIs
Five restructuring options, together with their characteristics, are identified in Table 1.

**Table 1: Restructuring Options for ECA RDIs**

<table>
<thead>
<tr>
<th>Option</th>
<th>Relevance to public goods RDIs</th>
<th>Effect on market-pull of RDIs</th>
<th>Effect on RDI governance incentives</th>
<th>Political feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Corporatization / autonomy</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td>2. Insider restructuring, Government-owned</td>
<td>+</td>
<td>±</td>
<td>±</td>
<td>+</td>
</tr>
<tr>
<td>3. Government-owned, contractor operated (GOGO)</td>
<td>+</td>
<td>±</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>4. Non-profit Foundation</td>
<td>+</td>
<td>-</td>
<td>±</td>
<td>++</td>
</tr>
<tr>
<td>5. Insider privatization</td>
<td>-</td>
<td>±</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>6. Outsider privatization</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7. Liquidation/closure</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: World Bank Staff

**Corporatization and Increased Autonomy of Government RDIs**

Under this option, governments maintain their ownership and management of RDIs but increase their effectiveness by granting them more autonomy—a good option for RDIs producing public goods with strategic implications such as defense, nuclear, metrology, etc., which have no current or prospective private and commercial clients. Increased autonomy allows the RDIs more freedom in terms of the direction of the innovation activity. However, it sometimes creates a high scope for rent seeking and leaves unresolved the issue of interaction between private and public stakeholders. This form of public/state-owned RDIs may not
be conducive to science-industry collaboration unless certain preconditions, in terms of governance, are placed and sweeteners are made available in the form of public subsidies.

**Insider Restructuring of Government-owned RDIs**

Under this option, the governments restructure the RDIs with the help of the current management, by spinning off non-core activities but maintaining the ownership. Restructuring plans specify the core activities, which activities will be integrated with other organizations or 'spun-off', and which will be liquidated.

Gradual restructuring of RDIs is a voluntary management-driven activity that is funded and facilitated by government programs—it is gradual because it is based on bottom-up initiatives by the management of RDIs and their financial participation. Ownership after restructuring stays with the government, while control is given to the management. It is unclear, however, as to who would be the residual claimant, if there are any profits, which might be the case in the more commercial RDIs.

**Government-Owned, Contractor-Operated (GOCO)**

Under this option, the governments contract out the management of the RDIs to outside contractors who are paid for the services, but maintain ownership. The contractors may be universities or university consortiums, for-profit corporations, not-for-profit organizations, or professional and external management teams, or CEOs. Government ownership addresses the objective of public good provision and the contractor management facilitates meeting market demand and ensuring improvements in internal governance; simultaneously the level of public funding for operating and investment expenses are agreed upon. GOCO contracts were designed to be insulated from political pressures and to better attract and retain talented personnel because they did not have to conform to civil service rules.

**Insider or Outsider Privatization and/or Closure**

The privatization and/or closure option is relevant to quadrants III and IV where private knowledge-based goods and services provide a revenue stream to run RDIs on a purely or mostly commercial basis. Methods of privatization for public enterprises include sale through public subscription, sale of shares to employees, or sale to strategic investors.

The privatization of RDIs in ECA in the 1990s had some negative outcomes. In Russia, privatization in the mid-90s led to acquisitions by investors interested in the valuable real estate possessed by the centrally located RDIs. The investors then typically disbanded the RDIs and used the real estate to develop shopping malls and for other commercial urban uses. One way to deal with the concern about assets is ‘insider privatization’ that is, selling the shares of the enterprises to the researchers.

If a government, as the owner of an RDI, comes to the conclusion that none of the options mentioned in Table 1 can resolve a problem with a particular RDI, the last resort is closure. Usually this is the most difficult option for political reasons (and is, therefore, marked with a ‘double minus’ in Table 1). If the RDI in question produces public goods, the effect of its closure on the economy would be negative. However, if the state-owned RDI sells private goods, the effect of closure would be positive because it would level the playing field vis-à-vis private companies (usually SMEs) which make the same products. Finally, if all options fail, that is, the RDI cannot be transformed into an organization with improved governance, closure would be positive.

**Sustaining RDI Restructuring Through Reform of Public Funding for R&D**

RDI restructuring needs to be done in parallel with public funding reforms for R&D. Along with ownership and management reforms, governments should establish a more transparent basis for allocating R&D funding to the public RDIs in quadrant I (Figure 4). Institutional funding should be made conditional on RDIs meeting observable and measurable performance goals. One way to ensure ‘market-pull’ research would be to move away from block grants or institutional funding, and towards public procurement which should preferably be done through international tenders to ensure that RDIs build and retain their competitiveness. Another way would be to make public resources available through matching grants that require co-financing from private enterprises. Matching grants provide the potential for creating and fostering linkages between the private sector and universities and research institutes, often producing the best research outcomes for the public good.

**About the Authors**

Jean-Louis Racine, Science, Technology and Innovation Specialist; Itzhak Goldberg, Policy and Strategy Advisor; John Gabriel Goddard, Economist; and Natasha Kapil, Private Sector Development Specialist, all from the ECA Private/Financial Sector Development Unit. Smita Kuriakose, Consultant.

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