Advancing Innovation in the Republic of Tatarstan

A Framework for Competing and Thriving in the Global Economy

June 17, 2010

Europe and Central Asia
Private and Financial Sector Development Department (ECSPF)

THE WORLD BANK
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CIS</td>
<td>Commonwealth of Independent States</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FASIE</td>
<td>Foundation for Assistance to Small Innovative Enterprises</td>
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<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GRP</td>
<td>Gross Regional Product</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<tr>
<td>IPR</td>
<td>Intellectual Property Right</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>IVF</td>
<td>Investment and Venture Fund</td>
</tr>
<tr>
<td>KSU</td>
<td>Kazan State University</td>
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<tr>
<td>KSTU</td>
<td>Kazan State Technological University</td>
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<tr>
<td>KTU</td>
<td>Kazan State Technical University</td>
</tr>
<tr>
<td>MEP</td>
<td>Manufacturing Extension Partnership</td>
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<tr>
<td>MoE</td>
<td>Ministry of Economy</td>
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<tr>
<td>NIS</td>
<td>National Innovation System</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<tr>
<td>PE</td>
<td>Private Equity</td>
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<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>RAS</td>
<td>Russian Academy of Sciences</td>
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<td>RF</td>
<td>Russian Federation</td>
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<tr>
<td>RIS</td>
<td>Regional Innovation System</td>
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<tr>
<td>RT</td>
<td>Republic of Tatarstan</td>
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<tr>
<td>RVC</td>
<td>Russian Venture Company</td>
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<tr>
<td>SME</td>
<td>Small and Medium Enterprise</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths, Weaknesses, Opportunities and Threats</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>US</td>
<td>United States of America</td>
</tr>
<tr>
<td>USPTO</td>
<td>United States Patent and Trademark Office</td>
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<tr>
<td>VC</td>
<td>Venture Capital</td>
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<td>WIPO</td>
<td>World Intellectual Property Organization</td>
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Chapter 1

Good Practices in Fostering Regional Innovation Systems
Key Messages

- A broad range of innovation policies are best handled at the regional level and are difficult to achieve through an approach solely based on national innovation systems. This is particularly the case in a large, diverse country like Russia. It is also true for old industrial regions, such as Tatarstan, that are locked in to mature sectors and risk losing their competitiveness unless they pursue further diversification and reengineering of their industrial base.

- Successful regions tend to share two features: they continuously diversify in closely related sectors and they develop high-density, high-quality links between actors in the regional innovation system—firms, R&D institutions, universities, intermediaries, public institutions, and other stakeholders. Regional governments can help promote diversification across sectors and foster links in innovation systems. But because regional innovation systems are constantly evolving, these efforts are difficult to conduct in a top-down fashion, by rigidly supporting certain sectors or firms. Instead, governments must support learning and interactions between innovation stakeholders and the ability of firms to find their competitive advantages in global markets.

- Good practices in regional innovation strategies mostly apply to drawing up a tailor-made strategy, the governance of the regional innovation systems and the ability of local stakeholders to implement the strategy. However, it should be noted that there is no universal set of policies for fostering regional innovation.

1.1 Basic Concepts: the Regional Innovation System

This section introduces regional innovation systems, and why a deep understanding of this concept is important for policy.

“Innovation”

The OECD Oslo Manual identifies four types of innovation: product innovation; process innovation; marketing innovation and organizational innovation. These innovations can be new to the firm/educational institution, new to the market/sector or new to the world. The advantage of using such a broad concept of innovation is that it includes all activities involved in the process of technological change. These range from identifying problems, to generating new ideas and solutions, to the implementation of new solutions and the diffusion of new technologies. Such a broad definition is practical for policy purposes since similar ingredients are required for all of these activities. In effect, at the core of innovation is learning, as a collective process, which includes learning by doing, learning by using, learning by interacting and learning by searching.¹

A broad definition of innovation will be used for the purpose of this report. It will be useful to first define what innovation is not, in order to shed any preconceptions right from the start.

Innovation is not

- **Invention**: innovation is not just about the implementation of an idea but about its application in widespread use, in an institution, the market or society.
- **High-technology**: innovation is a process while high-technology is a product.

Innovation is usually not

- **Radical or revolutionary**: most innovation is incremental. Only very few completely new ideas actually reach a market. It is therefore important to support innovation of different types and intensities.
- **The first-time commercialization of an invention**: while some innovations are patented and generate monopoly rents, most involve learning and experimentation to imitate a technology, process or service already existing elsewhere.
- **Achieved by using high-technology**: although high-technology such as ICTs, biotechnology and nanotechnology can stimulate rapid technological progress in many spheres of economic activity, most innovations evolve around more mundane technologies or concepts, yet create enormous economic value.

“**Innovation Systems**”

The concept of innovation system is useful for innovation policy because it views innovation as being the product of many elements and of the relationship between these elements. **Innovation is nearly never the product of a linear trajectory from R&D in the laboratory to technology in the marketplace.** Experience shows that innovation is much fuzzier. Most innovations fail in one stage or the other. Feedback from manufacturers in the deployment stage, and retailers and consumers in the diffusion stage trickles back to the other stages, completely modifying the course of innovation, leading to new unexpected ideas and products, or unforeseen costs. Sometimes, breakthrough innovations are driven not by R&D but by new business models that put together already existing technologies (see for instance Web.2.0 products and services).

So why does this matter for policy? The linear view gives the misleading impression that innovation can be managed, simply by supplying more research inputs (technology-push) and creating market incentives (market-pull). While both of these types of policies are extremely important, they ignore the contributions of the numerous interactions among the actors involved in the different stages of innovation: firms, consumers, governments, universities and the like. Partnerships, learning by selling or buying a technology and learning through imitation play critical roles. Equally critical are the forces that drive diffusion. The compatibility, perceived benefits and the learning costs of using a new product are all key drivers of innovation. Effective policies must find ways to stimulate all of these facets of the innovation process. In other words, innovation almost never flourishes from a vacuum. It is the interdependence and inter-relationship between different factors...
that make the system work. This is also why governments and support agencies can play such an important role (Figure 1)

Figure 1: Innovation and its environment

“Regional Innovation Systems”

A Regional innovation system (RIS) is a framework for studying economic and innovative performance. It is a functional tool to enhance the innovation processes of firms (Cooke et al., 2004). A RIS comprises a set of institutions, both public and private, which produce pervasive and systemic effects that encourage firms in the region to adopt common norms, expectations, values, attitudes and practices, where a culture of innovation is nurtured and knowledge-transfer processes are enhanced. RIS enhance firm innovation by knitting together knowledge flows and the systems on which they rely, building trust and confidence in institutional reliability, and above all by generating institutional self-knowledge and a certain kind of collective dissatisfaction with the status quo.

A broad spectrum of innovation policies are best handled at the regional level. This is particularly true in a large and diverse country such as the Russian Federation. First, innovation occurs in different ways in different regions because of specific endowments such as industrial structure, research institutions and labour force, and the way they
interact. Second, geographical distance matters for knowledge spillovers. In spite of rapid advance in telecommunications face-to-face interaction is still the most effective way to stimulate frequent and substantive interactions. Geographic proximity also encourages trust in network relationships, which is critical to the creation and dissemination of knowledge and innovation. Regions represent more meaningful communities of economic interest, especially if they have developed clusters, such as in the Republic of Tatarstan. They can take advantage of linkages and synergies among economic actors.

1.2 What Makes a Successful Regional Innovation System?

Successful regions have similar structural characteristics.

A regional innovation system can be deemed successful if it generates shared economic growth. While there has been a long academic debate on what leads to regional growth, sectoral specialization or sectoral differentiation, there is evidence that growth occurs in contexts of related variety economic platforms. In plain words, this occurs when there are closely related industrial sectors operating in geographic proximity of one another. Related variety allows innovation to be diffused more rapidly among communities. Innovation, of course is at the core of this type of diversification. It involves learning new ways of doing new things with existing knowledge and institutional assets.

The implication of this finding is that innovation policy must not be rigidly sectoral (i.e. restricted to a particular industry). First of all, sectoral policies are not sustainable, since they will never protect an industry from moving to lower-cost countries in the long run. Second, rigid sectoral policies prevent scientific and technological opportunities that occur in other sectors from being exploited in the region. Third, while sectors can be neatly defined using statistical definitions, the market is continuously redefining the organization of value chains, and the notion of “sectors” is a moving target. Different tasks within a sector are being conducted in different regions. And these tasks may have more in common with tasks in different “sectors” than with tasks in their own sectors.

Industries are able to diversify into closely related industries through various knowledge transfer mechanisms that operate mainly at the regional level. One is diversification of products and services within firms. A second is entrepreneurship through spinoffs. A third is labour mobility. And a fourth is social networking.

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UNIDO, Industrial Development Report 2009 - Breaking In and Moving Up: New Industrial Challenges for the Bottom Billion and the Middle-Income Countries
Frank Neffke, Martin Henning and Ron Boschma, "How do regions diversify over time? Industry relatedness and the development of new growth paths in regions", Papers in Evolutionary Economic Geography, # 09.16, October 2009
Successful regional innovation systems share several systemic characteristics.

Empirical evidence shows that a strong regional innovation system is one in which there are systemic linkages between internal sources of knowledge (universities and research institutions), knowledge intermediaries (public and private service providers) and firms. This is because innovation is a learning process, and can be triggered by proximity. **Innovative regions tend to have a rich network of intermediary service providers, such as lawyers, accountants, consultants and venture capitalists.** Less innovative regions are not able to draw on these intermediaries and the government steps in to provide support services in the forms of financing, business advice and technological expertise.

External linkages play a particularly important role in less developed regions. They allow these regions to catch-up technologically without having to spend the time and resources to reinvent everything. Transnational corporations create external linkages via knowledge spillovers to local suppliers, via the mobility of their personnel to other local firms or by collaborating with local research organizations. This is a virtuous circle. As regions become more specialized and pull the institutional support structure along, foreign direct investment (FDI) seeks out centres of expertise (Cooke and Morgan, 1998), following domestic investment as part of a global location strategy. This is already occurring in China and India.

And finally, successful regional innovation systems tend to have a good business climate and a good quality of life. A good business climate is necessary to attract businesses from abroad or from other regions and allow local businesses to flourish. A good quality of life and a social environment open to creativity are required to attracted and retain a talented workforce. International experience shows that talented people are not spread out evenly across countries, or even within regions, but tend to concentrate in metropolitan agglomerations.

**Regional governments play a critical role in regional innovation systems**

Policies pursued by regional governments can improve the economy, culture and identity of regions, including their institutional capacity to attract, facilitate and construct competitive advantage. Collective entrepreneurship, by promotion of cooperative practices among actors, can give regions distinctive development trajectories. Assistance to firms in meeting knowledge, skill, finance and other needs, when markets fail to provide, can play a crucial role in their success. Notable regions where government institutions played a role to attract and foster entrepreneurship include Emilia-Romagna in Italy and Baden-Württemberg in Germany.

Differences in economic performance between more or less successful regions can often be explained by the mix of regional innovation policies and institutions that foster economic dynamism. In transitions economies, RIS require policies that align institutional missions and facilitate connections between exploration and exploitation of knowledge. Refocusing of institutional priorities towards entrepreneurship and facilitating seed funding and incubation

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Claudia Werker, “An Assessment of the Regional Innovation Policy by the European Union based on Bibliometrical Analysis”, Papers on Economics and Evolution # 0611, Max Planck Institute of Economics Evolutionary Economics Group
of small firms are among appropriate instruments, as are softer actions such as integrating associative and networking capabilities between exploration and exploitation activities.

A dimension that seems almost completely missing in the way most national innovation systems function is the capability to manage media communication about innovation in a non-dogmatic way. This can be inimical to furthering innovation strategies, since labour supply and demand mismatches arise as market failures owing to the absence of even virtual knowledge spillovers. Governments in most developed regions and many developing countries make injunctions to their businesses to innovate, but this is seldom analysed or popularized in ways that assist non-innovators to gain the necessary knowledge to effect change. A contributing factor is that innovation is seldom communicated in digestible ways to the media. This issue has been at the forefront of concern in the ongoing activities of The Competitiveness Institute (TCI), one of whose members, the Swedish Innovation Agency (VINNOVA), houses the only known dedicated innovation media specialist.

1.3 How to Foster a Successful Regional Innovation System

The rationale for policy intervention at the regional level is to reduce connectivity and interaction deficits. In countries in which there are innovation policy gaps at the national government, such as in the Russian Federation, regional policy can also address market failures linked to innovation such as under-investments in R&D.

Old industrial regions such as the Republic of Tatarstan have an additional policy challenge. These regions are locked-in to mature industrial sectors. The productive sector, knowledge infrastructure and labour force are all heavily specialized in activities linked to the dominant industrial sector. There are strong reinforcing externalities and each group has incentives not to deviate from this specialization. Innovation in these regions is typically concentrated in process innovation, with very little product innovation.\(^6\)

There is no blueprint of policies that regions can use to promote innovation. The local environment determines the available policy options and their probable outcomes.\(^7\) The process of developing a RIS is as important as its implementation. During the design process, stakeholders, decision-makers and practitioners are one way or another “obliged” to reveal their needs, their constraints and their vision for success. This interaction (in most cases conducted by an external party, such as a specialised expert) leads to a better transparency between all stakeholders. It facilitates a bottom-up approach and helps policy-makers to better understand the reality of companies and intermediary institutions (such as TTOs, science parks or incubators).


\(^7\) Ron Boschma, *Some reflections on regional innovation policy*, prepared for the Expert Group meeting on ‘Constructing Regional Advantage’ Brussels, December 7, 2004
The successful implementation of a RIS requires the following:

| 1. | A strategy understood (and hopefully endorsed) by all stakeholders at all levels. |
| 2. | A set of measures *(new or improvement of existing tools)* to foster the competitiveness of the Region. |
| 3. | A monitoring system implemented in all support agencies. |
| 4. | An increased competency in the regional administration and a cross thematic collaboration between various regional ministries. |
| 5. | An improvement of the image of the region with an increased attractiveness for foreign direct investments. |

This approach must be based on:

1. A clear **understanding of the needs of companies** (SMEs as well as larger firms),
2. A **mapping of the potential embedded into knowledge-based institutions** (universities, private and public R&D centres).
3. An **increase in transparency among the different agencies** supporting the local innovation ecosystem (science and technology parks, incubators, consultancy, seed and venture funding, technology transfer offices).

At the centre of this approach is a paradigm shift from traditional administrative support to a culture focusing on fostering new behaviour and shared goals.

A study by Bjørn T. Asheim (University of Oslo and the STEP group) and Arne Isaksen (Agder University College and the STEP Group) based on comparative analyses of almost 40 existing instruments to promote innovation capabilities of small and medium sized enterprises (SMEs) in regions in eight European countries, demonstrated that regional support systems need (i) **instruments focusing on behavioural additionality** to supplement traditional direct support schemes, (ii) **receiver-oriented and proactive working methods** in (part of) the support system, (iii) **instruments targeting bottlenecks in regional production and innovation system**, (iv) all-round instruments (or group of instruments), and (v) adaptation of instruments and policy systems to different types of SMEs and regional circumstances. The policy lessons learned from the comparative evaluations are to a large extent valid also in the emerging “new economy” as long as it is relevant to understand the contemporary economy as a globalising learning economy.

### 1.4 Types of Innovation Policy Tools

Because of the systemic nature of innovation, innovation policy requires a “systems” approach. This means both helping existing firms and networks of actors’ access the resources they need to carry out innovation, and fostering an environment of learning, i.e. changing behaviours. **Table 1** classifies innovation policy instruments along four dimensions, according to the aim of the support tool and the target.

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*By Bjørn T. Asheim (University of Oslo and the STEP group) and Arne Isaksen (Agder University College and the STEP Group)*
Table 1: Examples of regional policy support instruments

<table>
<thead>
<tr>
<th>Objective</th>
<th>Assign lacking resources to firms (support projects)</th>
<th>Learning to innovate (change behaviour)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tool</strong></td>
<td>Financial support for innovation projects and innovative new firms</td>
<td>Mobility schemes to recruit specific kinds of personnel to SMEs</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>Firm</td>
<td>Lack of risk capital</td>
</tr>
<tr>
<td></td>
<td>Innovation brokers for firms and knowledge organisations</td>
<td>Lack of technological competence, strategic planning etc.</td>
</tr>
<tr>
<td></td>
<td>Technology centres providing services to regional firms</td>
<td>Lack of (codified) technological competence</td>
</tr>
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<td></td>
<td></td>
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</tbody>
</table>

Source: adapted from European Commission, 2006.

The most common instrument provides financial support for innovation and R&D projects in new and existing firms. This type of instrument in particular targets lack of real risk capital (angel, seed or venture capital) for innovation activity in SMEs. Another common type of instrument includes technology and knowledge centres that support of technology diffusion and innovation in SMEs and build networks between firms. This instrument is geared towards the problem of a limited resource base in many traditional SMEs.

A third type of instrument is the upgrading of regional innovation systems. It looks beyond the mere innovation barriers in individual firms and is directed towards removing bottlenecks in, or strengthening, the total regional production or innovation system. Thus, this instrument can supplement the other four main policy instruments which focus on individual firms or projects.

A fourth type of instrument shown in the table consists of proactive innovation brokers. Generally, SMEs find it difficult to identify and articulate their own support needs. Brokers can assist them in identifying their needs of innovation projects and in making contact with relevant knowledge organisations. This instrument may be directed towards several possible innovation barriers such as limited technological competence, lack of market research and limited strategic vision, depending on specific barriers in individual firms, the brokers’ knowledge and experience and the specific activities the brokers examine. It may be particular relevant to stimulate low-innovative firms start becoming more innovative.
The last innovation policy instrument shown in the table consists of mobility schemes. Mobility schemes are directed towards the problem of recruiting higher educated persons to SMEs and limited technological competence in the enterprises. Some of the most effective means of promoting a demand for knowledge, and thus technology transfer, in SMEs involve strengthening the human resource base of the firm, such as by stimulating the employment of graduates in SMEs. Mobility schemes recruit an expert (e.g. a university candidate) for an SME for a specific time period. The expert works with a specific innovation project in the enterprise or contributes to technology diffusion and in strengthening the contact and co-operation between the firm and R&D institutes and higher education institutions.
Chapter 2

Background Analysis: The Regional Innovation System
Main Findings

- **Tatarstan has a strong manufacturing base from which to launch an innovative economy.** The Republic manufacturing sector accounts for more than a quarter of its economy, comparable to the Republic of Korea or Taiwan, Province of China. Most of the Republic’s industry is concentrated in mature sectors, meaning that there are more opportunities for absorbing existing technologies in those sectors than for conducting R&D. But there are also fast-growing companies that compete on engineering and scientific skills, and offer a basis for diversification into more knowledge-intensive sectors.

- **There is little evidence of the global competitiveness of Tatarstan’s industry, apart from the fuel sector.** Outside of the fuel sector Tatarstan exports few manufactured goods, compared to the rest of Russia or to other fuel producers such as Norway and Kazakhstan. Tatarstan’s limited manufactured exports hinders opportunities for knowledge transfer from abroad, reduces pressures to innovate and raises questions onto the global competitiveness of Tatarstan’s.

- **Regional R&D is still limited and only a small fraction is financed by the enterprise sector.** Only a small number of elite organizations are engaged in frontier R&D in Tatarstan, and most inventions in Tatarstan are not oriented to global markets. Compared to other countries and to Russia as a whole, Tatarstan has few international patents (Figure 2). Even large enterprises in Tatarstan hardly register any foreign patents.

Figure 2: Number of US patents granted per population

<table>
<thead>
<tr>
<th>Year</th>
<th>Russia</th>
<th>Tatarstan</th>
<th>Tomsk</th>
<th>Estonia</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1.2</td>
<td>0.8</td>
<td>1.5</td>
<td>1.8</td>
<td>0.6</td>
</tr>
<tr>
<td>2005</td>
<td>1.4</td>
<td>1.0</td>
<td>2.0</td>
<td>2.2</td>
<td>1.1</td>
</tr>
<tr>
<td>2006</td>
<td>1.6</td>
<td>1.2</td>
<td>2.5</td>
<td>2.5</td>
<td>1.2</td>
</tr>
<tr>
<td>2007</td>
<td>1.8</td>
<td>1.4</td>
<td>3.0</td>
<td>3.0</td>
<td>1.5</td>
</tr>
<tr>
<td>2008</td>
<td>2.0</td>
<td>1.6</td>
<td>3.5</td>
<td>3.5</td>
<td>1.8</td>
</tr>
<tr>
<td>2009</td>
<td>2.2</td>
<td>1.8</td>
<td>4.0</td>
<td>4.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: USPTO.

- **Skills for the knowledge economy are limited and in decline.** There is limited pool of science and engineering students who have skills relevant to the needs of Tatarstan’s economy. The number of post-graduate students as a share of the regional population is a small fraction (one eighth) of what it is in the country, on average.

- **Low rates of foreign direct investment (FDI) limit prospects for technology diffusion.** Enterprises with foreign-owned participation are classic channels for technology transfer. They tend to be more technology-intensive than domestically-owned enterprises and hire more ICT and R&D workers. However, only a small
fraction (1 percent) of Tatarstan’s enterprises has any foreign ownership.

- **Tatarstan shows potential for entrepreneurship but its exploitation will require further improvements in the business environment.** New firm formation rates are higher than other economies with similar per capita income. While Tatarstan has already eliminated some barriers to entrepreneurship, several barriers remain and limit the level of innovative entrepreneurship in the Republic. These include the ease of trading across borders and administrative control.

### 2.1 Introduction

The Government of the Republic of Tatarstan has made bold efforts to support the development of the regional innovation system. Its imperative is to become a knowledge-based economy adapted to sustainable and shared long-term growth.

This chapter presents a bird’s eye view of the regional innovation system, developed mostly through readily-available innovation data and economic data from Tatarstan and several benchmark countries and regions. Comparator countries have been selected so as to maximize the information related to by the benchmarking process, combined with data availability constraints. Finland, the United Kingdom and the Republic of Korea have been selected as high-performing innovative countries at the technology frontier. The Russian Federation and the Tomsk region have been selected for their similar national environment conditions. Turkey has been selected for its similar level of per capita income, but also because this is a fast growing economy which have been able to develop a globally-oriented manufacturing base and has massively scaled up its innovation policy efforts in recent years. Estonia was selected because it is a former Soviet economy, and thus shares a common political-economic history with Tatarstan, and is successfully transitioning towards a knowledge-oriented economy. That said, Estonia’s per-capita GDP is about twice that of Tatarstan’s, so comparisons need to be placed in context.

The analysis in this chapter reveals that Tatarstan faces a discrepancy between its goals to be measured as a knowledge-based economy and the reality of its industrial and innovation ecosystem. The findings in this chapter provide a basis for the more in-depth analysis in the subsequent chapters, as well as for the recommended strategy and recommendations. Section 2 describes the overall performance of the regional innovation system. Section 3 presents the drivers of innovation. Section 4 presents the enabling environment, which affects both the drivers and their impact on the system’s performance (**Figure 3**).
2.2 Overall Performance of the Regional Innovation System

2.2.1 Industry Structure

Tatarstan has a strong manufacturing base from which to launch an innovative economy. The manufacturing sector has played an important role in helping countries transition to a knowledge-based economy. East Asian economies constitute a prominent example. In this sense, Tatarstan has a historical advantage. Manufacturing represents almost 30 percent of Tatarstan’s economy. It plays a very similar role in its economy as in rapidly developing economies such as the Republic of Korea and Taiwan, Province of China. Thus, although mining plays an important role in the region’s economy, in no way can Tatarstan be placed in the category of natural-resource based economies such as Saudi Arabia, where mining and quarrying account for almost a three time larger share of the economy (Figure 4). Moreover, the presence of several industrial clusters in Tatarstan presents opportunities for virtuous circles of growth through geographic externalities. A recent analysis of Tatarstan’s automotive cluster made a positive assessment on clustering spillovers such as the availability and quality of local inputs and the availability of foreign customers.⁹

While manufacturing plays an important role in Tatarstan’s economy, it is dominated by traditional sectors in which opportunities for rapid new-to-the-world innovation are limited. Roughly half of industry value added originates from the mining sector, where innovation is possible but not the core competitive asset (Figure 5). Moreover, the sectors with the fastest growing value added, hence possibly those with increasing competitiveness, are nonmetallic minerals, food and wood. These three traditional sectors have fewer technological opportunities than Tatarstan’s larger sectors, namely transport vehicles and chemicals. Moreover, apart from these three sectors, value added contracted in all other industrial sectors. Although this is likely an effect of the global financial crisis, it highlights a possible difference in those sectors’ competitiveness.

Sources: RT MoE; World Development Indicators. Note: Tatarstan - 2008 data; Other countries – 2007 data. Comparator countries are selected on the basis of data availability.
An examination of sectoral R&D patterns in an innovation-leader, the United States, suggests limited opportunities for innovation in Tatarstan’s dominant sectors. Figure 6 shows R&D intensity, namely R&D expenditures as a share of turnover, in sectors similar to Tatarstan’s dominant sectors. The figure shows that R&D intensity in sectors which are important to Tatarstan’s economy, such as basic chemicals, oil and gas extraction, motor vehicles, petroleum products tends to be less than half the average for manufacturing industries. R&D intensity is particularly low in petroleum products, Tatarstan’s dominant sector. The figure also shows that R&D intensity in sectors such as pharmaceuticals, computers and electronic products can be more than five times greater than in Tatarstan’s dominant sectors. Hence, one should not expect to see high levels of R&D intensity in Tatarstan, given the region’s industry composition. Increasing R&D would imply diversifying the economy into more R&D-intensive sectors.
Nonetheless, this is not to say there are no opportunities for innovation. Innovation comes in many forms, and does not always require R&D. In some markets, companies with small R&D teams can be tremendously innovative. Moreover, there are specific niche areas for R&D in Tatarstan. For example, heavy oils require innovative techniques to be more effectively extracted. Tatarstan’s heavy oils differ enough from Canadian heavy oil to justify investments in new extraction technology. Several research teams are already very active in this area.

2.2.2 Industrial Competitiveness

Although most of Tatarstan’s fastest growing medium and large companies are selling commoditized products and services, several draw on engineering and scientific skills. The presence of fast-growing companies can be a signal of either a newly-found regional competitive advantage or of a growing market. From 2008 to 2009, twelve companies had profit growth rates of more than 100 percent, a remarkable achievement in light of the global financial crisis (Figure 7). Although most of these companies operate in commodities, such as milk, electricity and poultry, several are involved in traditional manufactured products and several are in knowledge-intensive sectors such as R&D services, geophysics and mechanical engineering. This suggests opportunities for these sectors to grow once diversification is achieved.
Figure 7: Profits and profit growth rate of companies with the highest contributions to the Tatarstan state budget

However, outside of the fuel sector, Tatarstan’s manufacturing industries are not competing on a global scale. Regions are able to export manufactured goods when they can compete on price, quality, flexibility or functionality. Exporting also has its advantages. It creates pressures on companies to innovate and upgrade their products, since they must compete globally with a wide range of countries, many of which have lower factor costs or superior technology. Exporting is also a known channel for knowledge transfer. It enables firms to learn from global supply chains and buyers on how to meet international quality standards. But Tatarstan is not taking advantage of this “innovating-through-exporting” strategy. Outside of the fuel sector, manufacturing exports play a small role in Tatarstan’s economy when compared to the rest of Russia, or with other large fuel exporters such as Norway or Kazakhstan (Figure 8). Non-fuel manufactured exports represented only 10 percent of Tatarstan’s GRP in 2008, compared to 18 percent for Russia and 67 percent for Finland in 2007. Even when mining and oil products are subtracted from Tatarstan’s GRP, manufactured exports only represent 14 percent of GRP. Tatarstan’s limited manufactured exports hinders opportunities for knowledge transfer from abroad, reduces pressures to innovate and raises questions onto the global competitiveness of Tatarstan’s products.
2.2.3 Patent Activity: A Window Into Innovation

Patents are a useful general measure of innovation since they are used by firms and research institutions to protect their profits from invention. Nonetheless, it is important to note that organizations also use other means to protect their inventions, such as secrecy, lead time advantages and the use of complementary marketing and manufacturing capabilities. Patents are also more widely used to protect inventions in some industries than others.\(^\text{10}\)

**Tatarstan is on par with the rest of the country in developing inventions which are new to the Russian market.** Russian patent applications are a measure of inventions which are new to the national market. They cannot be compared to national patents from other countries since they imply different levels of technological sophistication, but they can be compared within Russia. On a population basis, Tatarstan has the same number of patents as the rest of Russia, on average. However, the region lags far behind Tomsk, which has about twice the number of patents when accounting for its population.

\(^{10}\) Cohen, Nelson and Walsh (2000)
However, compared to other countries and to Russia as a whole, few world-frontier technologies are being developed in Tatarstan. Tatarstan lags far behind technology leaders such as Finland in terms of patents granted by the United States Patent and Trademark Office or the European Patent Office, when these statistics are compared on a population basis (Figure 10 and Figure 11). In 2008, Tatarstan had about 150 fewer US patents than Finland, and 300 fewer than the US state of Michigan, a region that was historically based on traditional manufacturing sectors. Tatarstan also lags behind in US and EU patents when compared to the rest of Russia, to a former Soviet republic, Estonia, and to a Russian region, Tomsk. Tatarstan only performs better than Turkey, a country with a large agricultural population. Since US and EU patents represent inventions at the global frontier of technology, Tatarstan’s weak patenting activity could indicate that the region is not developing patentable technologies which are new to the world. A key problem, in addition to the weak number of patents, is the rather poor admission of the situation from key research leaders. This low level recognition undermines the development and implementation of countermeasures among the research and business communities.

Figure 9: Number of national patent applications by residents per population

Figure 10: Number of US patents granted per population
Advancing Innovation in the Republic of Tatarstan

Frontier R&D is concentrated among a limited number of researchers in Tatarstan. An examination of US patents granted to inventors residing in Tatarstan from 2004 to 2009 shows that the vast majority, almost three-quarters originate from Tatneft or the Kazan Aviation Institute. These are Tatarstan’s two principle sources of R&D at the global technology frontier. Surprisingly, apart from Tatneft, none of the large enterprises based in Tatarstan registered any US patents since 2004 in spite of their large size and potential for exploiting global markets.

Tatarstan’s inventions are not oriented to global markets. The overwhelming majority of Tatarstan’s patents are filed with the Russian patent office. This implies that these inventions are to be commercialized in the Russian market only. Filing patents in the US implies a more global perspective from the inventor’s viewpoint. US patents also generally reflect innovations that are new to the world, since the US is a technology leader and a large market for innovation. US patents represent barely 0.3 percent of Russian patents filed by residents of Tatarstan. This proportion is almost six times larger in Russian on average, and in the Tomsk region. Technology leaders such as Finland tend to have a global view of their markets. In Finland, more residents file patents in the US patent office than in the Finish national patent office (Figure 13). Costs for filing and maintaining international patenting could be a major factor hampering the ability of research teams to consider global markets.
On average, Tatarstan is slightly more efficient at frontier innovation than other transition countries and regions, but lags far behind technology leaders. The number of US patents produced per unit of R&D expenditures is a possible measure of the efficiency of the innovation system at producing inventions which are at the world frontier. According to this measure, Tatarstan performs slightly better than the Tomsk region, Russia or former Soviet republics such as Estonia and Kazakhstan (Figure 14). However, Tatarstan is one-tenth as efficient as Finland at transforming R&D into frontier technology. In spite of this gap Tatarstan’s performance points to the relatively strong performance of the two organizations responsible for the vast majority of Tatarstan’s US patents, Tatneft and Kazan State Technical University (formerly Kazan Aviation Institute. They, almost alone, are able to make Tatarstan perform better than the national average. Tatarstan’s gap with technology leaders could also imply that most R&D in Tatarstan leads to inventions that are new to the Russian market, but not new to the world, or that Tatarstan’s innovation system is not efficient.

Low levels of patenting activity are not necessarily a sign of low level of innovation, it is also a reflection of the type of innovative activity in the region. Tatarstan’s limited patenting activity could indicate that firms and research institutions are engaged in technological catch-up rather than by pushing the technological frontier. Tatarstan’s low level of patenting activity is also a reflection of its industrial structure which is heavily biased
toward traditional low- and medium-technology sectors where firms typically compete more through process innovations,11 which can be protected by secrecy, or through low labour costs and flexibility of production.

2.3 Drivers of Innovation

2.3.1 Investments in R&D

R&D investments are important for both innovation and technology absorption. R&D is a basic input for innovation since it leads to new or improved products but it is also vital to developing technological absorptive capacities in firms.12

Investments in R&D have increased over the past decade but remain low when compared to the size of the economy. From 2000 to 2007, R&D investments in Tatarstan increased significantly from barely more than one billion roubles to more than RUB 4.5 billion (Figure 15).13 However, this increase only reflects the overall growth of the regional economy. Since 2000, R&D expenditures have only represented around 0.64 percent of GRP.

Figure 15: R&D expenditures in Tatarstan

![R&D expenditures in Tatarstan graph]

Source: RT MoE; http://government.ru/eng/russia/16/social.html; http://www.tatar.ru/?DNSID=99d361f8a6f2b22842aa51a8bbce634d&node_id=792.

When compared to other innovative countries and to the rest of Russia, Tatarstan spends a small share of its Gross Regional Product on R&D. The Tomsk region spends about twice Tatarstan’s 0.64 percent (Figure 16). High income economies generally spend around 2 to 3 percent of their GDP on R&D. Countries typically invest more in R&D as they develop their industrial base and as consequently the opportunity costs of investing in R&D become lower and private returns become higher. Many highly-innovative countries such as Israel and Finland invested higher than other countries at the same (low) income levels in their early

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11 rather than product innovation
12 Cohen and Levinthal (1990)
13 Constant 1995 rubles
stages of their catch-up with technologically advanced countries. R&D investment levels in the Tomsk region shows that this strategy is also possible in Russia.

**Figure 16: R&D as a share of GDP and GRP in 2007**

![Graph showing R&D as a share of GDP and GRP in 2007](image)


Note: Data are shares of GDP or GRP depending on whether they refer to a country or republic.

*Data for Tomsk include both enterprise and government sectors.

Moreover, only a very small fraction of Tatarstan’s R&D is financed by the enterprise sector, the most effective conduit for commercialization. R&D investments in the private sector responds to market incentives and are more likely to lead to useful innovations than public sector-funded R&D, although the two are complementary. Enterprises only accounted for 24 percent of R&D expenditures in Tatarstan in 2007, a far smaller share than any of the comparator countries shown in **Figure 16**, including Russia, where enterprises account for 29 percent of expenditures. In high income economies, enterprises generally account for two thirds of R&D expenditures. Although Tatarstan is host to many R&D organizations and R&D firms it should not be expected that Tatarstan achieve this level yet given its lower income level. But **Figure 16** shows that higher shares are achievable in comparable income economies.

### 2.3.2 Human Capital

Tatarstan has opportunities to increase and improve the market relevance of its science and engineering student population. Science and engineering students, along with business students, constitute core inputs to innovation. Highly innovative countries have fostered large science and engineering student populations as part of their growth strategies. Tatarstan has about one fifth fewer students enrolled in science and engineering as a share of its population than Russia on average and about 30 percent less than an innovative country such as Finland (**Table 2**). Science and engineering students represent only 23 percent of the total student population in Tatarstan, versus 27 in Russia and 37 in Finland.\(^{14}\)

But increasing the number of science and engineering students alone would not be sufficient. Ensuring the right mix and quality of graduates is also necessary. According to

\(^{14}\) RT MoE, UNESCO Statistics. Data for Tatarstan is for 2008. Data used for Russia and Finland is for 2007.
Tatarstan Ministry of Labour statistics, the Republic needs to increase by a factor of two the number of mechanical engineering graduates to satisfy market demand, but other engineering fields are not in such high demand. A recent World Bank study found that practical training is also lacking among science and engineering students and that only 57 percent of university graduates believed that they had enough skills for successful work. An IT firm in Kazan claimed that each year out of 100 graduating computer engineers they would only expect two to have the required skills to work for them. Thus, a larger, more diverse and higher quality pool of science and engineering students could help bolster Tatarstan’s important manufacturing sector.

Table 2: Students enrolled in science and engineering programs as a share of the total population

<table>
<thead>
<tr>
<th>Country</th>
<th>Finland</th>
<th>Russia</th>
<th>Tatarstan</th>
<th>Estonia</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.1%</td>
<td>1.8%</td>
<td>1.4%</td>
<td>1.2%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Source: RT MoE; UNESCO statistics. Note: 2008 data is used for Tatarstan; 2007 data is used for other countries.

More worryingly, post-graduate students, a critical input for innovation in a knowledge-based economy, are lacking in Tatarstan. Post-graduate students not only acquire critical skills for engineering and research activities, but act as a low-cost and flexible pool of labour for universities and research institutes to draw from as they engage industry. Table 3 shows that post-graduate students represent only 0.1 percent of Tatarstan’s population, compared to eight times that number in Russia and Finland.

Table 3: Post-graduate students as a share of the population

<table>
<thead>
<tr>
<th>Country</th>
<th>Finland</th>
<th>Russia</th>
<th>Estonia</th>
<th>Turkey</th>
<th>Tomsk</th>
<th>Tatarstan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.8%</td>
<td>0.8%</td>
<td>0.6%</td>
<td>0.4%</td>
<td>0.2%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Source: RT MoE; UNESCO statistics. Note: 2006 data is used for Russia; 2007 data is used for others.

Tatarstan has a small and declining R&D workforce and most are not directly engaged in R&D. Tatarstan has only about half of the R&D personnel as the Russian average, on a per capita basis, and about a third as Tomsk (Figure 17). Moreover, the gap is even wider when only researchers are considered. While R&D personnel involve all staff providing direct services to support R&D, researchers are those who directly engaged in R&D. On a per capita basis, Tatarstan only has 14 percent of the number of researchers found in Russia on average, and fewer than in Turkey and Estonia. Moreover, there has been a continuous

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16 According to the UNESCO Institute for Statistics:
- Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.
- R&D personnel: All persons employed directly in research and experimental development (R&D), as well as those providing direct services, such as R&D managers, administrators and clerical staff. Persons providing an indirect service, such as canteen and security staff, should be excluded. R&D personnel comprises researchers, technicians & equivalent staff, and other supporting staff.
decrease in the number of R&D workers in Tatarstan during the past decade. By 2007, Tatarstan’s R&D workforce had shrunk by 18 percent compared to 2000 levels.  

**Figure 17: Number of R&D personnel as a share of the population in 2007**

![Chart showing R&D personnel per million inhabitants in different countries including Finland, Tomsk, Estonia, Russia, Tatarstan, and Turkey.](chart)

Source: RT MoE; UNESCO statistics.

The enterprise sector, where commercialization of research is most effective, represents about half of Tatarstan’s R&D personnel. R&D conducted in the business sector is more likely to be successfully commercialized since its incentive structures are more profit-oriented and businesses tend to have more practical marketing and production experience than research institutions. Innovative countries generally have more of their R&D workforce concentrated in the business sector than countries at earlier stages of industrial development. In Tatarstan R&D personnel are distributed roughly equally between enterprise and public (government and university) sectors. This can be considered a good balance by international standards given the region’s income level, although it must be noted that the rest of Russia has succeeded in concentrating much more of its R&D personnel in the enterprise sector (Figure 18). Moreover, it seems that in Tatarstan companies consider researchers staff that do not really undertake research but are involved in simple upgrading activities. It would be useful to collect data based on clear classifications of roles in order to clarify the situation.

Employment data also shows that very few ICT specialists are employed in enterprises. In an era of ICT-driven technological progress, this could represent an important barrier to upgrading. ICT workers represent only 0.5 percent of employees in Tatarstan, compared to 1 percent in Poland and 5 percent in Norway.  

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17 RT MoE  
18 RT MoE 2008; Eurostat 2007
Surveys suggest that availability of skilled workers is a critical problem in Tatarstan. According to a 2009 OPORA study, 60 percent of surveyed enterprises cited low availability of personnel with required qualification on labour-market as a problem. This was the most cited problem. The same study ranked Tatarstan 25th and 28th on Quality of education programs and Availability of education programs respectively, out of 36 Russian regions.\(^{19}\)

### 2.3.3 Entrepreneurship

Innovation and entrepreneurship are closely linked. According to Schumpeter, entrepreneurs distort the market equilibrium by introducing new combinations of products and markets which drive out less productive firms and advance the product frontier. Of course, the experience of Japan and Finland show that innovation is still possible without particularly high levels of entrepreneurship, when there is a strong industrial base of large firms and a well-educated population.

New firm formation rates points to entrepreneurship potential in Tatarstan. One aspect of entrepreneurship is the rate of new firm formation in the formal sector. This rate tends to be higher as national per capita income increases. Tatarstan performs as predicted by its level of per capita income on this measure when compared to other countries (Figure 19).

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\(^{19}\) Индекс развития малого и среднего предпринимательства в регионах России «Индекс ОПОРы» ОТЧЕТ ПО ИТОГАМ ИССЛЕДОВАНИЯ
Figure 19: New business density

Source: RT MoE; http://www.tatar.ru/?DNSID=7ca002f7b1e102c5cde17c25d344b172&node_id=1401; World Bank Entrepreneurship Survey.

Note: Tatarstan - 2008 firm data used with 2002 working age population data; 2005, 2006 and 2007 data used for other country according to latest available data. Country data is for organizations of at least 1 employee. Country data is for organizations of at least 1 employee.

2.3.4 Knowledge Flows Through Foreign Direct Investments

FDI can act as a channel of technology transfer when investors introduce international practices in product, process and management techniques from their home countries to their domestic subsidiary. Not only can FDI introduce technology within the subsidiary, but spillovers, through backward and forward linkages, imitation and worker mobility can transmit technology to domestically-owned firms. FDI has been credited with the rapid growth of countries such as Singapore and Ireland, where it brought tangible assets in the form of equipment and intangible assets in the form of training and skills. Similarly, FDI can become a resource for Tatarstan’s companies to enter into global supply chains. This model helps local firms upgrade their skills, standards, etc.

Foreign direct investment can serve as a channel of technology transfer to Tatarstan. There are indications that foreign-invested firms in Tatarstan are more knowledge-intensive than domestically-owned firms. On average, ICT specialists represent a six time greater share of employees in organizations with foreign ownership than average in Tatarstan. R&D personnel represent almost a three times greater share (Table 4). As a result, 26 percent of employees engaged in computer engineering or IT-related activities in Tatarstan are engaged by foreign organizations. This figure is of 7 percent for R&D personnel. This points to the possible higher knowledge-intensity of foreign-invested firm in Tatarstan.
Table 4: Employment of ICT and R&D staff by enterprise ownership in Tatarstan in 2007

<table>
<thead>
<tr>
<th></th>
<th>ICT/IT specialists as a share of total enterprise employment</th>
<th>R&amp;D personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>All enterprises</td>
<td>0.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Organizations with foreign-owned participation</td>
<td>2.9%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Source: RT MoE.

Foreign technology transfer in Tatarstan is concentrated in a small fraction of companies, limiting prospects for widespread technology transfer. In 2008, 99 percent of organizations registered in Tatarstan had no foreign ownership whatsoever. Historically, transition countries which have been successful at technological catch-up such as Estonia, Slovakia and the Czech Republic have attracted much more foreign investment than Tatarstan. In Estonia, for example, more than 20 percent of enterprises have some form of foreign ownership (Figure 20).

Figure 20: Share of foreign-controlled enterprises

Foreign investments in Tatarstan occurs in two sectors, highlighting prospects to catalyze technology transfer through those sectors, but also the need to diversify foreign investments. Among the 18 companies receiving the bulk of foreign capital in Tatarstan in 2008, companies in the oil chemistry and motor industry sectors received ninety-eight percent of investment volume (Figure 21). This means that, apart from imports and licensing, flows of non-codified or “tacit” knowledge from abroad are concentrated in those sectors, with little going into other sectors of the economy.
2.4 Enabling Environment for Innovation

An enabling environment is a necessary condition for innovation. It promotes investments in innovative projects by strengthening incentives and decreasing risks for entrepreneurs. It also enhances the supply of drivers of innovation by attracting and retaining skilled workforce and knowledge-intensive businesses. An enabling environment is influenced by the policies and institutions that affect the cost of entrepreneurship. It is also influenced by the quality of life and working conditions in the region. Regional authorities can play a leading role in promoting an enabling environment to catalyze the regional potential.

The quality of Tatarstan’s enabling environment for enterprise innovation is moderate by national standards, but low by international standards. While the region’s enabling environment is superior to national standards along some dimensions, national standards are low relative to the rest of the world and several important obstacles remain in the way of innovative entrepreneurship. The World Bank’s Doing Business in Russia 2009 report ranked Kazan as the easiest city in which to do business among ten Russian cities, including Moscow, St. Petersburg and Tomsk. This was based on four Doing Business indicators, namely 1. Starting a business, 2. Dealing with construction permits, 3. Registering property and 4. Trading across borders. The only category in which Kazan scored poorly was Trading across borders, where it was only ahead of Moscow. This could have negative implications for Tatarstan’s global orientation. Kazan’s Doing Business ranking needs to be taken in context however. Russia ranks 120 among 183 countries on its latest Doing Business score, and 162 on the Trading across borders indicator.²¹

The 2006 OPORA study also raises a number of business climate issues. A third of respondents cite unfair competition on end production market as the most important problem for their business. This may make it particularly difficult to motivate large companies in Tatarstan to innovate through regional innovation policy, since they often operate in protected markets with little competition. And Tatarstan ranks low across most measures of administrative barriers, when compared to other Russian regions, including administrative control (30th out of 36) and corruption (27th). While the study finds that real estate infrastructure is adequate by national standards (6th), public infrastructure ranks low (22nd).

22 Индекс развития малого и среднего предпринимательства в регионах России «Индекс ОПОРы» ОТЧЕТ ПО ИТОГАМ ИССЛЕДОВАНИЯ
Chapter 3
Demand Side Analysis
Main Findings

- **The pace of technology upgrading and innovation is limited and uneven among Tatarstan’s enterprises.** Although more firms in Tatarstan are engaged in acquiring hard technologies, training and R&D than in the Russia on average, Tatarstan lags behind other technology followers such as the Tomsk region or Poland, and lags far behind technology leaders (Figure 22). More worryingly, few of Tatarstan’s firms are introducing technology through “soft innovations”, such as improved marketing and organizational processes.

  Figure 22: Share of enterprises engaged in innovation and technology absorption

![Graph showing share of enterprises engaged in innovation and technology absorption](image)

*Source: RT MoE; eurostat.
Note: 2007 data is used for Tatarstan, Tomsk and Russia; 2006 data is used for other countries.*

- **Few of Tatarstan’s enterprises see innovation as part of their business strategy.** More than one-third of respondents in the World Bank sample of Tatarstan firms believe that innovation is not necessary! This number is larger than what is found in the vast majority of European countries. World Bank case studies revealed that the large enterprises that dominate the regional economy were only inclined to innovate when their existence was threatened by a weakened market position, reflecting a reactive approach to innovation.

- **Tatarstan’s enterprises are not oriented towards global markets and have few innovation-related linkages with foreign organizations.** Only 13 percent of companies in the survey indicated having any exports in high-economy markets in the EU and the United States. Only one enterprise in the survey stated that local inputs are at the global frontier of quality. Without export-orientation, Tatarstan firms have fewer opportunities and incentives to innovate and to learn from foreign buyers on international product standards.

- **There are good linkages between innovative enterprises and research institutions but these do not lead to enough innovation.** Almost a quarter of innovative enterprises in Tatarstan are capitalizing on research institutions available in the region to implement innovations. This is a large number by international standards and could lead to faster competitiveness take-up.

- **Existing regional government support instruments do not appear to target enterprises with the greatest potential.** While innovative firms tend to receive more government support than non-innovative in Tatarstan, the World Bank survey finds that innovative firms with the greatest potential and fast-growing SMEs receive relatively less state support.
3.1 Introduction

Tatarstan has a strong industrial sector. This is a good basis for the development and commercialization of innovative ideas. Several companies occupy leading positions on the national market. Many are engaged in sectors requiring significant technical skills and manufacture complex products such as gas turbines, helicopters and products for the automotive industry. Although very few companies principally compete on the basis of innovation alone, in many cases process innovation is used to increase efficiency and enhanced quality control of products. Product innovation is also found in the form of adaptation (e.g. adapting aviation technology to the development and production of heat insulation panels for residential applications).

In spite of these assets, new sectors have been slow to emerge in Tatarstan, and most firms in the region are still unable—or unwilling—to enter global markets. Many companies are in survival mode and in declining industries. By and large, competitive advantage is sought in lower costs. Modes of organization of production are outdated and largely inherited from Soviet times, while investment in new capital outlays is limited. As a result, the market in which firms operate is regional and national, with almost non-existing prospects of entering global markets. Companies have trouble identifying their needs and capabilities. While a few firms have introduced incremental innovations, in most cases this was the result of an “innovation by fear” behaviour in which innovation was introduced to prevent the company’s collapse. While companies sit on real knowledge assets innovation remains minimal. This was found to be the case in some of Tatarstan’s large enterprises that survive due to protected markets and limited competition.

The lack of accompanying policies makes it almost impossible for companies to redirect themselves to more sustainable models of production or markets and concentrate on their existing assets. There are examples of companies who found solutions to restructure and survive: a gas pumping company and a film-making company. But in both cases this was done “by chance” and with no real resources to address new markets and grow again. In both cases, as well as in other companies, investments in innovative activities are always made from a share of the profits and are not based on long-term investment plans. This obviously leads to a poor innovation capacity (not to mention that in most cases, profits are quite limited).

Innovative activity of industry is hampered by limited systematic interaction between scientific and education organizations in Tatarstan and Russia. In addition, limited support for innovation at federal and regional level and the low willingness and poor capacity of R&D institutions to work with industry makes it difficult for firms to absorb, adapt and develop new technologies. This of course, is added to a challenging business environment for innovation, much of which is outside of the control of the Republic, including trade barriers and IPR regime.

This chapter draws on both existing statistical data, on a World Bank survey of enterprises in Tatarstan and on case studies of enterprises to gain deeper insight into the dynamics of firm innovation and identify constraints. Selection of comparator countries and regions are explained in the previous chapter.
3.2 Innovation and Technology Absorption in Enterprises

While both the absorption of existing technologies and the in-house development of new technologies can lead to growth, companies operating far from the technology frontier have most to gain from absorbing existing technologies. This is the least costly and most rapid way to grow.

Few of Tatarstan’s enterprises are absorbing new knowledge and technologies. Tatarstan’s companies, although far from the world technology frontier, are not capitalizing on opportunities to absorb existing technologies. Purchasing machinery, equipment or software, and training staff are the two most straightforward ways of accumulating technological capabilities. Although Figure 23 shows that more firms in Tatarstan are engaged in this form of technology absorption than in the Russia on average, Tatarstan lags behind other technology followers such as the Tomsk region or Poland, and lags far behind technology leaders such as Austria and the Netherlands. This means that technology absorption is unevenly spread within Tatarstan, and some firms run the risk of being left with obsolete technologies.

Moreover, in order to narrow their technological gap, technology followers need to make greater efforts than technology leaders to acquire new technologies. This is the strategy of firms in transition countries such as Poland and Estonia, who on average spend a greater share of their turnover on acquiring technology than firms in Western European countries (Figure 24). Tatarstan’s firms are employing this strategy, although not as aggressively as their Polish and Estonian counterparts. More worryingly, few of Tatarstan’s firms are introducing technology through “soft innovations”, such as improved marketing and organizational processes (Figure 25). These technologies are relatively low-cost and represent important factors of competitive advantage in the global economy. Hard technologies do not represent a source of competitive advantage when they are straightforward to acquire in global markets. Soft technologies enable companies to best identify, adopt and adapt hard technologies. The slow and uneven rate of technology absorption among Tatarstan’s enterprises threatens to deepen the gap between region and the technology frontier.
Figure 23: Share of enterprises engaged in innovation and technology absorption

Source: RT MoE; eurostat.
Note: 2007 data is used for Tatarstan, Tomsk and Russia; 2006 data is used for other countries.

Figure 24: Purchase of machines, equipment and software as a share of turnover

Source: RT MoE; eurostat.
Note: 2007 data is used for Tatarstan; 2006 data is used for other countries.
Tatarstan’s enterprises spend very little of their turnover on R&D, but this is partly due to industry structure and to the distance from the global technology frontier. On average, Tatarstan’s enterprises spend roughly the same amount as Poland or Turkey’s on R&D, roughly 0.3%. This amount is low by global standards. In comparison, Estonian enterprises spend about twice as much and Danish enterprises around ten time more. While Tatarstan cannot aspire to increase its enterprise R&D to the Danish levels given its industry structure and technological gap, Estonia, as a recent Soviet economy, shows that there is room for improvement.

3.3 Analytical Approach

The remainder of this chapter introduces findings from a survey of 137 enterprises in Tatarstan. The sample was selected so as to focus on sectors in which innovation represents a factor of global competitive advantage and on enterprises that were most likely to be engaged in innovation. A number of enterprises were selected with the help of innovation support institutions in Tatarstan. The sample was also selected so as to include a broad range of sectors of the Republic of Tatarstan. In view of the region’s existing strength in
manufacturing, as well as the key role played by manufacturing sector in the development of many emerging economies, the sample focused on manufacturing rather than services and agriculture. Agricultural, hotel, restaurant, wholesale and retail trade sectors were excluded from the sample. Figure 27 provides a composition of firms in the sample.

Figure 27: Composition of enterprises in the sample by main types of products and services

As a result, the enterprises in the sample are not representative of the average enterprise in Tatarstan but tend to be much more innovative. While only six percent of Tatarstan’s enterprises conduct R&D according to government statistics, this number reaches 56 percent in the sample. Similarly, while enterprises in Tatarstan spend 0.3 percent of their turnover on R&D, the average enterprise in the sample spends 14 percent of its turnover in R&D. Enterprises in the sample are also much more likely to receive support from innovation organizations than the average firm in Tatarstan. Almost half of firms in the sample receive this type of support. Firms in the sample were small or medium. Three-quarters had fewer than 250 employees.

Hence, the objective of the sample is not to assess the level of innovation in Tatarstan’s firms, but rather to understand the needs of firms that are likely to reap the greatest benefits from innovation while making contributions to the region’s economic growth.

3.4 Internationalization of Innovation

As discussed in the previous chapter, there is a two-way relationship between innovation and global market integration. This is particularly true in sectors that do not depend on low-cost labour or natural resource endowment. Firms using the latest technologies and implementing innovations are able to compete in high-income country markets where demand for quality and functionality is high. But exporting also opens up the market to a larger set of customers, creating opportunities for diversification into new activities and upgrading into new market segments. Both of these require technology absorption and innovation. Given that competition is more intensive in global markets, exporting firms are
also pressured to innovate and upgrade their technologies to meet or surpass global standards in quality, price or functionality.

**Outside of the natural resource extraction sector, most companies in the sample are not oriented towards global markets.** Only 13 percent of companies in the World Bank survey indicated having any exports in high-economy markets in the EU and the United States. Moreover, for half of these companies exports represent 10 percent or less of their total sales. Only one company in the sample had more sales in the EU and the United States than in Russia.

**One factor holding back firms from being globally competitive is the quality of local inputs.** Although most enterprises in the sample believe that product quality of regional suppliers is at the average industry level, only a small share believes that they are nationwide industry leaders (Figure 28). Only one enterprise believes that local inputs are at the global frontier of quality.

**Figure 28: Enterprises’ opinions of the product quality of their main suppliers in Tatarstan**

![Bar chart showing enterprises' opinions of the product quality of their main suppliers in Tatarstan. The chart displays the percentage of respondents who believe the quality of inputs is at various levels: Need to catch up considerably, Not quite at the average industry level, At the average industry level, Nation-wide leaders in the industry, International leaders in the industry.


**In Tatarstan, enterprises which export to high-income economies tend to have more incentives to innovate and to be more innovative than those who do not (Box 1).** The data from the sample is aligned with empirical evidence collected from other countries. While almost a third of firms that do not export to the EU or the United States do not believe that innovation is necessary, none of the firms exporting to those countries share this opinion (Figure 29). On the contrary, half innovates every 1 or 2 years, versus 28 percent in the other group. A look at Tatarstan’s innovative firms also reveals that a greater share of their markets is outside of Tatarstan (mainly in Russia) compared to non-innovative firms. On average, the EU and United States account for 18 percent of the market of companies conducting R&D or with patents in the past two years, compared to 2.8 percent for the entire sample of enterprises.
Figure 29: Frequency of implementation of new or significantly improved production technologies and products

Firms that **do not export** to the EU and the USA

- every 1-2 years: 28%
- every 2-4 years: 36%
- every 5-7 years: 5%
- less than once in 7 years: 1%
- Innovation is not necessary: 30%

Firms that **export** to the EU and the USA

- every 5 to 7 years: 6%
- every 1-2 years: 50%
- every 2 to 4 years: 44%


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**Box 1: For a small IT company global connections and ambitions are drivers of innovation**

A few years ago, two software engineers who were colleagues at a foreign-owned company decided to leave their jobs to create an IT company in Tatarstan. Their new company has grown 10 people and generates most of its revenues from internet-related services such as webpage design and search engine optimization, but they have much bigger plans for the future.

The company is already engaged in work that goes beyond routine internet services and is now developing an industry-specific software system for the Russian market. Although the system they developing is commonly used in high-income economies it has not yet found its way to the Russian market. The two founders learned about this system while working for their previous employer. The firm now has a Russian customer working with them to commercialize the technology in the national market.

The company also has customers in several high-income countries. The founders see selling complex software products to global companies as key to their future growth success. In fact, a significant share of the firm’s revenues from their internet services is reinvested in R&D. The firm is developing three products that they hope to market internationally.

Thus, the company’s ties with global technology and global market had two effects on innovation. First, the founders acquired their knowledge on a technology from a foreign-owned firm, which they are now transferring to the Russian market. And second, the firm’s existing global clients present a demand for innovative services that is not yet present in the national market.
Tatarstan’s enterprise R&D is not plugged into international innovation networks. Collaborating on innovation across borders allows firms to access new markets, pool forces with a wider range of sources of innovation, and transfer technology to their home region. Tatarstan’s innovative enterprises operate almost exclusively within the regional innovation system. Only 23 percent collaborate with organizations from other Russian regions and even fewer, 8 percent, collaborate with organizations in other countries. Although this is much more than the share of firms collaborating with other European countries in Turkey, it is far behind rapid technology followers such as Estonia or technology leaders such as Finland (Figure 30). Both of these countries understand innovation as a global process. Moreover, only a small share of Tatarstan’s R&D is financed by foreign sources. This share is much smaller than in the rest of Russia (Figure 31). This could imply that either Tatarstan’s R&D performers are not visible to the rest of the world, or that they do not conduct research which is relevant to global markets.

Figure 30: Firms collaborating on innovation with organizations in other countries

![Figure 30: Firms collaborating on innovation with organizations in other countries](image)

Source: Country data is from CIS and reflects the years 2004 to 2006.

Figure 31: Share of R&D financed from foreign sources

![Figure 31: Share of R&D financed from foreign sources](image)

Source: RT MoE; UNESCO statistics.

Note: 2007 data is used for Tatarstan; 2006 data is used for other countries.

Tatarstan’s entrepreneurs have a limited understanding of their global market opportunities. Many enterprises in the World Bank case studies stated that they were holding a
competitive position in the market. But, at the same time, almost none were able to describe with some level of precision what this meant for them.

### 3.5 Support from Other Organizations

In many countries, research institutions occupy an important role in the innovation system, drawing from industrial and scientific knowledge to provide support to industry. They acquire, maintain and supply technologies and technology-related services to firms that cannot access them in-house.

A relatively high number of innovative enterprises collaborate with universities and research institutions. Almost a quarter of innovative enterprises in Tatarstan are capitalizing on research institutions available in the region to implement innovations. Figure 32 shows that there is a large number by international standards. This shows that the region’s research institutions have products and services to offer to industry. Tatarstan’s universities appear to be the dominant sources of support. However, Tatarstan’s research institutions have much better linkages with large firms than with SMEs. Among large firms conducting R&D or with patents in the past two years, 35 percent interacted with research institutions. This number was only 8 percent for SMEs. Thus, while Tatarstan’s research institutions are able to support firms with existing capacity for innovation, they are not as effective in supporting less innovative firms. Moreover, there is no evidence that they are able to support technology upgrading in non-innovative firms.

**Figure 32: Innovative companies collaborating with research institutions on innovation**

![Figure 32: Innovative companies collaborating with research institutions on innovation](image)

*Source: Country data is from CIS and reflects the years 2004 to 2006.*

*Note: Data for Tatarstan is for 2008-2009.*

**Innovative firms receive support from the regional government, but not always those firms with the highest potential and greatest need.** Many enterprises in the sample receive support from the regional government, mostly in the form of grants and tax cuts, but also in the form training, business advice, equity investments and loans. Although a full understanding of the impact government support instruments would require an in-depth evaluation of all policy instruments, the results of the survey point to certain facts. The sample reveals that innovative firms, firms conducting R&D and firms with patents are twice as likely as the average firm in the sample to receive support from the regional government. This means that either innovative firms are more successful at attracting government support or that support instruments have a positive effect on innovation.

However, it is not clear that existing support instruments are able to target firms that are able to benefit most from these instruments. Out of innovative firms with exports to the EU
and the United States, only 7 percent received support from the regional government, compared to 39 percent of innovative firms on average. Moreover, the average firm receiving support from the government spent less on R&D than the average firm of the sample (10 percent versus 14 percent). And out of the 12 fastest growing SMEs in the sample, most of which conduct R&D, only two received any support from the regional government in the past three years. An analysis of the sample also suggests that regional support instruments are not targeted to firms that face the biggest barriers to technology upgrading and innovation: only 24 percent of innovative SMEs in the sample received support, compared to 39 for the average firm in the sample.

3.6 Constraints to Technology Absorption and Innovation

The presence of an elite group of national industry leaders and the emergence of several high-growth firms in Tatarstan points to the region’s potential for innovation-led growth. Several manufacturing firms in Tatarstan hold important shares of the national market in their respective sectors. Most of these firms conduct R&D, product design and make use of modern technologies. The enterprise survey also identified 12 small fast-growing firms which had grown in staff size by 35 to 900 percent between 2007 and 2009. All had fewer than 50 staff in 2007. Seven of these firms conduct R&D. Their only limitation is that none of these firms have any exports to high-income economies in the EU and in the United States.

A key barrier to innovation-led growth in Tatarstan is that many companies do not see a role for innovation in their business strategy. There is overwhelming evidence in the economic literature that technological change and growth go hand-in-hand. Nonetheless, more than one-third of firms in the sample respond that innovation is not necessary when asked how often they implement new or significantly improved production technologies and products. In addition, the third most cited constraint to innovation, cited by 22 percent of firms, is that there is no need for innovation (Figure 33). This number is larger than what is found in the vast majority of European countries which participate in the Community Innovation Survey. The results of the sample also highlight two factors where Tatarstan appears to be an outlier: uncertainty about markets and lack of financing are cited as the two dominant constraints for innovation. Given that these are subjective measures linked to the perception of the entrepreneur it is not clear that these are truly the root causes of limited innovation, but they do warrant further exploration.

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23 Enterprises with staff growth rates of more than 30% between 2007 and 2009
Figure 33: Factors cited by enterprises as the main constraints for innovation


Figure 34 below highlights a passive approach towards competitiveness. Stating that lack of finance and strong competition hampers growth is a characteristic of business leaders who do not see which market trends they should invest in and how to reengineer their businesses. The concept that the outside world is too challenging shows that entrepreneurs need external support to restart the classical entrepreneurship process that leads to success, including:

- Business intelligence.
- Sharp evaluation of in-house assets (human capital, technology performance, etc.).
- Reengineering capabilities.
- Open mind towards new products, supply chains and markets.

These findings are in agreement with the previous findings from a 2006 OPORA study, which placed Tatarstan 27th out of 36 regions in terms of availability of business services.24

Figure 34: Top 5 factors that prevent a company from growing [number of times cited by companies]


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24 Индекс развития малого и среднего предпринимательства в регионах России «Индекс ОПОРы» ОТЧЕТ ПО ИТОГАМ ИССЛЕДОВАНИЯ
Chapter 4
Knowledge Institutions
Main Findings

- The Republic of Tatarstan is host to a large number of well established universities and research institutes (RDIs) which could be mobilized for innovation-led growth. Kazan State University and Kazan State Technological University are ranked in the top 10 percent of Russian universities in their categories. The history of the Kazan State Technical University is closely connected with the progress of aeronautics in the country.

- However, Tatarstan’s major universities are either poorly integrated in international research circles or are not producing research near the global frontier of science. And the total impact of researchers in those universities is low, as measured by extremely low h-indices (Figure 35). This implies that the research outputs of Tatarstan’s universities are either not visible to the global research community or that their quality or relevance to international research is limited.

**Figure 35: Impact of publications in the ISI database**

![Graph showing h-index comparison between Tatarstan and other countries and universities](image)

Source: ISI Web of Knowledge,
Note: Publications cover the years 2005 to 2007.

- Several research institutions in Tatarstan are able to market their services effectively to industry while others have little interest or ability to do so. Tatarstan’s research institutions have only few international clients. Foreign contracts are not only an additional source of revenue for the local institutions, but a strong way to learn from interacting with global innovators and “inject” this knowledge in the regional economy.

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25 The h-index is an index that attempts to measure both the scientific productivity and the apparent scientific impact of a group of scientists. The index is based on the set of the scientist’s most cited papers and the number of citations that they have received in other people’s publications. A scientist has index h if h of [his/her] Np papers have at least h citations each, and the other (Np – h) papers have at most h citations each.
Most research organizations in Tatarstan are not aware of their technology commercialization potential. While most research organizations declared having strong industrial strategies the majority lacked sound commercialization practices and had very limited resources dedicated to marketing and industry collaboration. Overall, commercialisation of know-how, collaborations with companies and entrepreneurship are not considered key building blocks for Tatarstan’s R&D institutions. Not a single R&D institution in the World Bank survey considers technological support for economic competitiveness as a key function. However the World Bank survey also found that universities and RDIs are keen on providing a portfolio of support services to new entrepreneurs.

4.1 Introduction

The Republic of Tatarstan presents a paradox: it hosts large traditional companies as well as a critical mass of knowledge-providers and intermediary organisations but it does not take full advantage of this situation. Findings suggest that these assets are underexploited and barriers to success are not tackled properly by local stakeholders and public authorities. A major problem relates to the discrepancy between the analysis made by many stakeholders and the real efficiency of the innovation ecosystem.

There are opportunities for improving the market-orientation of knowledge institutions in Tatarstan and their contribution to firm competitiveness. Tatarstan’s universities and RDIs are keen on providing a portfolio of support services to new entrepreneurs. If such services were well structured, this should lead to positive results comparable to European good practices.

This chapter draws on the findings made through field visits to research institutions in addition to a survey of ten universities and six RDIs to understand the key knowledge assets of the RIS, as well as the existing gaps in the system. It also draws from publicly available data on R&D performance.

4.2 Knowledge Institutions in Tatarstan

The Republic of Tatarstan is a host to a large number of well established universities and research institutes (RDIs) which could be mobilized for innovation-led growth. Tatarstan’s universities play a prominent role in the Republic, due to the broad scope of their R&D, their research facilities and their links with Russian and foreign partners (including industrial companies). The system of higher education institutions (HEIs) of Tatarstan includes 20 state higher educational establishments and 13 municipal, military and non-state HEIs. The main universities are located in Kazan, which creates a critical geographic cluster of knowledge, a requirement for the development of sustainable RIS. Moreover, the main five universities are well placed in national rankings (Figure 36).

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26 A table presenting the list of organisations can be found in the Appendix
Several universities have a long and prestigious history. This is a major asset to develop an efficient innovation policy and to attract inwards investments from public and private sources. Kazan State University (KSU), founded in 1804, is the second oldest university in Russia. The KSU Library, containing over five million books, is one of the largest and oldest in Russia. The history of the Kazan State Technical University is closely connected with the progress of aeronautics in the country. Today the university is one of the leading Russian institutions in aircraft and rocket engineering, engine- and instrument-production, computer science and radio engineering, enrolls about 22,000 students and a faculty body of 3,000. Kazan State Technological University is even larger with 27,000 students and is ranked in the top 10 percent of Russian universities.

Research and development institutes (RDIs) in Tatarstan include the Kazan Scientific Centre of the Russian Academy of Sciences (RAS), the Academy of Sciences of Tatarstan and several dozen sectoral R&D organizations. The largest single entity is the Kazan Scientific Centre RAS with about 500 researchers. The Academy of Sciences of the Republic of Tatarstan includes six research institutes and seven research centres and laboratories created in cooperation with universities and the RAS institutes. The majority of research institutions of the Academy are working in the fields of social sciences and humanities studying Tatar culture and language. They receive funding from the republican budget. In addition to these, 26 R&D organizations work under the scientific leadership of the Academy. Several conduct little R&D and are closer to engineering companies than actual research institutes. Most competitive research of the Academy is in petrochemistry (local Petrocommodity Institute does research for Chevron), phosphoric chemistry and power machinery. Prospective works in planned in IT (a new small institute with 20 researchers is being established).

4.3 A Snapshot of Scientific Capabilities

This report is not focused on evaluating the scientific potential of Tatarstan’s research institutions. It focuses on the innovation potential and how to better mobilise this potential for the success of the Tatarstan economy. The objective of this section is to gauge the internationalization of Tatarstan’s research institutions not to provide recommendations on how they could improve their scientific performance. Thus, this section only presents a very brief overview of the scientific potential of research institution on the basis of internationally peer-reviewed publications. While this is commonly used method for benchmarking research institutions it is not comprehensive. An in-depth understanding of
the scientific potential of Tatarstan’s research institutions would require individual assessments of each institution by teams of international scientific peers.

**Tatarstan’s major universities are either poorly integrated in international research circles or are not producing research near the global frontier of science.** Comparing publication statistics is only meaningful if it is done through standardized international databases. Otherwise it is impossible to control for the quality of the journal publishing the research. **Figure 37** and **Figure 38** benchmark four of Tatarstan’s universities against two other universities in Russia, three foreign universities and one foreign applied research institute. **Figure 37** shows that Tatarstan’s international publications, as documented in the ISI database\(^{27}\), are not being cited by other international researchers. Publications produced between 2005 and 2007 were only cited once by other international publications between 2007 and 2009 (**Figure 37**). And the total impact of researchers in those universities was low, as measured by extremely low h-indices (**Figure 38**).\(^{28}\) This implies that the research outputs of Tatarstan’s universities are either not visible to the global research community or that their quality or relevance to international research is limited. Lomonosov Moscow State University’s superior performance on both indicators shows that it is not a question of the isolation of the Russian research community in general, but an issue more specific to Tatarstan.

If Tatarstan’s challenge is one of visibility of publications, then the region’s research community can develop a specific strategy for such visibility. If the key challenge is to produce “knowledge-goods” that can be used for commercialization and integration into the greater integration of global research networks, then the scientific community must aim for higher standards, focus on key assets and cross fertilisation between different research themes.

**Figure 37: Average number of citations per international peer-reviewed publication in the ISI database**

[Bar chart showing citations per publication for different institutions]

*Source: ISI Web of Knowledge,*

*Note: Publications cover the years 2005 to 2007. Citations are for 2007-2009.*

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\(^{27}\) The ISI database includes more than 14,000 journals.

\(^{28}\) The h-index is an index that attempts to measure both the scientific productivity and the apparent scientific impact of a group of scientists. The index is based on the set of the scientist’s most cited papers and the number of citations that they have received in other people’s publications. A scientist has index h if h of [his/her] Np papers have at least h citations each, and the other (Np – h) papers have at most h citations each.
4.4 Commercialization Capabilities: Perception Versus Reality

In high income economies, research institutions typically focus on the type of long-term strategic research that is unlikely to be funded by the private sector. In technology follower countries focusing on long-term research at the scientific frontier is less useful because the private sector does not have the capacity to absorb and commercialize this research. But research institutions in technology follower countries can still play a key role in supporting the weaker innovation and technological capabilities of the productive sector. An institution’s ability to generate revenue from industrial contracts is a sign of its relevance to enterprise sector needs.

Several research institutions in Tatarstan are able to market their services effectively to industry, but others have little interest or ability to do so. Figure 39 compares several of Tatarstan’s institutions to two applied Western European research institutes in terms of the revenue generated from industry contracts per staff. The figure shows that Kazan State Technological University (KSTU) is able to generate significant revenues from industry, but that three research institutions have no revenue whatsoever from industry.

Figure 38: Impact of publications in the ISI database

Source: ISI Web of Knowledge,
Note: Publications cover the years 2005 to 2007.
Most research organizations in Tatarstan are not aware of their technology commercialization needs. According to survey responses, R&D organizations claimed to have strong and well defined marketing strategies backed by proactive policies towards collaborations with firms (Table 5).

Table 5: Tatarstan survey response to questions on commercialization practices

<table>
<thead>
<tr>
<th>Questions to Universities</th>
<th>Share of organizations responding YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your organization have a written marketing strategy or plan?</td>
<td>Universities: 70%</td>
</tr>
<tr>
<td>Have you formally estimated industry demand for your services?</td>
<td>Universities: 90%</td>
</tr>
<tr>
<td>Are you actively looking for collaboration with firms?</td>
<td>Universities: 100%</td>
</tr>
<tr>
<td>Could the applied research performed by the organization lead to the creation of new firms?</td>
<td>Universities: 90%</td>
</tr>
<tr>
<td>Do you feel some of your staff or students are commercially-oriented and could create companies?</td>
<td>Universities: 80%</td>
</tr>
<tr>
<td>Does the R&amp;D institute collaborate regularly with a technology transfer office, incubator or technology park to commercialize knowledge?</td>
<td>Universities: N.A.</td>
</tr>
</tbody>
</table>

Source: World Bank survey of research institutions in Tatarstan.

These declarations contradict what can be observed during visits with these organizations. In-person interviews with research institutions showed that these organisations were lagging behind in terms of sound research commercialization practices. But stakeholders were keen on developing successful strategies for commercialisation of science and entrepreneurship. Moreover, not only the number of staff (equivalent full time) dedicated to marketing and technological collaborations is very limited and unstructured (with the apparent exception of KTU Light Manufacturing Institute) but personnel report lacking some...
of the necessary competencies to carry such complex tasks. The fact that not a single organization in the survey responded having been granted any foreign patents between 2003 and 2008 is a strong statement.

The following chart also illustrates that if the organisations have developed strategies and tools, these do not produce significant tangible results (Figure 40). Only two of the research institutions in the sample indicated (very few) contracts with foreign companies. Information obtained separately from Kazan State Technological University and Kazan State University revealed that only 0.2 and 3 percent respectively of their total industrial revenue from innovation-related contracts were from foreign sources. Foreign contracts are a signal of global integration but also of the global competitiveness of research institutions. The knowledge-based economy is by nature global so increasing innovation requires a significant share of customers and partners beyond local borders. Foreign contracts are not only an additional source of revenue for the local institutions, but a way to learn from interacting with global innovators and recycle this knowledge in the regional economy.

**Figure 40: Share of industry contracts made with foreign companies:**

An important barrier for the market orientation of some R&D institutes is their lack of practical skills. Tatarstan’s R&D institutes are not in a position to support the enterprise sector. They are either focused on productive activities and conduct very little actual R&D, and are thus either only “institutes” by name, or they conduct very theoretical research with little practical knowledge to offer industry. Figure 41 illustrates the situation. Few of the staff of Tatarstan’s R&D institutes that are not oriented towards production actually has any industrial experience. This type of experience is necessary because it allows the staff to better understand and diagnose industrial needs, and offer practical services to firms. Figure 42 also highlights that not a single R&D institute in the sample considers knowledge of industrial processes, or testing and measurement, as either their first or second most important asset for industry. Similarly, none consider technological support for economic competitiveness as their most important function (Figure 43). Universities in Tatarstan perceive their role in promoting economic competitiveness in the same way.
**Figure 41: Share of staff with previous industry experience in R&D institutes**

Source: World Bank survey of research institutions in Tatarstan.

**Figure 42: R&D institute perceptions of their most valuable assets for industry**

Source: World Bank survey of research institutions in Tatarstan.
Figure 43: R&D institute perceptions of their functions

Source: World Bank survey of research institutions in Tatarstan.

Overall, commercialisation of know-how, collaborations with companies and entrepreneurship are not considered key building blocks for Tatarstan’s R&D institutions. The idea that these activities need the same attention as research or education is not widely disseminated among administrators nor is it at the level of individual scientists.

Interviews with research institutions yielded a series of indicators that confirm that there was:

- No serious mapping of assets that could be proposed to the market.
- No analysis of strategic markets in Russia or abroad.
- Little understanding of the value of “knowledge goods”.
- Difficulty to assess the property of the IPR.
- Lack of mobilisation of the different departments to concentrate on technology transfer and commercialisation of R&D. A few individuals have remarkable success stories when it comes to such matters, but this resulted from personal willingness and ability rather than from a strategy shared by the personnel of the different R&D institutions.

These problems are not specific to Tatarstan and many equivalent institutions across Europe face similar problems.

### 4.5 Entrepreneurship Culture

While several research institutions are spinning out enterprises, their growth potential and link to innovation is questionable. Figure 44 shows that Kazan Technical University and Kazan University of Medicine actually spin-out more companies per R&D staff. But many of these are oriented to simple production activities or have been established by researchers to apply for FASIE funding for their projects, with no prospects for further entrepreneurship. In
Advancing Innovation in the Republic of Tatarstan

In many cases the CEO of the company is a scientist who holds on to his or her position in the research institution, a non-starter for a successful spin-off. It should be noticed that some key indicators have not been revealed from the outputs of face-to-face meetings and questionnaires including:

- The number of start-ups which are technology-based companies.
- The share of these companies that develops and markets innovative technologies or services.
- The share of these companies that has a real growth potential.

**Figure 44: Annual number of start-ups per 1000 R&D staff**

![Graph showing start-ups per 1000 R&D staff]

*Source: ASTP, 2006; FEDIT 2007 Annual Report; World Bank survey of research institutions in Tatarstan.*

Universities and RDIs are keen on providing a portfolio of support services to new entrepreneurs (Figure 45). If confirmed, this is a very positive signal. It implies that the heads of institutes and R&D departments are keen on making their best efforts if a well structured entrepreneurship programme is available. As discussed in the previous chapter, Tatarstan has potential for entrepreneurship, comparing well to countries such as the United States and Italy. Thus, there should be opportunities for spinouts.

**Figure 45: Research organizations’ responses to “How would your organisation be interested in participating in the creation of new companies?”**

![Bar chart showing responses]

*Source: World Bank survey of research institutions in Tatarstan.*

However, there are clear barriers to industry-research collaboration. Besides the lack of financing for enterprise R&D, Figure 46 points to a how research institutions deal with SMEs.
Research institutions do not have the types of intermediary staff or structures or the exposure to understand the needs of SMEs (“unclear questions from companies” and “lack of practical know-how”). Several research institutes do not have the required internal processes to deal with industry (“deadlines”). These gaps can be addressed by regional support for research-industry collaboration and interface organizations such as technology transfer offices.

Figure 46: Difficulties faced by research organization in collaborating with SMEs

Source: World Bank survey of research institutions in Tatarstan.

4.6 Interface Organisations

Tatarstan has taken steps to develop several interfaces organisations, a positive asset for the development of a successful innovation ecosystem. Tatarstan’s innovation system is on average slightly more effective than that of Russia’s and other transition countries, mostly due to a few “star” innovators, but the region lags far behind those of technology leaders such as Finland and the United Kingdom. This gap can be attributed to a different understanding of how to implement support and interface programmes.

Interface organizations have not yet the reached level of maturity to bridge the gap between knowledge and industry. Although the Republic of Tatarstan has significantly invested in a series of instruments (the Investment and Venture Fund, technology parks, etc.) this is far from sufficient create a virtuous circle of innovation in the region. So far, most investments have been made in the “hardware” and little in the “soft” dimension of support. This approach is common throughout Russia. An assessment of good practices (see for instance the evaluation of RITTS programmes funded by the European Commission[29]) shows that soft measures are equally important to concrete investments (e.g. buildings or funds).

There are a few burgeoning technology transfer offices in universities and several technology parks and incubators have as part of their mission to develop linkages between research and industry. Regardless of the goodwill of stakeholders, these interface organisations have not yet reached the maturity level enabling them to deploy commercialization services. This includes a set of interrelated activities such as:

o Assessing the entrepreneurship potential embedded in universities and RDIs as well as in the wider population.

o Delivering hands-on and continuous support to start-ups to make sure they can meet their highest objectives.

o Funding streams for step-by-step growth.

o Making a clear difference between projects that are innovative and those that are less so.

o Understanding that seed or venture funding is not about money but about support.

o Helping universities and RDIs assess their potential for knowledge commercialisation.

o Being able to detect strategic investors from abroad and attracting them to Tatarstan.

o Permanent monitoring the incubators and technology parks from the point of view of services rendered and not only number of square meters rented.

Much of this might be related to cultural differences where in Russia the so-called concrete measures surpass other less tangible (and less visible) activities related to behaviour and continuity. European regions have taken the time to understand the value of “soft” intervention in the RIS. It is by endorsing this approach that Tatarstan can become a knowledge-based region.

The other lesson to be used from international practices is that regional authorities represent the right policy level to design, implement, monitor and adapt innovation strategies. This holds true regardless of any legal power that would allow these authorities to impose their views on various stakeholders. In other words, regional governments can attract the other decision-makers through a consensus building approach and the promise that a collective innovation strategy will serve the region as well as each single institution.
Chapter 5

Innovation Policy in the Republic of Tatarstan
Main Findings

- **In recent years, the Government of Tatarstan has put significant efforts in developing the regional innovation system.** Innovation support institutions have been created including most notably a system of technology parks – especially Technopark IDEA, which appears to be on the right track – and a so-called Innovation Venture Fund. A system of competitions has been established to support R&D and innovation projects, and SMEs can benefit from certain forms of support. Several regional policy and strategy documents establish very ambitious targets, which reflect the government’s ambition in turning Tatarstan into a knowledge-economy.

- **Limited coordination and involvement of stakeholders hamper the effectiveness of the current policy however.** As a result, it is very unlikely that policy documents adequately reflect the current and future potential situation in the region. This leads to the fact public and private stakeholders do not really take ownership of the policy. For example, the *Strategy of Scientific and Innovation Activity Development* requires to triple regional R&D investments within two years and to multiply them five-fold within seven years to meet a 3 percent of gross regional product target by 2015. Not only have such high growth rates never been achieved in rapid-growth economies but a 3 percent share of GRP is a rare exception in global terms.

- **Existing forms of regional innovation monitoring do not exist or are not adequate to ensure the effective implementation of innovation policy and to provide feedback on innovation policy** (not to mention that efficient collection of data is still missing). Only a few indicators of innovation activity are taken into account by the government and there is no system for reliable data processing and analysis.

- **The bulk of regional support for innovation is in the form of large physical infrastructure and equity investments and not on the creation of a recurrent deal flow of projects.** Although the Republic of Tatarstan has significantly invested in a series of instruments this is far from sufficient to create a virtuous circle of innovation in the region. Many critical gaps in the innovation system are unaddressed such as soft support measures, innovation infrastructure in local research institutions and matching grant financing. For example, state enterprise matching grant funding for innovation is only $1.9 per capita in Tatarstan versus $74 in Ireland (Table 6).

*Table 6: Matching grant support for enterprise innovation per year*

<table>
<thead>
<tr>
<th></th>
<th>Russia (FASIE)</th>
<th>Tatarstan (FASIE-IVF program)</th>
<th>Finland (Tekes)</th>
<th>Ireland (Enterprise Ireland)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total (million USD)</strong></td>
<td>66</td>
<td>7.3</td>
<td>429</td>
<td>310</td>
</tr>
<tr>
<td><strong>Per capita (USD)</strong></td>
<td>0.5</td>
<td>1.9</td>
<td>81</td>
<td>74</td>
</tr>
</tbody>
</table>

Source: Tekes and Enterprise Ireland websites. Interviews with FASIE and IVF. Note: Tatarstan is based on 2004-2009 statistics. Other economies are based on 2008 statistics.

- **Interface organizations have not yet reached the level of maturity to bridge the gap between knowledge and industry.** Most investments have been made in the
“hardware” and little in the “soft” dimension of support such as high quality advisory services and partnership generation.

- The innovation support institutions require significant capacity building and restructuring to be able to generate real value-added in the regional innovation system. For example, there are only very few examples of successful public sector roles in VC, particularly in middle-income countries, but a large number of failures. And there are even fewer successful of institutions using IVF’s approach of combining venture capital and grant-making under a same roof. These two activities require significantly different selection processes and management skills.

In recent years Tatarstan’s government has paid significant attention to the creation of a regional innovation system. Several of innovation support institutions have been created including most notably a system of technology parks and a venture fund. A system of competitions has also been established to support R&D and innovation projects, and SMEs can benefit from certain forms of support.

But the regional government still needs to contribute significant time, effort and financings to ensure the different blocks of the regional innovation system create the added-value expected from this policy. As mentioned in Chapter 1, international findings demonstrate that linkages in the RIS are a key to success.

5.1 Governance of the Regional Innovation System

5.1.1 Institutions Involved in Innovation Policy

The main innovation policy-making bodies in Tatarstan are the Ministry of Economy and the Ministry of Education and Science, and several other bodies are also involved in innovation.

The Ministry of Economy is the main regional government body active in innovation policy in the Republic of Tatarstan. The Ministry has a Department of Investments and Innovations with a small staff of seven employees. The Ministry is responsible for drafting laws relevant to innovation, innovation support infrastructure and for planning the financing of large innovation projects approved by the regional government.

The Ministry of Education and Science is also involved in the support of innovation as well as in R&D commercialization in educational and research organizations. Two Divisions work in the area of innovation, with a total of six employees. There is also a Coordination Council on Innovation Activity, but this Council does not coordinate its activity with other ministries of Tatarstan Government. The Ministry has submitted proposals to the Government for the support of the innovation infrastructure embedded in universities and R&D organizations. The Ministry does not actively collaborate with the main state universities of Tatarstan which are under the authority of the federal government.

Several other government bodies are also involved in matters related to the innovation policy (Figure 47). All but one of these ministries have a functional division dedicated to innovation or technology with three to six staff members:
- The **Ministry of Industry and Trade**, which supervises activity of the State Unity Enterprise of the Republic of Tatarstan «Tatar Centre of Scientific and Technical Information».
- The **Ministry of Transport and Road Construction**.
- The **Ministry of Health Care**.
- The **Ministry of Building, Architecture and Housing and Communal Services**.
- The **Ministry of Agriculture and Foodstuff**.
- The **Ministry of Information Technologies and Communications**.
- The **Academy of Science of the Republic of Tatarstan**, although not a policy-making body strictly speaking is involved in developing major regional strategies and policies.
5.1.2 Strategies and Policies

The regional innovation strategy is presented in the “Strategy of Scientific and Innovation Activity Development in the Republic of Tatarstan Until 2015”\(^{30}\), developed by a working group led by the Academy of Sciences of Tatarstan. This group included representatives of the Ministry of Economy, Technopark IDEA, the Committee of State Statistics, Kazan State Technological University, Kazan State Technical University, the Chamber of Commerce and Industry of Tatarstan, the Polytechnic Institute (Naberezhnye Chelny) and the Association of Industrial Enterprises of Tatarstan.

Two other main innovation policy documents are the *Innovation Memorandum of the Republic of Tatarstan for 2008-2010\(^{31}\) and the *Republican Programme for Development of Innovative Activity in the Republic of Tatarstan in 2004-2010.\(^{32}\) Both were developed by the Ministry of Economy and the Academy of Sciences of Tatarstan, although other ministries submitted proposals and approved the documents.

*The Strategy of Scientific and Innovation Activity Development in the Republic of Tatarstan until 2015*

This Strategy positions innovation as one of the key priorities of the Republic. The objectives of the Strategy are to:

1. Enhance the competitiveness of the scientific potential of the Republic of Tatarstan and to create internationally recognized scientific schools.
2. Integrate academic, university and industrial science and innovation activities.
3. Increase the efficiency of financial investments in R&D.
4. Create economic and social incentives to attract young people to science.
5. Improve the skills of scientists.

The Strategy aims to achieve the following results:

1. Growth of industrial production of innovative organizations by at least 0.8% per year.
2. Decrease the resource-intensity of Gross Regional Product (GRP) by 0.2%.
3. Increase in the share of regional R&D expenditures to 2 % of the GRP in 2010 and 3 % in 2015.
4. Increase the share of the private sector in R&D expenditures to 60 % by 2010 and to 70 % by 2015.
5. Increase of employment in science and scientific services by 0.9 persons per 10 thousand of residents by 2010.
6. Achieve an annual positive growth of the number of students conducting R&D.
7. Increase in the number of patent applications per capita up to the national average by 2010.

\(^{30}\) approved by the Decree of the President of the Republic of Tatarstan dated 17.06.2008 № UP-293

\(^{31}\) approved by the Decree of the Tatarstan Government dated 15.12.08 № 875

\(^{32}\) approved by the Decree of the Tatarstan Government dated 12.03.2004 № 121
8. Increase exports of innovation production.

9. Increase in the number of international R&D programmes and projects implemented with participation of Tatarstan scientists.

The Strategy is to be financed with the equivalent of 0.2% of the 2005 GRP between 2008 and 2015. Its implementation is monitored by the Academy of Sciences (implementation mechanisms have not been established).

The Strategy sets forth very ambitious goals for the Republic of Tatarstan but many of the targets are not realistic, and this will negatively affect the buy-in of stakeholders. The ambitious nature of the Strategy positively reflects the Government’s vision of innovation at the centre of Tatarstan’s long term competitiveness. The choice of indicators also demonstrates a sound understanding of the drivers of innovation by Tatarstan’s policymakers. However, international experience suggests that the rapid rates of progress required to meet the targets will simply not be possible. For example, Tatarstan’s 2008 R&D expenditures represent 0.7 percent of GRP. The Strategy would require to triple this figure within two years and to multiply it five-fold within seven years to meet the 3 percent target in 2015. Not only have these growth rates never been reached in rapid-growth economies but a 3 percent share of GRP is a rare exception in global terms. Only five countries have reached the 3 percent mark. As seen in chapter 2, Tatarstan’s economic structure is dominated by industries that are not R&D-intensive, so the region cannot expect to meet these rates unless it radically restructures its economy. As discussed in chapter 1, this is a lengthy process. Most successful regions grow by diversifying into related industries, not by jumping into radically new high-technology sectors. Many of the other indicators suffer from similar shortcoming. A bottom-up strategy development process backed up by a rigorous analysis of the regional innovation system, as discussed in chapter 7, would help avoid this type of issue.

The Innovation Memorandum of the Republic of Tatarstan for 2008-2010

The Innovation Memorandum provides innovation objectives. It lists a series of strategic goals to enhance innovation in enterprises, industrial modernization, and improvements of the quality of economic growth through diversification. These objectives are formulated in the form of a detailed list of quantitative indicators to be met over a two-year period. The Memorandum also establishes a list of six technological priorities. Half are in generic high-technology sectors (IT, biotechnology, materials) and the other half in more conventional fields (energy, transport and communication).

The Innovation Memorandum outlines strategic objectives for achieving the economic growth of the Republic of Tatarstan. It is not clear how it differs from the Strategy. Having two parallel strategic documents developed through different processes and with different stakeholders can only dilute priorities and create confusion among stakeholders.

It is unlikely that the choice of quantitative targets of the Innovation Memorandum is realistic and optimal given the limited involvement of all stakeholders in the document’s elaboration (traditional top-down approach versus the needed consensus-building methodology). The ultimate “consumers” of the selected priority technology sectors are enterprises, and the primary “domestic generators” of these sectors are research institutions and universities. Without a proper stakeholder endorsement it is possible (or
even likely) that these priorities are not aligned with the needs, willingness and capabilities of these stakeholders. Similarly, targets for the detailed performance indicators are very ambitious and need to be aligned with the objectives of a large number of stakeholders which were not involved in the core preparation of the Memorandum. Not only is there little chance that these stakeholders will take ownership of these indicators but the Memorandum will lose its credibility as soon as the parties will realise that the objectives are unattainable.

The list of technological priorities presented in the Memorandum, mostly concentrated in high-technology areas can be strengthened by increasing its relevance to the regional economy and its assets. The current priorities are not based on any competitive advantage of Tatarstan but reflect those of most large and medium-sized high-income economies whereby information and communication technologies, biotechnology, clean technologies and materials occupy prominent positions. Moreover, the range of technological areas covered in the priorities is very broad. R&D is “lumpy” and requires a minimum critical mass of investments in infrastructure, equipment, team-building, learning and networking, before meaningful results can be obtained. It is hence unlikely that spreading scarce fiscal resources thinly among a large number of priorities can yield meaningful results. This is a challenge for most small countries or regions. A more efficient use of R&D funding may be achieved by increasing the role of private sector demand in guiding R&D priorities. More targeted sectors can be unveiled by developing institutional processes that select research priorities by leveraging existing regional competitive advantages and consulting stakeholders.

The Republican Programme of Development of Innovative Activity in the Republic of Tatarstan in 2004-2010

The Programme determines major tasks of the state, private and public bodies in the field of innovation to ensure a sustainable economic development and increases the living standards. The Programme includes the creation and development of an innovation support infrastructure, innovation support programs and innovation financing instruments. It also includes a policy for direct public investments in enterprises to spur innovation. The Programme focuses on fostering innovation through the commercialization of Russian R&D. It also includes a monitoring and evaluation stage. The Programme’s implementation is monitored by the Ministry of Economy.

Again, the comprehensive nature of the programme reflects the Government’s determination in using innovation to catalyze economic development. However, the Programme has no quantitative objectives and its successful implementation depends on the goodwill of stakeholders who did not have a key role in the Programme’s development process. The Programme presents an extensive list of activities to be undertaken during a relatively short period of time. Many of these activities have been used successfully in other countries to promote innovation. It is unlikely that these could all be deployed in a meaningful way if there are no specific outcome targets. Moreover, many of these activities are to be implemented by private and public stakeholders outside of the Ministry of Economy and Academy of Sciences. If these organizations only played a marginal role in the development of the Programme their ownership of the Programme and its alignment with their objectives is unlikely to be high. Finally, the document does not solve the problem of lack of adequate skills in Tatarstan to implement any of these objectives.
Some additional critical gaps of the *Strategy, Memorandum* and *Programme* documents are that:

- There is significant overlap in time frame, purpose, goals and means but they differ in details. The *Programme* even describes a set of institutions that no longer exist. While all programs contain the required economic and social target indicators, targets differ significantly from program to program to the degree of not being comparable. Finally, there is no set of control measures and actions in the event of non-performance.
- The terminology in the field of innovation is still not established in Tatarstan. This leads to a lack of common understanding of what an innovation policy aims to support.
- Although priorities and strategic goals are identified no real activities or financial streams are defined to achieve these goals.

### 5.1.3 Policy Coordination

An important obstacle to the development of an effective innovation policy in Tatarstan is the lack of consensus and coordination between regional innovation stakeholders. At the government level, the support to innovation is fragmented among various ministries and agencies with little or no established coordination mechanism. At present, there is no high-level government inter-ministerial commission or council that can support the effective coordination of a coherent innovation policy. Although the Presidium of the Academy of Sciences is the responsible Government Commission on scientific-technical and innovation policy it does not stand at the right political level for such a role. Moreover, there is a conflict of interest in having a beneficiary of innovation policy taking a leading role in the development of this policy. Furthermore, there is little involvement of non-government stakeholders (e.g. industry, universities, technology parks, etc.) in the policy making process, resulting in policies that do not reflect the actual needs of the regional innovation system and are unlikely to be properly implemented. As discussed in Chapter 1, a successful innovation system is one in which there are strong linkages between the various stakeholders. This cannot be achieved by excluding stakeholders from the governance of the regional innovation system.

On the positive side, Tatarstan’s government bodies actively cooperate with the federal authorities. A case in point is the cooperation of the Ministry of Economy and Committee of Development of Small and Medium Entrepreneurship with the Ministry of Economic Development of the Russian Federation, Ministry of Communications and Mass Media of the Russian Federation, JSC “Special Economic Zones”. This resulted in the creation of the Industrial and Production Special Economic Zone “Elabuga” and other elements of business support infrastructure in Tatarstan. The Ministry of Education and Science cooperates with the Ministry of Education and Science of the Russian Federation on support of big R&D projects submitted to the federal programs by the Tatarstan organizations. The Academy of Sciences cooperates with the Russian Foundation for Basic Research and the Russian Humanitarian Foundation on organization of the above mentioned joint competitions of R&D projects.
5.1.4 Monitoring and Evaluation

The monitoring and evaluation of innovation policy is fragmented. Monitoring and evaluation is conducted separately by several governmental bodies in their respective fields of responsibility. Several bodies collect information from different sectors involved in the processes of creation and use of innovation:

- The Ministry of Economy monitors activity of innovation support infrastructure.
- The Ministry of Education and Science collects information about the activity of Higher Educational Establishments and research institutes (Kazan Scientific Centre of the RAS, other institutes and design bureaus).
- The Academy of Sciences supervises activity of the institutes in the structure of the Academy and monitors implementation of the Strategy of scientific and innovation activity development in the Republic of Tatarstan until 2015.
- The Committee of Development of Small and Medium Entrepreneurship supervise activity of all business support infrastructure (including the SEZ “Elabuga” and venture funds).
- The Ministry of Industry and Trade, Ministry of Transport and Road Construction, Ministry of Health Care, Ministry of Building, Architecture and Housing and Communal Services, Ministry of Information Technologies and Communications, Ministry of Agriculture and Foodstuff are responsible for collection of data about the activity of organizations in their fields of responsibility.

It seems that no centralized and comprehensive process for the evaluation and analysis of the entire regional innovation system exists. Although an analysis of the situation was made in 2008 during the preparation of the Strategy it was very general and superficial. It was mostly a qualitative evaluation of the main innovation trends and challenges in Russia and Tatarstan. Finally, many indicators are seen as unreliable by stakeholders and those who collect such data!

The innovation monitoring system could be strengthened. Only a few indicators of innovation activity are taken into account by the government and there is no system for data processing and analysis. These problems hamper further development and successful implementation of the innovation policy of the Republic.

Moreover, the system of federal statistics and the collected information is not reliable enough to be used for innovation policy due to the following reasons:

- There is no a common understanding of terms: innovation production and innovative companies (in some cases enterprises consider production with insignificant technological changes as the innovation production which is not correct, some of enterprises considered as innovative because they produce new products for them or for Tatarstan but they do not have expenditures for R&D).
- Many enterprises (especially small innovative companies) are not monitored.
- The system of federal innovation statistics is not useful for the regions as many of indicators are not taken into account.
- The information from the federal statistics is received more than one year after the year when it was collected – for example, the data on innovative activity in Tatarstan
in 2008 is expected to be published in April-May 2010 – this information will not be very useful as the situation is different.

- Federal statistic organizations in the regions do not provide the regional administrations with the results of enterprises’ surveys.

The existing system of state statistics of innovation activity makes it difficult to gauge the performance of the regional innovation system. This is largely because functions of the Regional Division of the Federal Statistic Service and list of data collected annually is fixed by the instructions of the Federal Statistic Service and cannot be changed by regional governments. Moreover the list of surveyed organizations does not include all innovation stakeholders and does not reflect the actual situation. There are also problems with the form “4-innovations” of state statistics – different organizations understand questions of the form in a different way.

It must be stated – once more – that a solid monitoring (not to be equated with evaluation) is an essential building block for any real innovation strategy. Without fair and transparent monitoring mechanisms, the strategy might remain at the level of political declarations.

5.1.5 Legislation

Although the regional authority’s power to enact its own legislation is limited by the federal legislation there are opportunities for developing regional legislation on innovation and many funding instruments to choose from. Russian budgetary law is determined by provision of Federal Budget Code. Regional spending must conform to federal guidelines in a format that does not leave much room for legal manoeuvre. This applies to support for particular types of activities, including innovation. A wide range of financial support instruments area available (grants, subsidies, debt and equity financing, tax benefits, etc.) and are already used in some Russian regions (see Appendix B on the Implication of the Federal Legislation).

Several laws and regulations have been enacted by the Republic of Tatarstan (see Appendix B) but their impact is unclear. Most of the legal acts in the innovation sphere define action plans or create and empower certain entities (e.g. Cabinet, IVF, and Tatarstan Academy). They contain provisions that in their current forms are declarations of intent but have limited details on implementation.

The draft law “On Innovation Activity in the Republic of Tatarstan” is a step forward. It establishes terminology, determines forms of financial support for innovative projects and creates a basis for the development and implementation of Innovation Support Programmes of the Republic of Tatarstan. A draft Law “On Technoparks structures” developed by the Ministry of Economy in 2009 is aimed at establishing a system of accreditation of business support organizations.
5.2 Public Support Programs for Innovation

5.2.1 Main Areas of Support

Support for innovation by the regional government is concentrated in equity investments and technology parks, leaving many gaps in the innovation system unaddressed. Three publicly-supported venture funds operate in Tatarstan. The largest is the Investment and Venture Fund (IVF) with RUB 5 billion of capital and a limited amount of grant financing. IVF invested RUB 233 million in 2008 and 44 million in 2009 in innovative venture projects in the region and beyond. Two other regional venture funds are also active, one run by Troika Dialog (RUB 800 million) and another by AkBars Capital (RUB 300 million).

The regional government has provided significant financing for technology parks and incubators in the past few years. For example, Technopark IDEA received a RUB 1 billion budget government loan and real estate from TatNefteKhimInvestHolding. In 2009, approximately RUB 150 million of regional government funding was allocated to SME support programs, but these are not explicitly focused on innovation. A total of RUB 7.8 billion is being invested in two new high technology parks, half being contributed by the regional budget. The next largest category is practical training of young scientists, which received about RUB 100 million. Only a very modest budget is allocated to R&D, approximately RUB 13.3 million for the Tatarstan Academy of Science, including joint projects with the Russian Foundation for Basic Research and the Russian Humanitarian Foundation. In sum, regional support for innovation is focused on equity investments and infrastructure. A broad range of measures is largely missing from the region’s policy portfolio (Table 7).

Table 7: Classification of federal and regional policy measures

<table>
<thead>
<tr>
<th>Types of Policy Measures</th>
<th>Russian Federation</th>
<th>Republic of Tatarstan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Governance &amp; horizontal research and innovation policies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.1 Strategy policy documents (official documents, policy consultation papers, green or white papers, Operational Programs of Structural Funds)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>1.1.2 Activities of official advisory and consultative forum</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>1.1.3 Policy Advisory services (technology foresight, scoreboard type activities, cluster mapping, sectoral studies of innovation)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>1.2.1 Strategic Research policies (long-term research agendas)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>1.2.2 Innovation strategies</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>1.3.1 Cluster framework policies</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>1.3.2 Horizontal measures in support of financing</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>1.3.3 Other horizontal policies (ex. society-driven innovation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Research and Technologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.1 Policy measures concerning excellence, relevance and management of research in Universities</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2.1.2 Public Research Organisations</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2.1.3 Research and Technology Organisation (private non-</td>
<td></td>
<td>x</td>
</tr>
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</table>
### Types of Policy Measures

<table>
<thead>
<tr>
<th>Types of Policy Measures</th>
<th>Russian Federation</th>
<th>Republic of Tatarstan</th>
</tr>
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<tbody>
<tr>
<td>2.1.4 Research Infrastructures</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2.2.1 Support infrastructure (transfer offices, training of support staff)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2.2.2 Knowledge Transfer (contract research, licenses, research and IPR issues in public/academic/non-profit institutes)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2.2.3 R&amp;D cooperation (joint projects, PPP with research institutes)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2.3.1 Direct support of business R&amp;D (grants and loans)</td>
<td>x limited</td>
<td>x</td>
</tr>
<tr>
<td>2.3.2 Indirect support to business R&amp;D (tax incentives and guarantees)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3.1.1 Awareness creation and science education</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>3.1.2 Relation between teaching and research</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>3.1.3 Stimulation of PhDs</td>
<td></td>
<td></td>
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<tr>
<td>3.2.1 Recruitment of researchers (e.g. fiscal incentives)</td>
<td>x</td>
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<tr>
<td>3.2.2 Career development (e.g. long-term contracts for university researchers)</td>
<td></td>
<td></td>
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<tr>
<td>3.2.3 Mobility of researchers (e.g. brain-gain, transferability of rights)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>3.3.1 Job training (LLL) of researchers and other personnel involved in innovation</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>3.3.2 Recruitment of skilled personnel in enterprises</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4.1.1 Support to sectoral innovation in manufacturing</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4.1.2 Support to innovation in services</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4.2.1 Support to innovation management and advisory services</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4.2.2 Support to organisational innovation incl. e-business, new forms of work organisations, etc</td>
<td>x</td>
<td></td>
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<tr>
<td>4.2.3 Support to technology transfer between firms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3.1 Support to innovative start-ups incl. gazelles</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4.3.2 Support to risk capital</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5.1.1 Support to the creation of favourable innovation climate (ex. Road shows, awareness campaigns)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5.1.2 Innovation prizes incl. design prizes</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5.2.1 Fiscal incentives in support of the diffusion of innovative technologies, products and services</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>5.2.2 Support and guidelines on innovative Green Public Procurement (GPP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.3 Impact assessments (on research and innovation issues) of new legislative or regulatory proposals in any policy field</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>5.3.1 Measures to raise awareness and provide general information on IPR</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
Types of Policy Measures

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>5.3.2 Consultancy and financial incentives to the use of IPR</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>5.3.3 Support to the innovative use of standards</td>
<td></td>
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</tbody>
</table>

*Note:* The table uses the classification of the INNO-Trendchart European Inventory of Research and Innovation Policy Measures.

It is not clear that government support to innovation is grounded in the innovation *Strategy, Memorandum or Programme*. The government developed a *Plan of Action on the Implementation of the Strategy*,\(^ {33} \) which includes a number of measures. However, these measures do not appear to be linked to actual financial streams and existing support programs.

The *Plan* includes actions to enhance R&D and innovation in a number of priority sectors. The effectiveness of the *Plan* actions is questionable. In many cases the activities listed in the *Plan* are quite academic and aimed at discussion of problems and preparation of programmes that are – apparently -not well connected with the problems expressed by innovation stakeholders. Moreover, there are no performance indicators to monitor the success of the plan.

No funding has been set aside for the *Programme*. The Programme mentions regional budget support for R&D activities, including a Fund of Science of Tatarstan. To date, this has yet to materialize. The inclusion of a broad range of government stakeholders early on in the strategy development process, as will be discussed in chapter 7, would ensure that the content of the Strategy is matched with sufficient financial resources.

### 5.2.2 Support of Small and Medium Enterprises

The *Committee of Development of Small and Medium Entrepreneurship of the Republic of Tatarstan* provides a useful basic set of SME support instruments. The Committee is funded in equal parts by the federal and regional governments.\(^ {34} \) It is the main agency involved in supporting SMEs growth. It works on improving the business climate by monitoring the implementation of policy implementations in areas such as law-enforcement, competition law and administrative barriers. It represents the interests of SMEs in state bodies and contributes to the preparation of SME support programs. The committee monitors the activity of business support infrastructure such as technoparks, industrial parks, business incubators and the Special Economic Zone. It also provides financing for consulting and legal support for small enterprises and provides subsidies for energy.

Several other SME support schemes was recently created and are implemented by various actors through the *Programme for Support of Small Business of the Republic of Tatarstan for the 2005 to 2010 period*. One program is the “leasing grants” for purchasing production equipment, operated by the Leasing Company of Small Businesses of the Republic of Tatarstan. A Guarantee Fund provides credit guarantees to SMEs, and prioritizes technology acquisition and innovation activities. A Revolving Fund promotes government procurement.

\(^{33}\) approved by the Decree of Tatarstan Government dated 18.05.2009 № 319

\(^{34}\) RUB 150 million each in 2009
by guaranteeing the goods and services delivered by SMEs. Grants are provided for implementing projects in priority sectors of industry.

**While existing SME support measures are a useful starting point they do not address some fundamental gaps in innovation and technology absorption.** There are few matching grants available for innovation projects, a universally-accepted form of public support for innovation. There are no grants for funding business development, sales, marketing or patenting activities of promising innovative firms either. And finally, advisory support is only offered in a reactive manner. There are no technology extension services that seek to identify and support the most promising SMEs. The Committee itself is unable to learn from its experience since it does not have a monitoring system.

### 5.2.3 Technology Parks

Policy interventions to support technoparks as tools of economic development can address five systemic problems:

1. **Infrastructure provision**: technoparks typically offer tenants physical, information and communication technologies (ICT) and scientific infrastructure superior to that available outside the technopark.

2. **Institutional problems**: tenants in some technoparks benefit from special policies to create a favourable business environment.

3. **Complementarity problems**: technoparks can be developed or managed such that they facilitate geographic proximity and agglomeration economies, and thus enable knowledge spillovers and connections between complementary competences of the system (sources of research, sources of finance, labour, suppliers, etc.).

4. **Network problems**: technoparks strengthen linkages in the NIS.

5. **Capability and learning problems**: technoparks often provide consulting or training services to increase firms’ abilities in accessing or creating new knowledge or in transforming knowledge into innovations.

Tatarstan harbours an impressive number of physical premises to host innovation-related enterprises. With eight technoparks and two more being developed for a population of only 3.8 million people, Tatarstan has more technoparks than all of Kazakhstan and more technoparks per capita than in the United Kingdom, one of the birthplaces of technoparks. Tatarstan also hosts seven business incubators. Several technology parks and incubators are described in more details below (see also Appendix C for a complete list of technoparks and descriptions of several more technoparks).

**Technopark IDEA**

Technopark IDEA plays an important role in creating a good image of the Republic at the federal level and among other Russian regions, as well as for potential investors. It harbours an incubator where start-ups are located, a technology and innovation centre and a business park open to a wider variety of tenants, but which currently hosts subsidiaries of several multinational corporations. Significantly, the technopark has achieved financial self-sustainability through its business park’s revenue streams.
At the end of 2008, the technopark had 97 companies employing a total of 1740 people. Most of the tenants are companies that provide engineering, consulting or other services. Roughly half of the tenants are start ups, one third are at the expansion stage, one tenth anchor residents and one-tenth public institutions. The technopark manages several activities to support innovation in Tatarstan. An IT park is now being developed within Technopark IDEA and is poised to be one of the biggest in Eastern Europe, hosting approximately 150 companies. In addition to its classical technopark role, technopark IDEA organizes events such as the Kazan Venture Fair, seminars, conferences and competitions for students and innovators.

While Technopark IDEA has infused a positive element of support for enterprises, much can still be done to improve its effectiveness. The proportion of innovative enterprises in the technopark is low. Figure 48 compares levels of innovative activities among firms in different countries and in Tatarstan’s technoparks. The figure shows that firms found in Technopark IDEA are less likely to be innovative than firms found outside of technoparks in most EU and EU candidate countries. In effect, while many of the companies are involved in technology-related areas, such as engineering services, they focus on narrow slow-growth domestic markets. Few are experimenting with diversification into new activities, and very few hope to find a global niche market for their products or services. It is also noteworthy that in spite of Technopark IDEA’s visibility and role in the regional innovation system, IVF has invested in few of its tenants to date.

Figure 48: Enterprises with innovation activities as a share of total enterprises

Sources: Community Innovation Survey 2006 and Innovative memorandum of Republic Tatarstan for 2008-2010
Technopolis HIMGRAD

HIMGRAD is another major infrastructure space and service provider in Kazan. It specializes in the oil and chemical sectors but firms from other sectors also reside in the park. A total of 94 tenants are in the park and benefit from lower property, profit and road taxes. It also offers generic business and infrastructure services to firms. It organizes innovation competitions for enterprises in Kazan. A High Tech Park is being created on HIMGRAD’s site in the framework of the federal programme on creation of high technology parks in Russia. HIMGRAD does not offer support in terms of innovation management, development, market access, benchmarking, or financial engineering.

HIMGRAD has been successful in attracting relatively innovative companies. Companies in HIMGRAD tend to be more innovative than those outside of the park. A World Bank survey covering 87 out of 94 tenants showed that about half of the tenants conduct some form of R&D, and they invest on average 11 percent of their revenues in R&D. Both of these figures are high by global standards, leading to the conclusion that HIMGRAD has been able to attract innovative companies into its premises. Nonetheless, it is worth noting that a large share of companies in HIMGRAD have no innovative activities whatsoever. Most are engaged in manufacturing activities and only a few are exclusively knowledge-based companies, focused on research or product design.

However, HIMGRAD plays a limited role in strengthening the regional innovation system. Figure 49 suggests that being located in HIMGRAD does not do much in terms of stimulating new innovation activities. Only a very small share of tenants that was not already engaged in R&D or in collaborative projects prior to locating in HIMGRAD is now doing so. Moreover, only around 10 percent of firms in HIMGRAD are involved in any type of cooperation with research institutions or other firms, while this is precisely the type of cooperation that a technology park should help foster. These findings are confirmed in Figure 50. Surprisingly, around 20 percent of tenants mention that had they not located in HIMGRAD they would be conducting more R&D and collaborating to a greater extent with research institutions. Locating in HIMGRAD appeared to have a negative effect on innovation and RIS linkages for these firms. Tenants were ambivalent about the effect of locating in HIMGRAD on linkages with other firms. The only innovation-related benefit from locating in HIMGRAD appears to be the greater access to sources of innovation finance (Figure 49 and Figure 50). This could either be due to HIMGRAD’s internal innovation financing schemes or because locating in HIMGRAD is making firms more attractive to innovation financing.
While HIMGRAD offers attractive physical and financial services to firms, it does little to provide the (more important) “soft” benefits of a strong RIS. Tenants report being attracted to HIMGRAD because of its quality of premises and the financial conditions offered by the park. This is strongly reflected in tenants’ perceived benefits in Figure 51. Factors that address complementarity problems, network problems and capability and learning problems discussed further above are not very relevant to tenants. Hence, HIMGRAD functions more as an industrial park which facilitates access to finance, rather than a technology park, that addresses systemic failures in the RIS and spurs innovation.
Overall Assessment of Technology Parks

Case studies and surveys of firms in other technoparks and incubators in Tatarstan point to a general trend in overemphasizing “hard” support, such as infrastructure, as opposed to “soft” support such as high quality advisory services and partnership generation. The share of innovative firms is higher than average, but relatively low by international standards in all technology parks, with the exception of the Innovation and Technology Centre of JSC “Kazan Research Institute of Aviation Technology” and the Scientific and Technology Park of Kazan State Technical University A.N. Tupolev. Firms located in other technoparks repeatedly reported benefiting mostly from good physical infrastructure and access to financial incentives. Figure 52 shows that while tenants are aware of a range of innovation-related services which are offered by their technoparks and incubators, few of them are actually using any of these services. This suggests that either the services are of poor quality, of no interest to the tenants or difficult (or costly) to access.

Figure 52: Services offered by technology parks and used by tenant firms

![Bar chart showing services offered by technology parks and used by tenant firms.]

Note: The sample includes tenants from Technopolis HIMGRAD, Technopark of Kazan State University, Technopark Idea-Yugo-Vostok and Business incubator of Naberezhnye Chelny.

Paradoxically, firms in some of the technology parks appear to be less embedded in the RIS than innovative firms outside technoparks. Only a tiny share of respondents of the World Bank survey located in technoparks carry out collaborative R&D or innovative projects (Figure 53). The enterprise innovation survey found that firms that were not located in technology parks actually carried out more collaborative projects with research institutions, organizations throughout Russia and foreign organizations than firms inside the technology parks. One reason is that most technology parks are not closely associated to universities.

Figure 53: Partners of firms in R&D and innovation activities from 2008 to 2009

![Bar chart showing partners of firms in R&D and innovation activities.]

Note: The sample of technoparks tenants includes mostly represents Technopolis HIMGRAD, but also Kazan State University Technopark, Technopark Idea-Yugo-Vostok and Business incubator of Naberezhnye Chelny.

In many countries, as in Tatarstan, the role played by technology parks remains unclear. While Tatarstan’s technology park appear to be successful at addressing Infrastructure provision and Institutional problems, they are not addressing the complementarity, network,
capability and learning problems described above. The economic literature on technoparks provides mixed-evidence on the contribution of these support programs to economic development. Many technoparks have not proven to be major sources of technology development, have stimulated little interaction between performers and users of research and have generated only modest contributions to employment. World Bank experience shows that infrastructure installations originally designated as technoparks often quickly becomes subsidized real estate structures harboring little innovation and subject to capture and corruption.

International experience suggests that a number of factors influence the performance of technology parks. Technopark design and management have been found to heavily affect their performance. Developing R&D activities in technoparks can require strategic selectivity in attracting a certain kind of firms and institutions, decisions that technopark managers may be poorly equipped to take. Success factors have been found to be a favourable image of the technopark, access to nearby local markets relevant to the technopark, a local culture favouring innovation, entrepreneurship and cooperation, access to highly skilled labour, access to venture capital and good communication, and an attractive working and living environment. All of these factors suggest that considerable care must be taken during the technopark feasibility assessment process, in the management of the technopark, in designing appropriate government support policies for technoparks and in providing a mix of high value-added services to tenants.

While the government of Tatarstan has embarked on an ambitious trajectory of investing in technoparks, there is a large scope for rethinking the role and effectiveness of these instruments in promoting links between industry and science, supporting innovation and technology adoption in domestic enterprises and creating conditions for higher value added activities.

Besides questions of design and management, it is possible that some of the basic conditions for innovation and entrepreneurship present in countries where technoparks have been successful are not yet in place in Tatarstan. These include the business environment, market demand for innovation, public financial support for innovation and a large number of “soft” innovation support instruments. The government will be able to create the most effective technology park policies by focusing on achieving success in a limited number of technology parks rather than by continuing to expand the number of technoparks.

### 5.2.4 Innovation Grants

The regional government provides grant support for innovation through a limited number of programs. The competition “50 Best Innovative Ideas for the Republic of Tatarstan” is organized by the Investment and Venture Fund, Technopark IDEA and the Tatarstan Academy of Sciences. It provides relatively small grants of less than RUB 50,000 through a

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35 Ferguson, 2004; Siegel, 2003
36 Siegel, 2003; Westhead and Batstone, 1999
37 Phillips, 2002
38 Ylinenpää, 2001
variety of programs including student R&D projects and inventor competitions. Through this competition, IVF and Technopark IDEA have also made a deal with FASIE to provide joint support for projects that are eligible for FASIE funding. Up to 40 R&D projects received up to RUB 200 thousand from IVF and 200 from FASIE under the “Youth Innovation Project”. Up to 15 R&D projects receive funding of up to RUB 1 million from IVF and the same from FASIE under the START-1 program. And up to 5 projects receive up RUB 2 million from IVF and the same from FASIE under the follow-up program START-2.

There is very limited public financial support to address market gaps in innovation in Tatarstan or in the rest of Russia. During the 2004-2009 period Tatarstan-based organizations concluded 97 contracts with the FASIE for a total of RUB 130 million, mostly under the START programme. This averaged about RUB 46 million per award. This is a good but relatively modest sum considering the needs of innovative firms. At the federal level, the FASIE program offers very scarce resources for innovation when compared to similar programs in other countries. In 2008, it offered USD 66 million of funding. To put this in context, this should be compared to the USD 429 million of funding offered by Tekes in Finland, a country with a population 27 times smaller than Russia’s (Table 8). When including the matching contributions from the “50 Best Innovative Ideas for the Republic of Tatarstan”, Tatarstan does not fare much better.

Moreover, it should be noted that successful schemes tend to create a “coherent chain” of support addressing many different types of needs of firms (from a few hours of free consultancy to venture funding). This chain of services is largely lacking in Tatarstan (in terms of money as well as in terms of skills).

Table 8: Matching grant support for enterprise innovation per year

<table>
<thead>
<tr>
<th></th>
<th>Russia (FASIE)</th>
<th>Tatarstan (FASIE-IVF program)</th>
<th>United States (SBIR)</th>
<th>Finland (Tekes)</th>
<th>Ireland (Enterprise Ireland)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (million USD)</td>
<td>66</td>
<td>7.3</td>
<td>2000</td>
<td>429</td>
<td>310</td>
</tr>
<tr>
<td>Per capita (USD)</td>
<td>0.5</td>
<td>1.9</td>
<td>6.5</td>
<td>81</td>
<td>74</td>
</tr>
</tbody>
</table>

Source: Tekes and Enterprise Ireland websites. Interviews with FASIE and IVF.
Note: Tatarstan is based on 2004-2009 statistics. Other economies are based on 2008 statistics.

5.2.5 Venture Funds

Venture Funds Operating in Tatarstan

Tatarstan has two regional venture funds created in the framework of the special programme of the RF Ministry of Economic Development, one run by Troika Dialog (RUB 800 million) and another by AkBars Capital (RUB 300 million)39. Troika made 4 deals in 2 years and AkBars 2 deals in 1 year. Both funds were set up as part of a government program where federal and local government each contributed 25% of fund’s assets, with private

39 All numbers represent cash assets at time the funds were formed; current valuations and portfolios of venture funds are not disclosed under a 2007 change in Investment Funds Law that imposed on venture funds the no-disclosure clause, along with all other funds designed for “qualified” (sophisticated) investors only.
money raised by fund manager covering another 50%. The regional funding was designed to be contributed by a region-funded not-for-profit entity, which took the form of IVF.

**Troika and AkBars’ effect on regional innovation is probably limited.** IVF, Troika and AkBars signed an agreement dividing the investment areas. Troika retains out-of-republic companies that are domiciled in Tatarstan but have no physical presence in Tatarstan. This is a potentially financially successful strategy but bring no benefits to the Republic. IVF retains small business and grant-like handout areas. AkBars works with fairly well established businesses which are not necessarily innovative but have growth upside.

**IVF’s investments in AkBars and Troika create a potential conflict of interest.** IVF is a 25% investor both in AkBars Venture Fund and Troika Venture Fund. This could creates conflicts of interest for IVF, both in terms of poaching deals from those funds and by supporting AkBars and Troika investments in its own current or potential investments.

**Assessment of IVF’s Operational Model**

IVF is a “State Non-commercial Organization”, a not-for-profit organization established by the Government of Tatarstan with a capitalization of RUB 5 billion. Its purpose is to provide matching funds in the regional venture funds and to invest in innovative and non-innovative projects directly. From 2007 to 2009, IVF has invested RUB 420 million, or 8 percent of its total investments, in 85 innovative ventures.\(^40\)

**Governance and Management**

IVF’s governance structure and profile are not conducive to sound investing.

- **Governance and management profile:** The Board has 26 members and is comprised exclusively of government ministers, senior public officials, university rectors, directors of state development organizations and quasi-public agencies, and a few private companies and banks closely affiliated with the government.\(^41\) There are no independent directors or representatives of non-affiliated entities, and the even number of members implies that neither full attendance nor split votes are expected. This is an essential part of “good governance” in professional funds. Funds must be able to make clear and undisputable decisions. Professional backgrounds of all the senior staffers are not available but based on available information; there is no evidence of experience of any of them working previously in direct investment and venture capital in any capacity.

- **Investment decision process:** IVF staff does not have any authority beyond evaluating and preparing deals for review, as the only authority that can make investment decisions in the Fund is Board of Trustees of IVF headed by the Prime Minister of Tatarstan. According to international good practice venture funds, including publicly owned funds, fully delegate such decisions to the fund management and experts. According to IVF staff, typically proposals for investments are sent to the Prime Minister's office in advance, where investment decisions are de facto made. IVF’s role is primarily execution. Each board sessions lasts only 1 to 1.5 hours and projects are heard for only 10 minutes.

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\(^{40}\) Or on average RUB $ million per investment  
\(^{41}\) [http://ivf.tatar.ru/rus/popsovet.htm](http://ivf.tatar.ru/rus/popsovet.htm)
Support to Investees

IVF does not provide the type of in-kind support to investees that is typically provided by successful venture capitalists. Extensive worldwide venture investment industry practice has established standard methods of what is known as "active investment" in which the venture fund management adds value to their investment by providing hands-on help. Early stage and developing companies make poor targets for "passive" investments, whereby the individual or fund investor expects a company to be able to execute the profitable business strategy without assistance from the investor. An experienced investor, especially at the seed stage, or investment fund management team at a later stage, can provide what is known as "value added investment" by assisting the company to develop. Such assistance can involve strategic and current business advice, introductions to customers, suppliers and partners, executive search, mentoring and active governance role in the board of directors. Typically, a venture fund requires at least monthly progress reports, quarterly board meetings and ongoing management reports as requires. Additionally, venture investors retain veto rights on a number of non-capital issues of the company, such as starting or discontinuing new products, selling or acquiring assets, etc.

While business services provided by Pulsar Ventures (an IVF subsidiary) are regarded as support of investees, these fall quite short of the type of support required for successful start-up growth. Pulsar Ventures provides only a limited range of marketing-related services – coaching, patents, brand design and web design. Moreover, Pulsar employees do not have the required profile to advise investees. They lack the type of entrepreneurial or top managerial experience that could allow them to provide business strategy, operating or governance advice to investees. Backgrounds of leading venture capital fund employees in the United States and E.U. include at least 5 years of professional experience in high tech industries or less often investment banking and consulting firms; for venture fund leaders at a partner level 15-20 years of experience, with 5 or more years in executive capacity, is a norm. Non-financial support given to investees is an essential part of venture capital. It is often considered as the financing role of VC. In this respect IVF fails to respond to any known good practice. This has a negative effect on investee success.

IVF’s monitoring and support system is unclear. And while IVF can theoretically terminate non-performing companies, the procedure and shutdown indicators are unclear.

Development of Deal Flow

It is not clear that IVF’s investment strategy encourages the type of risk-taking required to support innovative firms. IVF has determined formal minimum criteria for deal eligibility. The investment should have an expected internal return on investment of at least 30% on a DCF/cashout forecast basis. This criterion applies to individual deals only. The normal industry practice is to establish IRR criteria for the entire fund, accounting for risk. The general assumption in the VC industry is that the vast majority of ventures will fail but that the surviving investments will generate extraordinary returns that make up for those losses. IVF does not have any portfolio structure or risk targets and does not run any ongoing calculations of these metrics or maintain a flexible deal database. IVF has no readily available document providing portfolio composition or structure based on certain parameters (deal

\[ DCF \text{ refers to discounted cash flow, a valuation technique whereby a company value is seen as a net present value of all anticipated cash flows; cashout method of valuation forecasts the price at which equity or other securities representing the company ownership can be sold at a certain time in future and values the company by discounting this sum to present.} \]
size, industry, PE-VC, date, stage, market type). This is a potential hazard to IVF’s financial stability in the medium term (4-5 years) and even in the short term (2-3 years) from market risks (lack of diversification of investment types) or liquidity risks (loss of operating capital and inability to replenish it).

The lack of transparency in IVF’s deals affects public confidence in the fund, with a detrimental effect on potential private co-investments, deal flow quality and public support for the fund. Innovation investments made by IVF are mixtures of equity and grants. The distribution between the two is not clear. In public documents, announcements of IVF deals are inconsistent, and totals do not match up. The website provides only generic contact details for IVF and does not solicit proposals. The investments published on the website\(^{43}\) include 23 investment project and 64 innovation projects. The latter are winners of a number of public republican and regional innovation competitions organized by FASIE and other similar organizations. However, they are listed as "for investors" and it is not clear whether they are funded by IVF or if IVF merely markets them. IVF’s public presentations\(^{44}\) acknowledge only 6 projects; however their investment targets do not match with IVF assets. The lack of transparency of IVF’s decisions and decision-making processes raise suspicion among the scientific and business communities, including possible foreign investors or partner companies. This image hampers IVF’s ability to be seen as a credible player in the regional innovation system.

**Benchmarking IVF against Good Practices**

The broad scope of IVF’s activities defies international practice and makes it difficult to find relevant benchmarks. This sub-section will benchmark IVF’s institutional, operational, managerial and strategic model against international good practices. The fact that IVF is a mixed type fund, investing on both other funds and in ventures directly, makes the comparison with RVC and RusNano (Russia) more difficult. Moreover, those funds are still in their very early stages and have yet to demonstrate success. More extensive comparisons can be made outside of Russia, with Calpers (US.), SITRA (Finland) and Yozma (Israel). However, unlike most public venture funds, IVF provides non-reimbursable grants in addition to investments (acquisitions of securities, units, interests, assets and other property for money, usually generating interim and/or terminal cash flow).

**Although there are a few examples of successful public sector roles in VC, there are a large number of failures. This makes it difficult to identify good practices.** Most research accessing the comparative effects of various practices of public-private partnership in venture investment is recent (on average a few years old) and is based on information that is not extensive enough to make substantive generalizations. Most of this research has focused on "direct investments by the state" versus a "fund of funds" model. Mixed type funds were not yet studied as a separate class and were not compared to "pure" models. In addition, there are difficulties in measuring performance of most mixed funds. For some of them, such as SITRA, program size and functions were modified over time as extra funds became available or unavailable to the government, which renders different periods in life of SITRA incomparable to one another. Other, such as Yozma, operated mostly during the Internet bubble, which skewed their performance, as risk appetite of private investors for venture funds increased enormously simultaneously with program progress; taking this effect out of

\(^{43}\) [http://ivf.tatar.ru/ru/proekts.htm](http://ivf.tatar.ru/ru/proekts.htm)

\(^{44}\) [http://ivf.tatar.ru/ru/about.htm](http://ivf.tatar.ru/ru/about.htm)
the program results appears to be a task that cannot be accomplished due to its sheer methodological ambiguity.

Venture funding programs currently in operation in Russia are still in very early stages (3-5 years or less) and cannot yet be judged on program design and program execution, as venture investments have a 7 to 15 year horizon from inception to maturity. This includes IVF as well. Of course, some conclusions and observations can be drawn but they necessarily remain conceptual to a degree, as they rely upon anecdotal rather than hard quantitative data.

Moreover, while benchmarking against good practices can highlight how to improve a fund under optimal conditions, it does not provide answers to the viability of publicly-supported VC or its value-added in the regional innovation system, both of which might be limited in Tatarstan. The success of public support for venture capital does not only depend on fund design. It depends on supportive public and private institutions, an excellent business environment and an available pipeline of investment projects. It is not clear that Tatarstan has all of these necessary conditions; so even adherence to good practices may not result in successful fund performance. Good practice comparisons of national and international public VC funds with IVF can be found in Table 13 of Appendix D.

**Accepted good practices of international entrepreneurship stimulation programs**

Good practices of managing a government-backed investment scheme include sound design practices and sound implementation practices. Design practices include the terms of the program itself and associated legal and procedural framework. Implementation practices include the program execution, its timing, as well as program modification in response to situation and feedback.

Some of the common principles of good practices have been formulated as follows\(^{45}\):

1. **Addressing non-monetary barriers to entrepreneurship:** Non-monetary barriers include both regulatory hurdles and institutional and infrastructural measures, such as education, services, technology transfer, networking and public awareness.

2. **Leveraging the local academic scientific and research base:** Technology transfer offices are critical to entrepreneurship growth, in particular when they also involve in educating researchers in entrepreneurship and provide business advice, in particular connections to corporations.

3. **Conformity with global standards:** With exception of China, global investors are stimulated positively by presence of common regulatory and tax framework (in particular tax-exempt structures, partnerships and public securities markets).

4. **Direction of the program determined by the market:** The principles that provide the best results include
   1. Careful and prolonged selection of firms and funds;
   2. Avoidance of competition with independent investors;

3. Market-level investment standards;
4. Co-financing from private sources wherever possible;
5. Leveraging local industries, existing competitive advantages and investors;
6. Broad and flexible investment focus (e.g. funding corporate spinouts and corporate funds);
7. Non-monetary intervention to raise investability of local companies (strategy advisory, connections to partners, financial planning etc.)
8. Public evaluation criteria similar to ones used by private investors

5. **Limited amount of program engineering**: Limits on business location, types of allowed securities, partners, and corporate reorganizations, as well as micromanagement of program participants have proven particularly detrimental to long-term success.

6. **Long-term result orientation**: 5 to 10 year term is recommended before first principal critical re-evaluation of the program.

7. **Proper financial size of the initiative**: Financial commitment to the initiative must be balanced against the local opportunities; excessive allocations create waste and inefficiencies, while funding that is too small (and in particular lack of reserves to continue funding longer than originally expected) fails to produce mature results.

8. **Access to global connections**: While local hiring and management may be encouraged, the global nature of entrepreneurship requires maintaining business ties outside the geography where the program operates.

9. **Institutionalization of careful evaluation of initiatives**: The principles that provide the best results include
   1. Collecting and publicizing accurate data on the extent of entrepreneurship growth and venture investment activity.
   2. Comparing companies and venture funds supported under the program to their peers to identify the difference the program makes.
   3. Tracking the performance of non-participating fund and companies, including investment returns, financial results and job growth.

10. **Expectations of program creativity and flexibility**: A non-performing program must be reformed or shut down, despite the vested interest in its continuation.

11. **Acceptance of agency problems as inevitable**: Procedural independence, firewall between public officials and program administrators and proper assessment of the program are required to prevent political influence on investment processes.

12. **Emphasis on education of investors and entrepreneurs**: The principles that provide the best results include
   1. Building the understanding of outsiders about the local market potential
   2. Educating entrepreneurs on working with investors
   3. Educating the public sector officials about how the venture investments and entrepreneurship works
In addition, there is a set of negative practices that have a demonstrated zero or negative effect:

1. Limiting the program to a certain region or country.
2. Using tax breaks.
3. Providing poor incentives to program managers.
4. Supporting imitation instead of innovation.

Table 9 presents a benchmarking of IVF against international good practices. The scores are assigned as follows:

- **High** – meets good practices.
- **Medium** – effort to meet good practices is made but significant room for improvement exists.
- **Low** – no good practices.

**Table 9: Benchmarking of IVF against good practices**

<table>
<thead>
<tr>
<th>No.</th>
<th>GOOD PRACTICES</th>
<th>IVF SCORE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Addressing non-monetary barriers to entrepreneurship</strong>&lt;br&gt;Non-monetary barriers include both regulatory hurdles and institutional and infrastructural measures, such as education, services, technology transfer, networking and public awareness.</td>
<td>Low</td>
<td>IVF does not have a formal mandate to improve the investment situation but is not forbidden from doing so, and has both financial and administrative resources to engage in such activity. Nonetheless, it does not have such plans, and its only engagement to date has been financing the construction of Technopark IDEA, sponsoring trade fairs and offering a very limited service range via Pulsar Ventures.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Leveraging the local academic scientific and research base</strong>&lt;br&gt;Technology transfer offices (TTOs) are critical to entrepreneurship growth, in particular when they are also involved in educating researchers in entrepreneurship and provide business advice, in particular connections to corporations.</td>
<td>Medium</td>
<td>IVF has high-level (rector to CEO) relationships with local universities but does not engage in creating TTOs, and TTOs of local universities are all but absent from innovation activities. There is no information of how many researchers and university graduates are co-founders of IVF-funded businesses.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Conformity with global standards</strong>&lt;br&gt;Global investors are generally attracted by the presence of common</td>
<td>Medium</td>
<td>IVF's memorandum outlines a concept similar to the venture investment process, but on a procedural level it operates more like a government agency. On regulatory level, Tatarstan is not</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>No.</th>
<th>GOOD PRACTICES</th>
<th>IVF SCORE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>regulatory and tax framework (in particular tax-exempt structures, partnerships and public securities markets).</td>
<td>allowed to change federal laws that govern securities, corporate formation etc. unilaterally.</td>
<td>Medium to high</td>
<td><strong>Direction of the program determined by the market</strong> The principles that provide the best results include:</td>
</tr>
<tr>
<td>4a</td>
<td>- careful and prolonged selection of firms and funds;</td>
<td>Low</td>
<td>Summary of lines 4a-h.</td>
</tr>
<tr>
<td>4b</td>
<td>- avoidance of competition with independent investors;</td>
<td>Not applicable</td>
<td>Troika and Akbars funds were funded by IVF were selected by political negotiations between federal and regional officials. Companies are being funded and grants are issued through decisions of the Board of Trustees headed by the Prime Minister of the Tatarstan. The role of IVF staff is unclear and at best indirect.</td>
</tr>
<tr>
<td>4c</td>
<td>- market-level investment standards;</td>
<td>Medium</td>
<td>There are no independent venture investors active in Tatarstan, as all known funding sources are affiliated with the Tatarstan Government via IVF.</td>
</tr>
<tr>
<td>4d</td>
<td>- co-financing from private sources wherever possible;</td>
<td>Medium</td>
<td>The written investment criteria set forth in IVF investment memorandum are fair, transparent and conform to international standards. However, it is unclear that these are actually applied as stated. Procedural documents for investments are brief (1-2 pages each), not detailed and do not contain deadlines or action procedures.</td>
</tr>
<tr>
<td>4e</td>
<td>- leveraging local industries, existing competitive advantages and investors;</td>
<td>Medium to high</td>
<td>Required for most IVF programs (except grants). However, there is no evidence that IVF has attracted private investments in its portfolio of investees and no private investors are investing in IVF’s fund.</td>
</tr>
<tr>
<td>4f</td>
<td>- broad and flexible investment focus (e.g. funding corporate spinouts and corporate funds);</td>
<td>Medium to high</td>
<td>Most of IVF and AkBars investments are local, whether for lack of other opportunities or local leverage advantages, not known.</td>
</tr>
<tr>
<td>4</td>
<td>Direction of the program determined by the market The principles that provide the best results include:</td>
<td>Medium to high</td>
<td>AkBars is known to have funded spinouts, and other Tatarstan corporate-affiliated projects appear in IVF direct portfolio. Whether or not such a policy is based on opportunity or choice, no information is available.</td>
</tr>
<tr>
<td>No.</td>
<td>GOOD PRACTICES</td>
<td>IVF SCORE</td>
<td>COMMENTS</td>
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</tr>
<tr>
<td>4g</td>
<td>- non-monetary intervention to raise investability of local companies (strategy advisory, connections to partners, financial planning etc.)</td>
<td>Low</td>
<td>IVF &quot;reserves the right&quot; it is not clear that IVF has been able to provide value-added services.</td>
</tr>
<tr>
<td>4h</td>
<td>- public evaluation criteria similar to ones used by private investors</td>
<td>Medium to high</td>
<td>Criteria are made public and conform to good practices but their fair and actual use in investment process is not confirmed.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Limited amount of program engineering</strong>&lt;br&gt;Limits on business location, types of allowed securities, partners, and corporate reorganizations, as well as micromanagement of program participants have proven particularly detrimental to long-term success.</td>
<td>Low to medium</td>
<td>Published documents of IVF show that an extensive set of documents are required to apply for IVF funding (including notarized copies of charter and financials), which do not contribute to investment decisions and create an unnecessary burden for both the company and the fund. These documents should be required during due diligence stage after the investment has been judged on basic merits. Akbars does not have a set internal review procedure. Troika is most flexible.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Long-term result orientation</strong>&lt;br&gt;5 to 10 year term is recommended before first principal critical re-evaluation of the program.</td>
<td>Medium</td>
<td>IVF has been in operation for 5 years already and apparently will continue; no short-term performance is required. However, IVF does not appear to have any long-term performance metrics of its own or from the Tatarstan government.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Proper financial size of the initiative</strong>&lt;br&gt;Financial commitment to the initiative must be balanced against the local opportunities; excessive allocation create waste and inefficiencies, while funding that is too small (and in particular lack of reserves to continue funding longer than originally expected) fails to produce mature results.</td>
<td>Medium to high</td>
<td>IVF and funds have a combined portfolio of RUB 5 billion. This is the biggest regional program in Russia. There is no doubt that Tatarstan can absorb more that RUB 5 billion in private equity and VC investments.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Access to global connections</strong>&lt;br&gt;While local hiring and management may be encouraged, the global</td>
<td>Low</td>
<td>Only Troika and funds companies have business interests Russia-wide; both IVF and Akbars focus are deliberately local.</td>
</tr>
<tr>
<td>No.</td>
<td>GOOD PRACTICES</td>
<td>IVF SCORE</td>
<td>COMMENTS</td>
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</tr>
<tr>
<td>9</td>
<td>Institutionalization of careful evaluation of initiatives</td>
<td>Low</td>
<td>Summary of lines 9a-c</td>
</tr>
<tr>
<td></td>
<td>The principles that provide the best results include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9a</td>
<td>- Collect and publicize accurate data on the extent of entrepreneurship growth and venture investment activity;</td>
<td>Low</td>
<td>IVF and the Tatarstan Government rely on standard statistical tools to evaluate innovation and investment performance; no studies on ongoing monitoring were or are committed to this purpose; IVF's own public reporting is fragmentary and substandard; internal reports were not made available; IVF does not have any portfolio strategy or target structure, investment seem to be made in an opportunistic manner.</td>
</tr>
<tr>
<td>9b</td>
<td>- Compare companies and venture funds supported under the program to their peers to identify the difference the program makes;</td>
<td>Low</td>
<td>No such comparisons are available or planned.</td>
</tr>
<tr>
<td>9c</td>
<td>- Track the performance of non-participating fund and companies, including investment returns, financial results and job growth.</td>
<td>Low</td>
<td>No such tracking.</td>
</tr>
<tr>
<td>10</td>
<td>Expectations of program creativity and flexibility</td>
<td>Low</td>
<td>No expected, ongoing or eventual performance metrics of IVF, let alone a backup plan for correcting IVF's poor performance are prepared or provided for; same for individual investments that are required to present a projected IRR of 20% or more but are not expected to meet certain expectations or metrics; no strategy or action plan for non performing individual investments either.</td>
</tr>
<tr>
<td>11</td>
<td>Acceptance of agency problems as inevitable</td>
<td>Low</td>
<td>No check and balances for IVF management independence, and no de facto political independence; the eventual investment decision rests with</td>
</tr>
<tr>
<td>No.</td>
<td>GOOD PRACTICES</td>
<td>IVF SCORE</td>
<td>COMMENTS</td>
</tr>
<tr>
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<td>-------------------------------------------------------------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>officials and program administrators and proper assessment of the program are required to prevent political influence on investment processes</td>
<td></td>
<td>public officials from the Board of Trustees.</td>
</tr>
<tr>
<td>12</td>
<td><strong>Emphasis on education of investors and entrepreneurs</strong></td>
<td>Low to medium</td>
<td>Summary of lines 12a-c</td>
</tr>
<tr>
<td>12a</td>
<td>- Building the understanding of outsiders about the local market potential</td>
<td>Low to medium</td>
<td>Some information activity outside regions occurs, but so far, most PR efforts are oriented at federal bureaucracy and media, rather than investors at large.</td>
</tr>
<tr>
<td>12b</td>
<td>- Educating entrepreneurs on working with investors</td>
<td>Low to medium</td>
<td>Education programs for entrepreneurs exist both at IVF and its sister Small Business Agency but no feedback from attending entrepreneurs is collected or available, and post-education performance is not tracked, so the quality of programs cannot be judged.</td>
</tr>
<tr>
<td>12c</td>
<td>- Educating the public sector officials about how the venture investments and entrepreneurship works</td>
<td>Not applicable</td>
<td>No information</td>
</tr>
</tbody>
</table>

Although IVF has made efforts to adopt sound investment practices it falls short of doing so systematically. IVF’s strongest asset is its formal investment approach and criteria, although it is unclear that these have actually been put into practice. IVF’s most significant weaknesses are (1) lack of institutional independence of the fund’s management, (2) “fire and forget” approach that sets the goal to make an investment but ignores the future of this investment and does not have a monitoring system, (3) lack of both public transparency and clear internal investment and development strategy and procedures and (4) limited technical capacity to carry out the functions of a VC fund.

Finally, there are very few good international examples of institutions using IVF’s approach of combining venture capital and grant-making under a same roof. These two activities require significantly different selection processes and management skills.

**Operational Recommendation:**

If the Government of Tatarstan decides to maintain IVF’s role in equity investments in innovative ventures, it can ensure that the following steps are taken to improve the performance of the fund:

- Establish the institutional autonomy of the investment decision-making process.
• Create ongoing internal reporting and feedback collection system.

• Design performance metrics.

• Develop a medium-term (5-10 years) investment strategy that is clearly aimed at the Tatarstan economy and addresses the gaps in the development of a strong knowledge-economy.

• Design sophisticated but open and simple deal-flow procedures.

• Implement mechanisms' that generate a permanent and high quality deal-flow of technology-based companies.

• Make sure the Fund – or affiliates – is able to deliver high quality support to investees.

**IVF’s role in Federal Seed Funding**

IVF will have the opportunity to partner with new federal seed funding programs, but probably not as an investor. As of January 2010, the Russian Venture Company (RVC) has made available the details of their new seed funding project, to be executed via a joint investment vehicle with FASIE. RVC intends to match funds on a project-by-project basis by investing directly in start-ups alongside eligible private investors. The seed fund will be 99% RVC and 1% FASIE funding, and managed by RVC. The new project calls off plans to transfer funds into specialized early stage venture funds. Instead, RVC will fund early stage start-ups based on a case-by-case review and only if private money covering at least 25% of proposed funding is already secured. In addition, RVC will only accept applications from pre-authorized “venture partners” who will prepare the deal for review and funding. As of the time of this report, no such agents are registered in Tatarstan (which however does not prevent IVF from registering). However, according to RVC’s CEO, RVC’s policy is that quasi-public money is not acceptable as private funding, so the prospects of IVF obtaining co-financing via this mechanism are uncertain (should this policy be applied in their case).

**5.2.6 Gaps in the Innovation Support System**

To conclude, although the government has made significant efforts to push innovation in Tatarstan, major gaps have been detected (this list focuses on themes in which the government could have an influence):

• Weak infrastructure for support of cooperation between R&D organizations and industry.

• No support for raising understanding about industrial needs and markets.

• No incentives for scientists to work closely and regularly with industry.

• No tax incentives for R&D and innovation activity in industry.

• Limited support for R&D and innovative projects in industry and promotion of innovative products and services to the markets.

• Insufficient support of small and medium innovative companies and innovative projects (supporting growth potential, helping to find networks and supply chains, etc.).
• No high added value for consultancy and financial incentives for the use of IPR.
• Low stimulation of young researchers, postgraduates and PhDs.
• Limited support for Tatarstan integration to international R&D networks. No activity on attracting the best scientists and innovation managers to Tatarstan (so-called “Brain Gain”).
• Insufficient support for applied R&D.
• Limited support for industrial upgrading in manufacturing (especially for traditional sectors).
• No support of innovation management and advisory services.
• Low support of links between main blocks of the innovation system (government, science, industry, small innovation business).
• Insufficient activity on impact assessments (on research and innovation issues) of new legislative or regulatory proposals in any policy field.
• Limited investments in upgrading the “innovation skills” of public civil servants in the relevant ministries.
Chapter 6
SWOT Analysis
The following figure presents a summarized strengths, weaknesses, opportunities and threat (SWOT) analysis constructed under the following framework:

- **Strengths**: Attributes which are at least partly under the control of the Republic of Tatarstan and promote innovation-led growth.
- **Weaknesses**: Attributes which are at least partly under the control of the Republic of Tatarstan and hamper innovation-led growth.
- **Opportunities**: Parameters of the environment which are not under the control of regional actors and could promote innovation-led growth.
- **Threats**: Parameters of the environment which are not under the control of regional actors and could hamper innovation-led growth.

### Summary SWOT

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Important manufacturing base.</td>
<td>- Very limited number of globally-oriented firms.</td>
</tr>
<tr>
<td>- A critical mass of R&amp;D/HEI organizations in Kazan and across the Region.</td>
<td>- Declining number of science and engineering students and not enough graduate students.</td>
</tr>
<tr>
<td>- Oil resources currently providing fiscal resources to promote innovation.</td>
<td>- A lack of innovation culture among the business and research communities.</td>
</tr>
<tr>
<td>- Political will to support innovation.</td>
<td>- Limited linkages between research institutions and industry.</td>
</tr>
<tr>
<td>- Good image for Russian investors.</td>
<td>- Limited monitoring and evaluation mechanisms for innovation policy.</td>
</tr>
<tr>
<td>- Good quality of life.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Appointment of regional universities federal universities and national research universities.</td>
<td>- Barriers to trade imposed at the federal level.</td>
</tr>
<tr>
<td>- FDI in Tatarstan tends to be more knowledge intensive.</td>
<td>- Governance and funding of research institutes and universities at the Federal level are not conducive to market-oriented R&amp;D.</td>
</tr>
<tr>
<td>- Access to more markets through Russia’s potential accession to the World Trade Organization.</td>
<td>- Federal innovation support programs do not provide sufficient support for market-oriented R&amp;D or to the early stages of innovation.</td>
</tr>
<tr>
<td>- Creation of a Nanotechnology centre in Technopark IDEA.</td>
<td>- Weak competition policy at the national level.</td>
</tr>
<tr>
<td></td>
<td>- National IPR protection is inappropriate and unstable.</td>
</tr>
</tbody>
</table>
## Detailed SWOT

### Strengths

**Attributes which are at least partly under the control of the Republic of Tatarstan and promote innovation-led growth.**

| Demand for innovation | - Important manufacturing base  
| - Large established industrial players  
| - Good level of business entry  
| - Apparent understanding from some firms that innovation is crucial to survive and grow |
| Sources of innovation | - A few world-class R&D poles in the public and private sectors  
| - Growing R&D and engineering sector  
| - Good quality higher education institutions  
| - A critical mass of R&D/HEI organizations in Kazan and across the Region |
| Diffusion of knowledge and innovation | - R&D and higher education institutions tend to speak highly about the need for more commercialization of science, more interaction between them and more international exposure |
| Policy | - Oil resources currently providing fiscal resources to promote innovation  
| - Political will to support innovation, as measured by investments in existing programs and the Innovation Memorandum |
| Enabling environment | - Developed infrastructure  
| - Good image for Russian investors  
| - Good quality of life  
| - Cultural openness |

### Weaknesses

**Attributes which are at least partly under the control of the Republic of Tatarstan and hamper innovation-led growth.**

| Demand for innovation | - Lack of competitive pressures from exporting manufactured goods  
| - The quality of manufactured goods does not reach global standards  
| - Technological development is not at the global frontier |
- Inward-oriented inventive activities
- Very limited number of globally-oriented firms
- Moderate growth in world-frontier technological development in the past few years, as measured by international patenting

| Sources of innovation | - Limited investments in R&D, and even less by the enterprise sector  
|                       | - Declining number of science and engineering students and not enough graduate students  
|                       | - A small and declining overall R&D workforce and an even smaller number of researchers  
|                       | - The dominant and fastest-growing sectors are not knowledge-intensive  
|                       | - Inability to translate R&D into world-frontier technology in most enterprises and research institutions  
|                       | - A lack of innovation culture among the business and research communities  
|                       | - Limited number of innovative start-ups with high growth potential |

| Diffusion of knowledge and innovation | - Channels of knowledge transfer through FDI are extremely limited  
|                                      | - Limited linkages between research institutions and industry  
|                                      | - Technology transfer instruments are embryonic and lack top level competencies and resources |

| Policy | - Poor coordination of innovation policy at the regional level (between Ministries, between agencies and stakeholders)  
|        | - Limited monitoring and evaluation mechanisms for innovation policy  
|        | - Weak capacity of innovation support institutions  
|        | - Few regional policy instruments to support innovation and technology absorption  
|        | - Lack of transparency and consensus among decision-makers and practitioners.  
|        | - Regional innovation policy is not conductive to “positive pressure” on stakeholders located in Tatarstan |
## Opportunities

Parameters of the environment which are not under the control of regional actors and could promote innovation-led growth.

| Demand for innovation          | - Proximity to Russian market  
|                                | - Access to more markets through Russia’s potential accession to the World Trade Organization  
|                                | - Increased international visibility of Tatarstan as a knowledge economy through World Student Games held in Kazan in 2013, leading to potential partnerships and investment opportunities  
| Sources of innovation          | - FDI in Tatarstan tends to be more knowledge intensive  
|                                | - Attraction of FDI through Russian future potential accession to the World Trade Organization  
|                                | - Appointment of Kazan State Technical University as a national research university  
| Policy                         | - Possible increases in financial support from the federal budget for diversification and modernization (investment in regional venture funds, FASIE support)  

## Threats

Parameters of the environment which are not under the control of regional actors and could hamper innovation-led growth.

| Demand for innovation          | - Barriers to trade at the Federal level limit global competitive pressures to innovate  
|                                | - Very weak industrial demand from the post-crisis Russian economy  
|                                | - Too much of innovation imports versus innovation building  
|                                | - Exchange rates limit external demand for Russian products and services  
| Sources of innovation          | - Governance and funding of the Russian Academy of Sciences at the Federal level are not conducive to market-oriented R&D  
|                                | - Governance and funding of the higher education institutions at the Federal level are not conducive to market-oriented R&D  
|                                | - Increased Federal funding for high-tech R&D decreases R&D relevant to the regional economy  
| Policy                         | - Federal innovation support programs do not provide  

sufficient support for market-oriented R&D or to the early stages of innovation

<table>
<thead>
<tr>
<th>Enabling Environment</th>
<th>Weak competition policy at the federal level creates disincentives for innovation and stifles entrepreneurship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal IPR protection is inappropriate and unstable compared to international standards, particularly concerning publicly-funded and publicly-implemented R&amp;D</td>
</tr>
<tr>
<td></td>
<td>There are significant administrative barriers to trade at the federal level</td>
</tr>
</tbody>
</table>
Chapter 7
Framework for an Innovation Strategy
CHAPTER 7
Advancing Innovation in the Republic of Tatarstan

Key Messages

• **International experience shows that well-managed innovation strategies have catalytic effects on regional development.** It also shows that the Strategy process is as important as the Strategy document itself. Strategies promote cooperation between the various stakeholders on the basis of shared objectives. They facilitate policy learning and fine-tuning since the results of actions are evaluated against cleared goals. Finally, innovation strategies promote internal and external visibility of stakeholder commitments to innovation.

• **Experience shows that reaching a consensus between policy-makers, industry, researchers and other stakeholders is of paramount importance in the development of a strategy.** This ensures that the strategy responds to real needs and that all relevant actors are ready and willing to commit time and resources in its implementation. Without such a consensus, regions spend enormous efforts to impose their views at the expense of the effectiveness of their programmes. To achieve this consensus, relevant actors must be involved in the design of the strategy from the very beginning.

• **Many of the gaps in Tatarstan’s regional innovation system stem from the lack of a shared vision. A strategy can help address these gaps.** Many stakeholders have revealed the discrepancy between the apparent potential of the Republic and the limited number of innovative projects that are supported and growing locally.

• **An innovation strategy will have little impact without a proper monitoring and evaluation system.** The evaluation mechanism needs to be designed at the same time as the Strategy, not as an afterthought. Conversely, the Strategy needs to be designed with monitoring in mind.

7.1 Introduction

A number of European regions have successfully developed attractive and creative innovation strategies in order to reengineer their economy. This includes the East Midlands in the United Kingdom, Western Sweden in Sweden or Nord-pas-de-Calais in France. These regions have taken serious action to support the transformation of local traditional industries and have continuously invested to turn out the economic roots towards a vibrant knowledge-based economy. In all such cases, the regional stakeholders have bundled forces to understand in which direction they could prosper and how they could become more attractive to inward investors.

Successful strategies promote cooperation between the various stakeholders on the basis of shared objectives. They also facilitate policy learning and fine-tuning since the results of actions are evaluated against clear goals. Finally, innovation strategies promote internal and external visibility of stakeholder commitments to innovation.
Many regions in Europe and in the world have influenced regional competitiveness thanks to a positive, constant and publicly-shared attitude towards innovation and entrepreneurship. This can be particularly true for Tatarstan, since many innovation support policies are still missing at the Federal level. The previous chapters show that the Republic of Tatarstan has all the necessary assets to succeed in such a path. One example of a strategic objective for Tatarstan, could be to become the most innovative region in the CIS. This chapter examines why an innovation strategy can be successfully developed and implemented in Tatarstan.

### 7.2 Content of the Strategy

The purpose of a strategy is to outline priorities and how to achieve these priorities. Experience in Western and Eastern European countries shows that the Strategy process is more important than the actual strategy document. The Innovation Strategy should be able to mobilize the various actors involved in different parts of the regional innovation system. It should enable all these actors to develop a joint understanding of:

1. The **current situation** in the region, and in particular with respects to other regions or countries, as well as the major innovation needs that need to be addressed.
2. Shared **objectives and priorities** in terms of innovation support and development, as well as their justification. Desired results should be described in terms measurable indicators.
3. **Coordination** of actions to achieve these objectives.
4. Detection and mobilisation of required **resources**.

The Strategy should encompass priorities to be covered during a 5 to 10 year timeline, but should be a living document, revisited, revised and fine tuned periodically as the situation changes and policies are evaluated.

An effective strategy should have the following attributes:

- It should be understandable to the entire regional innovation system, including the government, enterprises, R&D institutions, technoparks, etc.
- It should focus on a limited set of priorities shared, to a maximum extent, by the stakeholders, rather than enumerate a long list of priorities that satisfy every single stakeholder.
- It should provide a clear roadmap to achieve the stated objectives.
- It should be customized to the region.
- It should be realistic, in terms of available resources and objectives.
- It should represent a consensus among the key stakeholders.

The Strategy should be used as the basis for an action plan which involves a description of how the Strategy priorities will be implemented (e.g. measures, tools, timeline ...etc).

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7.3 Building Blocks of the Strategy

The Government of the Republic of Tatarstan will naturally be the lead player in developing and facilitating the implementation of the Innovation Strategy. On the one hand, it can achieve this by influencing the actions of the stakeholders that are under its direct control. On the other hand, this will not be enough, since many of important regional innovation stakeholders are not under the direct authority of the government (e.g. universities, private entrepreneurs, and private banks). Hence, while the Government can take the leading role, the ownership must be shared for the Strategy to be successful.

The Government of Tatarstan can take the following steps for its Innovation Strategy of:

- An inter-ministerial task force reporting to the Prime Minister will be in charge of delivering and monitoring the implementation of the Innovation Strategy.
- The different ministries that are responsible for issues related to economic development, R&D, technology, education and finance will closely work together. They will make sure that there is staff in these administrations with the right know-how to deal with innovation and competitiveness.
- The public and private stakeholders will be closely associated with the approval of the Strategy and to its implementation.
- A specific set of indicators will be developed and will be updated on a biennial basis (see chapter 8).

The success of the Tatarstan Innovation Strategy is very much in the hands of its policy-makers. This success is related to professional management, to an increase of competencies in the existing mechanisms and to gaining the support and buy-in of the business and R&D communities.

7.4 Rationale for the Strategy

Evaluations of innovation strategies in Western and Eastern Europe show that well-managed strategies have catalytic effects for regional innovation. Strategies promote cooperation between the various stakeholders on the basis of shared objectives. They also facilitate policy learning and fine-tuning since the results of actions are evaluated against cleared goals. Finally, innovation strategies promote internal and external visibility of stakeholder commitments to innovation. Within the Russian Federation, the Tomsk region provides a model for a bottom up, inclusive, well-managed strategy process that has yielded good results (Box 2).

Box 2: Innovation policy of Tomsk

One of the most advanced territories in Russia in terms of development of the regional innovation system is the Tomsk Region. It was the first region in Russia to approve a regional law on innovative activity in 1999 and the regional innovation strategy in 2001. In 2002-2008 two Interdepartmental Programmes on designing and
implementation of a model of the innovative territory were fulfilled. The Programmes were agreed with the Russian Ministry of Education, Russian Ministry of Industry, Science and Technologies and the Russian Academy of Sciences as well as with the main innovation stakeholders of the region.

In 2005 the Tomsk government approved the Strategy of Tomsk Region Development Until 2020. In the Strategy, the research and innovation was determined as a priority area. Since then, innovation has been supported by the strong political will of the Governor and the regional administration. Although the volume of financial resources allocated to innovation was modest, this was only due to modest budget of the region.

One of the key success factors for the Tomsk RIS is the strong consensus between all innovation stakeholders. The process of consensus building has been developing for about 10 years and has yielded very good results connected with designing and implementing an adequate, clear and consistent innovation policy supported by all stakeholders. Very close interaction between all parts of the RIS has been organized though numerous meetings, seminars, conferences, etc. The Innovation Forum plays an important role in this process. Consensus building was achieved thanks to the innovative approach of the Tomsk Region Administration and other stakeholders. It led to the creation of a sincere mutual understanding and willingness to cooperate between the government, universities, research institutes and innovative enterprises. They used all possible foreign and Russian experience and developed new mechanisms in the fields of innovation projects evaluation and support, interregional and international cooperation, integration of science, education and industry, creation of a new regional system for monitoring of innovation sphere, educational innovations, etc.

Tomsk’s inclusive and well-managed approach to innovation policy has led to remarkable result in light of the region’s geographical location, industrial capacity and limited fiscal resources:

- A comprehensive regional innovation system was established (special economic zone, commercialization offices, business incubators, technology transfer centres, centres for international cooperation, consulting organizations, a regional venture fund).
- Considerable financial resources were obtained from the federal government (creation of the Research and Innovation Special Economic Zone, development of the universities, creation of centres for collective use of research equipment, implementation of a big number of R&D and innovation projects).
- A large number of innovative enterprises was created.
- The capabilities of all innovation stakeholders were significantly improved.
- The volume of innovation production and services was increased.
- The image of the region was improved.
- Investors, including foreign investors, were attracted to the region.
- An interregional and international collaboration system was developed.
A strategy based on a shared vision can have the same effect on Tatarstan’s regional innovation, in view of the following findings:

- The Government of Tatarstan has already allocated significant resources to develop several instruments to stimulate innovation. This includes science and technology parks and a venture fund.

- Many stakeholders have revealed the discrepancy between the apparent potential of the Republic and the limited number of innovative projects that are supported and growing locally.

- In parallel, the same stakeholders have demonstrated that more could be done to foster the existing potential and help it “crystallise” in something unique.

- Too many firms rely on rather old models of competitiveness. Doing nothing to help these firms view innovation as a factor of competitiveness is not sustainable and could lead to a sharp industrial decline in the future as emerging manufacturing powerhouses such as China diversify into Tatarstan’s traditional sectors.

- The current innovation support agencies and organisations have the potential to upgrade their skills and participate much more actively in the reengineering of Tatarstan’s economy.

- Stakeholders in universities, R&D centres, and private firms are in need and in demand of creative policies that would help them match their potential.

- The Russian Federation has started to look seriously at transforming itself into a knowledge-based economy. This will take time and significant resources. Nevertheless, if managed properly, Russia can succeed in gaining back its international position in innovation. The Innovation Strategy is an opportunity for Tatarstan to become one of the leading regions of the Federation during this process.

This above list includes rationales both linked to the concept of “innovation by fear” and to “innovation by ambition”. This a mix creates excellent conditions to develop and promote an aggressive strategy helping all local players to look at innovation as a positive mean to survive and grow.

In concrete terms, the most immediate outcomes of a strategy will be to:

- Upgrade existing innovation support mechanisms to international good practices within a couple of years.

- Promote the image of Tatarstan as an innovative region throughout the country and abroad.

Medium-term outcomes will be to establish new measures that address real gaps in the innovation system, while leveraging the support of all stakeholders.

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48 “Innovation by Fear” theorises that stakeholders start becoming serious about innovation when they clearly measure the risks of doing nothing. This relates to survival modes. A number of Tatarstan’s organisations have already gone through this process with some success.
7.5 How to Develop and Implement the Strategy

7.5.1 Approach

As stated previously, the Strategy design process is the most important aspect of the Strategy. The Strategy must be acceptable to all key stakeholders to be effective. Sufficient time and resources need to be dedicated to this process since it will have an impact on key financial and policy decisions in the next 5 to 10 years. Significant efforts should also be placed in the Strategy process due to the inherent difficulties it is likely to face in Tatarstan. Possible hurdles will include:

- The region’s innovation culture is not well developed compared to many European and several Russian Regions.
- The different administrations and agencies in Tatarstan may lack a concrete understanding of the mechanisms that allow innovation processes to flourish.
- Although Tatarstan has invested massively into the Investment and Venture Fund and its technology parks the current economic conditions limit its budgetary possibilities.
- Many of the key stakeholders located in the area (universities, large companies or R&D centres) do not report to the Government of the Republic and cannot be “forced” to undertake actions they do not support; their buy-in is therefore necessary.
- Many individuals dealing directly, or in the periphery, of innovation matters are not up-to-date with good practices and might not have the courage or the authority to deliver creative approaches (with some remarkable exceptions, of course).
- Many private and public stakeholders have an overly positive image of Tatarstan (which is an asset) but they only have a very vague idea of how fierce the competition is beyond the borders of the Russian Federation. This hampers their ability to decide upon strong and straight measures that would position Tatarstan as a visible player among comparable locations (at least in Europe).
- Finally, the entrepreneurial spirit (that leads to the creation of many start-ups and the desire to innovate in existing firms) is still embryonic.

In view of this environment an effective strategy can be developed through the following steps:

1. Conducting and disseminating an analysis of the regional innovation system. This will establish a common understanding of the starting point.
2. Creating a sincere and strong consensus among stakeholders.
3. Bringing up innovation as a priority for the Government of Tatarstan (and distinguishing innovation policy from industrial policy)
4. Making sure the adequate financial resources are mobilised to address the “wish list” of strategic priorities.
5. Creating a reliable system of monitoring and evaluation. This will ensure that Tatarstan can analyze the situation, learn from its experience with new policies and make appropriate corrections to the policies.
7.5.2 Analyzing the Regional Innovation System as a Starting Point

The basis of the Innovation Strategy should be the analysis of the regional innovation system conducted the Innovation Annual Report. The objective of this report should be to provide an overview of the regional situation, its needs and prospects. Chapter 8 describes the content of the Report in more detail. It enables the region to identify the most strategic priorities and the most relevant actions to be taken. The analysis should be credible and accepted by key stakeholders. This implies that relevant stakeholders must be involved in the analysis and the interpretation of the analysis. Its results must be understood and broadly communicated to all stakeholders. Without a consensus on the interpretation of the results it will be difficult to convince stakeholders to support the Strategy and a shared vision will not be achievable. A first step, of course, is to have a common understanding and culture of innovation in the region (Box 3).

Box 3: Considering innovation as a coherent process

“Innovation does not develop in a vacuum” this statement is a driver for many innovation policies at national and regional levels. In other words, the concepts underlying innovation must be diffused deeply into the business, administrative, educative, scientific and civil communities.

For instance, in Germany (region of Baden-Württemberg) a ten year programme (KEIM and Exist. http://www.keim.de) was dedicated to “magnifying” innovation in schools and in the entire education system. This led to a boost in new entrepreneurs starting their careers in technology-based start-ups instead of traditional industries.

This approach has a cultural dimension: the government needs to develop a mechanism that allows all stakeholders, at all levels, to share a common definition of innovation. Many stakeholders have a different definition of innovation (or no definition at all). This lack of consistency is of course a strong blocking factor when it comes to implementing programmes.

The innovation process must comprise technological and non-technological dimensions. People must understand that innovation is about changes and improvements; sometimes modest (incremental innovations) and sometimes dramatic (frontier-breaking innovations). In other words, almost everyone, at their own level, can be tuned towards new ideas that improve the quality, the industrial process, the logistics, the products, the customer relationship, the bureaucracy, etc.

In a couple of years, the Republic could promote the establishment of a “Chair of Innovation Culture” in one of the key universities of Kazan. Ideally, such a Chair should be financed or co-financed by the private sector. It should deliver lectures to students as well as to professionals.

The Strategy should then start with a summary of the analysis of the Innovation Report, highlighting the areas that the Strategy will focus on. These must be areas in which the regional authorities can really have an impact, not those which are affected by Federal Government decisions or market forces. An effective methodology is to systematically link
the actions of the Strategy to the strengths, weaknesses, opportunities and threats presented in the summary of the analysis.

7.5.3 Building Consensus

International experience shows that reaching a sincere consensus between policy-makers, industry, universities, researchers and other stakeholders is of paramount importance to the success of an innovation strategy (Box 4).\footnote{including programmes of the European Union (RITTS, RIS, TRIPS, IRE, FP1 to 7)} This ensures that the Strategy responds to real needs and that all relevant actors will commit time and resources in its implementation. Without a consensus, regions spend enormous efforts to impose their views and dramatically decrease the effectiveness of their programmes. To achieve this consensus, relevant actors must be involved in the design of the Strategy from the very beginning.

**Box 4: Benefits of consensus-driven innovation strategies**

Pilot experiences undertaken with the support of the Structural Funds since the beginning of the 1990s have demonstrated the relevance of the approaches developed within the framework of the Regional Strategies for Innovation (RIS). Those which could mobilise a broad partnership have in general had a significant impact in the following areas:

- Better perception of what should be done to promote innovation (policies to adopt, participation in partnership actions).
- Better cooperation among actors and better circulation and sharing of knowledge.
- Comparison of the innovation policies followed in the region with those of other regions.
- Development of strategies which lead to an action plan of concrete measures to be carried out on specific issues.
- Development of an iterative process: identification of the priority sectors and the actions to be implemented, testing of the identified actions, evaluation of their effects.
- Increase in public budgets for the promotion of innovation.
- Development of a culture of innovation based on the ownership of the new approaches by the actors involved and less reticence to change which is now perceived as an opportunity to seize in an open economy.

Source: *Innovative strategies and actions: Results from 15 years of regional experimentation*, European Commission, Directorate General Regional Policy, Thematic development, impact, evaluation and innovative actions

Many tools and processes exist to reach a consensus, but the key words here are time and leadership. A government official must become the “Innovation Champion” for Tatarstan and must be willing and able to allocate a significant amount of his or her energy and time to
reach this consensus goal. This Innovation Champion must have the power and legitimacy to lead the Strategy development process and its implementation.

In light of the regional environment and its political culture, the following steps can be taken:

- Start with an inter-ministerial seminar. The goals of such an event will be to disseminate the urgency of becoming an innovative region and to work under the format of an inter-ministerial Task Force under the direct authority of the Prime Minister of the Republic of Tatarstan.
- Implement a consensus-building action plan over a period of six to nine months for the following target groups:
  - Rectors of universities with their counterparts from R&D organisations.
  - Heads of large corporations.
  - Representatives of the SME sector.
  - Heads of the different agencies and organizations dealing with innovation.
  - A mix of all these types of stakeholders every three months leading to the creation of a Steering Committee.
- Agree on a series of actions (to be undertaken individually or collectively).
- Attract regions from both within and outside the Russian Federation that have managed to achieve such a consensus to deliver “real-life” testimonies.
- Communicate the overall ambition and the consensus building process to civil society (this is important as many individuals have a negative perception of the role and influence of public initiatives).
- Seek external expertise to manage the process. This external player must be seen as an “honest broker” and capable of speaking with and understanding all types of actors (high ranking policy-makers, directors of small firms, scientists, bureaucrats, etc.).

7.5.4 Bringing up Innovation as a Government Priority

Many top national and regional policy-makers declare that innovation and knowledge are key priorities for their governments. While these can be true statements for the top layer of policy-makers they often no longer hold true lower down in the different levels of the administrative bureaucracy.

Empirical findings based on the analysis of a large number of European regional innovation strategies demonstrate that regions and countries that did implement measures to support an innovation culture in their respective administrations did succeed better than those who only focused on companies and knowledge-providers. However, developing such a vision takes time and requires a lot of coaching before it becomes adopted by bureaucrats who tend to be rather conservative and willing to only stick to the rules of the book.

50 Great Britain has published a White Paper for innovation in the British Administration.
Tatarstan can ensure that the Strategy is embraced at all levels of the bureaucracy by:

- Making sure that all civil servants know that the Tatarstan is taking strong actions to move towards a knowledge-based economy.
- Helping civil servants understand what the *innovation* means and work towards a universal understanding the word.
- Nominating an official in charge of innovation in every ministry; attach that person to the cabinet of the Minister. Make sure that such a person is well acquainted with the different dimensions of innovation.
- Organizing regular meetings between these officials to share findings, ideas and problems. These should be reported to the Inter-Ministerial Innovation Task Force.
- Facilitating experimentation and accept failures.
- Carrying out a critical review of all existing regulations and work to facilitate the registration and reporting of companies.
- Opening a “Help Desk” for entrepreneurs who can come and speak about their problems and find solutions with the support of the Administration.
- Promoting innovation in the administration through rewards and prizes that will be publicized in the press.

Such a process must be led by the highest levels of the Government of Tatarstan to send the right message to each civil servant. The process should be monitored, allowing all parties to see how innovative the administration has become in Tatarstan.

### 7.5.5 Ensuring That Adequate Financial Resources Are Mobilised

The implementation of a successful regional Innovation Strategy is ultimately linked to financial and human resources. Creating a competitive and globally-recognized Tatarstan will require that the government make a series of budgetary decisions. Budgetary resources are needed for:

- Promoting innovation and entrepreneurship.
- Stimulating the commercialisation of R&D in an innovative and efficient manner.
- Supporting the growth of innovative companies (existing and start-ups).
- Helping firms to create international links to improve their growth and competitiveness.
- Improving existing mechanisms and bringing them up to international standards.
- Developing linkages between industry and science, and between innovative SMEs and other firms.
- Stimulating innovation in the educational system to foster a new wave of innovative entrepreneurs.
- Reengineering the economic landscape and supporting the transformation of traditional industries to help them to succeed in the Global Competition.
Transforming Tatarstan into an innovative economy will require significant amounts of financing. As discussed in Chapter 5, there are major gaps in the Federal innovation support policies. In the short-term, the region can address these gaps with its own financial resources. But considering the post-crisis environment period and the inherent limitations of the republican budget, it is absolutely necessary to mobilise resources beyond the Budget of the Republic. Tatarstan can create a system that can detect and attract resources from many different organisations. This obviously includes Federal funding, but can also involve international companies, international organizations or Russian venture funds.

This can be done with the support of a team of high level experts who understand how such “contributors” make decisions and select locations they want to support.

### 7.6 Monitoring and Evaluation

An innovation strategy will have little impact without a proper monitoring and evaluation system.

The purpose of monitoring is to ensure that activities defined in the action plan are managed according to their original objectives, timelines and budgets. It is a tool for ensuring that measures are meeting their technical and financial objectives. This report does not describe in full detail the means to be employed to design and implement this monitoring system because it should be the result of the consensus building process.

Evaluation has a much broader role. Its purpose is to analyze the impact of the Strategy. It allows the Strategy or actions defined in the Strategy to be modified to maximize their impact. It also allows the Strategy to be adapted continuously to changing conditions and new challenges. It recognized that there is no unique “correct” set of innovation policies. Innovation policy-making is a learning process.

The evaluation mechanism needs to be designed at the same time as the Strategy, not as an afterthought. Conversely, the Strategy needs to be designed with evaluation in mind. Progress towards results should be measurable through statistical data, surveys and interviews. It should be performed every three to five years using a predetermined standardized methodology in order to allow for comparisons. The evaluation should not only focus on immediate concrete results of the Strategy. Many of these are difficult to measure, occur only in the long term and it is difficult to ascribe causal relations with specific policies (e.g. job creation, increased profits). Many outcomes linked to processes can also be used to measure the impact of the Strategy (e.g. increased collaboration between industry and research institutions). While monitoring can be performed by project management teams, evaluation is most credible when assigned to an independent institution. Even better, relying on evaluators from other regions or countries can help introduce external viewpoints and new practices.
Chapter 8

Key Recommendations
### Key Messages

- **Eight interrelated and complementary approaches are proposed to enhance innovation in the Republic of Tatarstan:**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Approach</th>
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| Stimulate innovation through effective policy-making | 1. Generating strong consensus and shared vision  
2. The Innovation Report  
3. The Innovation Forum |
| Catalyze demand for innovation | 4. Support to SMEs with growth potential  
5. Financing knowledge-based entrepreneurship  
6. Facilitating start-ups |
| Bridge gaps through effective support institutions | 7. Launching a Joint Commercialisation Team  
8. Strengthening existing support institutions |

Two key concepts need to be embedded in all of these recommendations:

- One is monitoring and evaluation, already described in the previous chapter.
- The other is facilitating innovation collaboration with international partners.

Some of the recommendations are aimed explicitly at SMEs, start-ups and single entrepreneurs. These are the types of firms that regional innovation policy can affect in the most immediate way. Large firms operating in Tatarstan should benefit from new suppliers through SME support programs and from R&D commercialization from universities, but fundamentally changing their innovative behaviour goes beyond the scope of a regional innovation policy.

1. **Generating strong consensus and shared vision**

   Developing a deep, long-term and ongoing consensus among stakeholders is a key building block to successfully implementing the strategy.

2. **The Innovation Report**

   The basis of an innovation strategy should be the analysis of the regional innovation system conducted in an Annual Innovation Report. The Ministry of Economy should establish a system of indicators for monitoring the regional innovation system.

3. **The Innovation Forum**
An Innovation Forum can be organized to:

- Engage in a constructive, open and mutually beneficial exchange between government, business, science, education and society on the issues of innovative development of Russia and Tatarstan in the context of the global economy.
- Elaborate methodologies for the transformation of regions with strong traditional industrial background into leading knowledge-based economies.
- Promote Tatarstan’s competitive and innovative assets.
- Present Tatarstan as a region attractive for innovators, entrepreneurs and investors.

**4. Support to SMEs with growth potential**

The Government of Tatarstan can create a program that delivers support to SMEs that have the potential and the willingness to grow (with special attention to those that can address international markets). The first step of this program is to identify the firms that present the right characteristics. They can then be provided with high-quality hands-on technical assistance to help the upgrade their technologies, innovate and penetrate global markets. Enterprises in the region already spend more of their revenues on acquiring new technology than several Western European countries. The key will be to further accelerate this trend by developing a local market for advisory services through public and private networks.

**5. Financing knowledge-based entrepreneurship**

Matching grants and loans can address market failures that result in underinvestment in innovation by the private sector but are currently limited in the Tatarstan. R&D expenditures have already significantly increased in the past decade. The key now will be to increase their share of the regional economy. Grants are useful for pre-competitive innovative activities since they can increase an entrepreneur’s willingness to undertake an innovative project by reducing downside risk. They can be used to make investments that may not generate immediate positive cash flows, as is the case of early-stage firms. To ensure additionality, grant funding should require a matching investment from the beneficiary. Loans can be used for technology upgrading for projects with more immediate payoffs.

**6. Facilitating start-ups**

The government can foster innovative start-ups by creating a more favourable environment for entrepreneurs and helping them succeed in Tatarstan as well as outside the Republic. A core recommendation is the detection, selection and support of start-ups that have a potential for growth and internationalisation.

**7. Launching a Joint Commercialisation Team**

The government can accelerate the commercialization of research by establishing a
Joint Commercialisation Team independently from existing research organizations (Figure 54). It can be made responsible for commercialising the “knowledge goods” embedded in the different R&D institutions. This can increase the quality and quantity of knowledge commercialization of universities that are already turned towards the market, such as Kazan State Technological University, and it can spread this model to other research institutions that have yet to reach this stage. A Joint Commercialisation Team can be effective when run under private management, with clear “public” goals and when it considers the world as its natural market.

Figure 54: Joint commercialization team interactions

8. Strengthening existing support institutions

Tatarstan has unique assets compared to other Russian regions. It has already heavily invested in creating an innovation ecosystem and created some political momentum in this direction. Nevertheless, more efforts are required to generate the expected return-on-investment. To improve the effectiveness of the innovation system, the government can establish a series of tangible and measurable goals for the support infrastructure. As a starting point, the government and the management of existing support institutions will need to decide how to attract new staff with additional skills and how to ensure they become accepted leaders in transforming the economy.

This chapter presents in detail eight interrelated and complementary approaches aimed at enhancing innovation and competitiveness in the Republic of Tatarstan. Their objective is to enhance innovation and technological upgrading capacity in Tatarstan’s economy in order to ensure sustained long-term growth. First results could become visible within eighteen
months to two years. Some of these recommendations are aimed explicitly at SMEs, start-ups and single entrepreneurs. These are the types of firms that regional innovation policy can affect in the most immediate way. Large firms operating in Tatarstan can benefit from new supply chains through SME support programs and from R&D commercialization from universities, but fundamentally changing their innovative behaviour goes beyond the scope of regional innovation policy. These are likely to include competition policy, trade policy, corporate governance reform and corporate income tax incentives. The eight recommendations are summarized in Table 10. When appropriate, the government of Tatarstan should ensure that these actions leverage existing resources from federal programmes (e.g. the FASIE programmes for start-ups).

Table 10: Summary of key recommendations

<table>
<thead>
<tr>
<th>Objective</th>
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<td>Stimulate innovation through effective policy-making</td>
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</tr>
</tbody>
</table>

Two key concepts need to be embedded in all of these recommendations. One is monitoring and evaluation, already described in the previous chapter. The other is facilitating innovation collaboration with international partners.

Each sub-section of this chapter is organised as follows: concept, rationale for this recommendation, expected outputs and possible implementation mechanisms.

8.1 Generating a Strong Consensus and a Shared Vision

As mentioned in chapter 7, developing a deep, long-term and ongoing consensus among stakeholders is a key building block to successfully implement a strategy.

Although generating consensus is a process embedded into the strategy, it is also an intrinsic part of the recommendations. The proposed approach presented in chapter 7 focused on the following components:

- Starting with an inter-ministerial seminar. The goals of such an event will be to disseminate the urgency of becoming an Innovative Region of the Federation and to work under the format of an inter-ministerial Task Force under the direct authority of the Prime Minister. This seminar should also allow the government to review different federal “instruments” and better coordinate the attraction of federal programmes to the territory of the Republic.
Implementing a consensus-building action plan over a period of six to nine months for the following target groups:

- Rectors of universities with their counterparts from R&D organisations,
- Heads of large corporations,
- Representatives from the SME sector,
- Heads of the different agencies dealing with innovation matters in one way or another,
- A mix of all these types of stakeholders every three months.

Agreeing on a series of actions (to be undertaken individually or collectively).

Asking regions that have managed to achieve such a consensus to deliver “real-life” testimonies at a meeting to be held in Kazan.

Communicating the overall ambition and consensus building process with civil society (this is important as many individuals have a negative perception about the role and influence of public initiatives).

Asking for external support to manage the process. An external player must be seen as an “honest broker” in search of good results and capable of speaking/understanding all levels (high ranking policy-makers, directors of small firms, scientists, bureaucrats, etc.).

### 8.2 The Innovation Report

#### 8.2.1 Overview

The basis of the Innovation Strategy should be the analysis of the regional innovation system conducted in the Annual Innovation Report. The rationale for the Innovation Report is as follows:

- Increase innovation policy capacity in the government.
- Help all interested stakeholders taking stock of a “common language”.
- Identify critical gaps, opportunity areas and impact of policies.
- Use for monitoring the Innovation Strategy.

The Report can be produced every two years. A brief set of key indicators constructed from readily available data can be provided on an annual basis.

#### 8.2.2 Data Collection

A single organization needs to collect reliable data. Unreliable data should be omitted from the Innovation Report.

A system of regional innovation statistics should be created in Tatarstan in cooperation with the regional branch of the Federal Committee for Statistics. This system should be a basis of the entire innovation strategy. It is not possible to develop, learn from and redirect policies
without such a system. It is also a basis for a common understanding of terminology to be used by all stakeholders.

Establishing a solid regional statistics system in Tatarstan requires the implementation of efficient methods of collection of reliable data and its processing. It will be necessary to achieve consensus between all interested parties about the main terms to be used in this system and ensure that all actors understand these terms properly. A feedback system can also be created by organizing exchanges of opinions and proposals between innovation stakeholders and monitor innovation enterprises and promising innovative projects in order to help them to grow.

The Ministry of Economy can establish a system of indicators for monitoring the regional innovation system. This particularly holds true for analysing the linkages between the main blocks of the system (government, science, education, industrial enterprises, and innovative companies). Based on these indicators, revised objectives and targets for improving the regional innovation system can be established.

8.2.3 Structure of the Report

This section presents a possible structure for the Innovation Report. Possible indicators are described in blue. In some cases, units are shown in brackets “[ ]” and numbers in parentheses “( )” refers to possible information sources.

1. Regional Innovation Systems and the Situation in the Republic of Tatarstan
   1.1. Regional innovation systems, networks, clusters
   1.2. Tatarstan’s regional innovation system uniqueness and drivers
   1.3. Regional innovation system barriers (current and future)
   1.4. Critical success factors
   1.5. Innovation policy in the Republic of Tatarstan

2. Regional Innovation Governance: Accepted Good Practices
   2.1. The challenge of coordination and transparency
   2.2. Good governance principles
   2.3. Different approaches to innovation policy-making
   2.4. Use of systemic instruments
   2.5. Regional innovation governance in the Republic of Tatarstan

3. Industry Demand for Innovation
   3.1. Business dynamism and entrepreneurship (by sector and aggregate)

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51 Through a website for example
3.2. Start-ups and entrepreneurship

- **Gazelle companies**: firms with annual sales revenue that has grown 20 percent\(^ {52} \) or more for four straight years per 1 million nonfarm establishments [ratio]. (11)
- **Gazelle jobs**: jobs firms with annual sales revenue that has grown 20 percent or more for four straight years as a share of total employment [%]. (11)

3.3. Manufacturing sectors

- **Entry rate**: Number of newly registered corporations divided by the number of total registered corporations [ratio] (1)
- **New business density**: Number of newly registered corporations divided by total working age population [enterprises / population] (1)
- **Perceived capabilities**: Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who believe they have the required skills and knowledge to start a business. [%] (4)
- **Fear of failure rate**: Percentage of 18-64 population with positive perceived opportunities (individuals involved in any stage of entrepreneurial activity excluded) who indicate that fear of failure would prevent them from setting up a business. [%](4)
- **Entrepreneurship as desirable career choice**: Percentage of 18-64 population who agree with the statement that in their country, most people consider starting a business as a desirable career choice [%](4)

3.4. High-technology sectors

- **Value-added in high-tech sectors as a share of GRP**: High tech sectors are as defined by the OECD [5].
- **High-tech employment**: Share of workers employed in high tech sectors. High tech sectors are as defined by the OECD [5].
- **Exports of high technology products as a share of total exports**: High tech sectors are as defined by the OECD [5].

3.5. Business Globalization

- **Export focus of manufacturing and services**: the value of exports per manufacturing and service worker [RUB/worker].

\(^{52}\) This could be changed to a 10 percent growth rate to be more adapted to the regional context. However, the indicator would no longer be comparable to international benchmarks.
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- **Export intensity in manufacturing and services**: exports as a share of total output in manufacturing and services [%].
- **Foreign direct investment (FDI)**: FDI as a share of regional GRP [%].
- **Foreign direct investment jobs**: the percentage of the workforce employed by foreign companies [%].

3.6. Knowledge Economy

- **Managerial, professional, and technical jobs**: managers, professionals, and technicians as a share of the total workforce [%].
- **Scientists and engineers per workforce**: scientists and engineers as a percentage of the labour force [%] (by sector) (2)
- **Scientists and engineers in industry**: number of scientists and engineers employed in industry as a share of total number of scientists and engineers [%] (2)

3.7. Appetite for innovation

- **FASIE projects**: Number of projects supported by the FASIE per 1,000 workers [awards/worker] (6)
- **Industry R&D Intensity**: industry investments in research and development as a percentage of industry output [%] (5)
- **Share R&D performed by industry**: research and development performed in enterprises as a share of total R&D [%]. (2)(3)

3.8. Innovation activities

- **Product innovation**: Share of enterprises having introduced a product innovation during the past 3 years. A product innovation is the market introduction of a new good or service or a significantly improved good or service with respect to its capabilities, such as improved software, user friendliness, components or sub-systems. The innovation (new or improved) must be new to the enterprise, but it does not need to be new to the sector or market. It does not matter if the innovation was originally developed by the enterprise or by other enterprises. [%] (8)
- **Organizational innovation**: Share of enterprises having introduced an organizational innovation during the past 3 years. An organizational innovation is the implementation of new or significant changes in firm structure or management methods that are intended to improve the firm’s use of knowledge, the quality of the goods and services or the efficiency of work flows. [%] (8)
- **Process innovation**: Share of enterprises having introduced process innovations during the past 3 years. A process innovation is the implementation of a new or significantly improved production process, distribution method or support activity for your goods or services. The innovation (new or improved) must be new to the enterprise, but it does not need to be new to the sector or market. It does not matter if the innovation was originally developed by the enterprise or by other enterprises. Exclude purely organizational innovations. [%] (8)
- **Number of enterprises with product, organizational or process innovations in the past three years as a share of total number of enterprises** [%] (8)
- **Factors hampering innovation**: During the 3 years, how important were the
following factors in hampering firms’ innovation activities or projects or influencing a decision not to innovate? [“High” “Medium” “Low” “Factor not experienced”]:

- Lack of funds within the enterprise or group
- Lack of finance from sources outside the enterprise
- Innovation costs too high
- Lack of qualified personnel
- Lack of information on technology
- Lack of information on markets and competitors
- Difficulty in finding cooperation partners for innovation
- Market dominated by established enterprises acting as monopoles
- Uncertain demand for innovative goods or services
- Need to meet Government regulations
- Excessive perceived economic risks
- No need due to prior innovations
- No need because of no demand for innovations
- Difficulties understanding which types of innovations would best serve the growth of the company
- Lack of desire to grow the company

4. Knowledge Providers in the Republic of Tatarstan (universities, R&D organizations)

4.1. Evolution of the transfer systems

4.2. Competence mapping in institutions depending from the RT

4.3. Competence mapping in institutions not depending from the RT

4.4. Overall R&D Activity Indicator

- Total R&D expenditures as share of GRP [%] (5)(8)
- Russian patents per worker: the number of Russian patents issued per 1,000 workers [patents/1,000 worker] (7)
- US or European patents per worker: the number of US patents issued per 1,000 workers [patents/1,000 worker] (13)
- Russian patents per R&D performed: the number of Russian patents issued per total investments in R&D [patent/RUB].
- US or European patents per R&D performed: the number of US patents issued per total investments in R&D [patents/RUB]
- Publications: Academic articles in international peer-reviewed journals per 1,000 researchers [articles/1,000 researchers]. (14)

4.5. Human Capital

- University attainment: Percent of population over 25 years of age with at least a university degree [%]. (2)
- Doctoral attainment: Percent of population over 25 years of age with a
4.6. Academic R&D performance

- **Academic patents**: Number of university and research institute patents per total academic investment in R&D [patents/RUB]. (9)(12)

4.7. Research Commercialization

- **Academic start-ups**: Number of university and research institute start-ups formed per total academic investment in R&D. [start-ups/RUB] (9)(12)
- **Percentage of academic start-ups receiving external seed or venture financing**
- **Academic industry funding**: Share of university research funded by industry [%].
- **International academic funding**: Share of university research funded by foreign public or private organizations. [%]
- **Industry contracts**: Number of contracts with industrial companies at scientific and educational organizations per 1,000 researchers [contracts/researchers] (6)
- **Extra-regional contracts**: Number of contracts with industrial companies from other Russian regions at scientific and educational organizations per 1,000 researchers [contracts/researchers] (6)
- **Foreign contracts**: Number of contracts with foreign industrial companies at scientific and educational organizations per 1,000 researchers [contracts/researchers] (6)
- **Academic licenses**: Number of licenses per 1,000 researchers [licenses/researcher] (9)(12)
- **International academic licenses**: Number of licenses to foreign-owned companies per 1,000 researchers [licenses/researcher]

4.8. Revenues generated thanks to technology transfer (to be measured by independent auditors)

5. Support Structures in the Republic of Tatarstan (innovation support infrastructure, funds, consultancy services, etc.)

5.1. Description of existing support programs

5.2. Programs results growth

5.2.1. Number of companies having resided in the technopark or incubator in the past two years

5.2.2. Selection

- **Gazelle tenant**: Share of tenants with annual revenue growth of more than 20% for each of the past four years or since formation [%]
- **Globalization tenants**: Median share of tenant revenues obtained from exports [%]
- **Innovation appetite**: Share of tenants fulfilling at least 3 of the following 5
criteria: *Examples of questions to define together with other stakeholders*:

- Internal or outsourced R&D accounts for more than 10% of annual company turnover.
- The company is regularly carrying out market intelligence (every 3 months).
- The company is using tools to regularly check the latest innovations in their field of activity.
- The company is regularly participating in exchange of ideas with other tenants organized by the technopark or informally.
- The company is regularly analyzing market trends leading to being an innovation follower or a pre-emptive innovator.

5.2.3. Reputation assessment of support programs (technoparks, incubators, IVF) among stakeholders – companies, universities, start-ups. A five-question survey can be carried out by an independent party from outside Tatarstan. *Examples of questions to define together with other stakeholders*:

- Have you collaborated with the following support program [list programs]? [yes/no]
- If yes, have you been satisfied [list programs]? [1-5]
- Have you ever recommended to one of your contacts to work with these programs [list programs]? [yes/no]
- If yes, did the support respond to their needs [list programs]? [1-5]
- How do you perceive the effectiveness of these programs at promoting innovation [list programs]? [1-5]

5.2.4. An independent evaluation of each program should be carried out every 4 years.

5.3. Investments made by the RT to facilitate the transformation into a knowledge-based economy

5.3.1. Example of traditional programs supported by regional government:

- Entrepreneurship appraisal [yes – how much/no]
- Micro-business setting [yes – how much/no]
- Small industries from the supply chain [yes – how much/no]
- Business development [yes – how much/no]
- Export development [yes – how much/no]
- Business centres [yes – how much/no]
- Innovation experts [yes – how much/no]
- Growth analysis [yes – how much/no]
- Competence mapping [yes – how much/no]
- In HEI to support innovation [yes – how much/no]
- Innovation competition [yes – how much/no]
- Etc.

5.4. Investments made through the channel of federal support programmes; the goal being to make sure the Republic of Tatarstan and its stakeholders do develop a coherent approach towards the many programmes implemented at the federal
levels (including the different agencies).

5.5. Investments made by other parties (Russia, international organizations, inward investors) in tenant firms and in infrastructure

Proposed Benchmarks

- Countries
  - Russian Federation
  - Finland
  - Ireland
  - Turkey
- Regions
  - Tomsk
  - Scotland, United Kingdom
  - Michigan, United States

Rationale for choice of benchmarks

- Countries and regions for which data is available.
- Several technology leaders to understand the gap with the innovation frontier.
- Several regions with similar economic structures to show future prospects.
- One of more fast-growing middle-income countries to show strengths and weaknesses.
- One or more Russian regions to reflect the national context.

Data Sources for Benchmarks

The sources below contain a hyperlink to the relevant websites.

1) World Bank Group Entrepreneurship Survey
2) UNESCO Science & Technology statistics
3) OECD Science & Technology statistics
4) Global Entrepreneurship Monitor
5) World Bank World Development Indicators
6) Tomsk Administration regional indicators
7) ROSSTAT
8) Eurostat Science & Technology Statistics, including the Community Innovation Survey (EU)

9) Association of European Science and Technology Transfer Professionals (EU)

10) Global Competitiveness Report

11) Kauffman Foundation State New Economy Index (US)

12) Association of University Technology Transfer Managers (US)

13) United States Patent and Trademark Office (US)

14) ISI Web of Science

8.3 The Innovation Forum

This section presents a concept for an Innovation Forum for the Republic of Tatarstan.

Mission of the Innovation Forum: To improve living standards in Tatarstan by facilitating innovation for economic development and boosting the global competitiveness of the region in knowledge-intensive areas.

Strategic goals of the Forum:

1. Engaging in a constructive, open and mutually beneficial exchange between government, business, science, education and society on the issues of innovative development of Russia and Tatarstan in the context of the global economy.

2. Elaborating methodologies for the transformation of regions with strong traditional industrial background into leading knowledge-based economies.

3. Promoting Tatarstan’s competitive and innovative assets.

4. Presenting Tatarstan as a region attractive for innovators, entrepreneurs and investors.

Focus of the Forum:

Governance of the Regional Innovation System

1. Discussion of global best practices in regional innovation systems (RIS).

2. Facilitation of the development of a methodological basis for the development of a RIS.

3. Discussion of problems of development and implementation of regional innovation strategies, legislation and programmes.

4. Facilitation of the consensus of innovation stakeholders of Tatarstan, development of coordinated and consistent regional innovation strategy and proposals for its implementation.
5. Improvement of methodologies and practices of regional authorities aimed at innovative development of Tatarstan.

Transformation of traditional industries

6. Discussion of problems and mechanisms of development of networking innovative activity in the main clusters of Tatarstan.

7. Demonstration of the benefits of modern management tools such as lean-manufacturing and 6 sigma.

8. Presentation of the international market (including market barriers) for dynamic high-tech sectors such as nanotech, IT, biotech and cleantech.

Marketing Tatarstan

9. Attracting the attention of federal authorities to the problems and potential of innovative development of Tatarstan (special focus to industrial innovations and formation of knowledge-based economy and society).

10. Positioning of Tatarstan as an innovative region in Europe.

Promotion of innovative entrepreneurship

11. Attraction of attention of Tatarstan society to the problems and opportunities of innovative development.

12. Development of an innovative and entrepreneurial culture (especially among young people) in Tatarstan.

13. Development of innovations in the educational system with a view of innovative and entrepreneurial culture.

Facilitating linkages

14. Presentation of strategies for universities to develop national and international research links with industry.

15. Networking among the different stakeholders of the RT innovation system (this could take the form of a “speed-dating” event).

16. Presentation of potential clients of RT innovations from other Russian regions or countries of their supply chains and how to work with them (e.g. major national and international corporate players in chemicals, aerospace, oil and gas, food ...etc.).

Types of Audiences:

Insiders:
   a. Tatarstan policymakers and innovation support agencies
   b. Tatarstan universities and research institutes
   c. Tatarstan industry
   d. Tatarstan entrepreneurs and potential entrepreneurs

Outsiders:
   e. Russian and international investors and business partners
8.4 Support to SMEs with Growth Potential

The Republic of Tatarstan is home to SMEs of different nature. This chapter looks at the role the Government can play to increase the competitiveness of these firms and enhance their demand for innovation.

8.4.1 Concept

Companies with growth potential exist in Tatarstan but they do not receive the support needed. In most case, they do not even know how to analyse and address their needs. To address these types of issues, many countries have created comprehensive approaches to technology upgrading that do not solely focus on a single aspect such as certification or acquiring equipment, but on technological absorptive capacity: the ability to identify, absorb, adapt and improve technology. Technological absorptive capacity is a key requirement for innovation. Moreover, integration in global markets is a key driver of innovation, as it creates competitive pressures from companies working at international standards and creates opportunities to diversify into new markets. International experience also shows that a broad base of suppliers meeting international standards can be a strong attracting factor for foreign invested companies, who tend to be more innovation-focused and create a local demand for innovation. Demand from global buyers, along with technical support and training can lead to enhanced technological capabilities (Figure 55).

Figure 55: Strategies for enhancing growth and demand for innovation in SMEs

The Government of Tatarstan can create a program that can deliver support to SMEs that have the potential and the willingness to grow. This support can be developed as a network of services. This network can leverage existing public and private providers but will also need to be strengthened by introducing new types of technical consultancy services operating at international standards. The program can facilitate the creation of a market for technical consultants, able to support companies in the region and throughout Russia. In the United
States (Box 5), the United Kingdom, Germany and many other European countries, technology upgrading programs provide comprehensive business and technology services that rely on internal and external advisors to help enterprises diagnose their strengths and weaknesses, make recommendations and develop growth action plans. Such a programme should take stock of the different (and often un-related) projects made available at the federal levels Ministry for Regional Development, Ministry of Education and Science, Ministry for Economic Development, the federal agencies, etc.).

Box 5: Integrating quality in industrial extension programs leads to a multi-pronged approach to SME growth

Industrial extension was first implemented by a few states in the United States in the 1960s and has been significantly expanded by the federal government since 1989, in reaction to the loss of international competitiveness of US manufacturing in the 1980’s. Now, the 59 nationwide Manufacturing Extension Centres (MEC) and 440 satellite locations of the federal Manufacturing Extension Partnership (MEP) with a total staff of nearly 1,600 specialists in business and manufacturing provide direct assistance to SME customers throughout the US. These centres provide small and medium-sized manufacturers with an array of services that focus on growth, productivity, quality and efficiency primarily by helping clients adopt more advanced, existing and proven technology, processes and techniques.

Assistance is provided in the areas quality, as well as manufacturing and business systems, engineering services, human resources and organizational development, and IT. Assistance is offered through a combination of initial visits, engagements, assessments, and technical assistance projects and applications for grants. MECs offer training services but also conduct outreach activities such as coordinating group projects, organizing workshops, seminars and demonstrations. Technical assistance is provided on request. Questions from firms range from broad issues concerning the general management issues to detailed questions concerning manufacturing productivity. Experienced field agents can provide individual firms with advice and practical assistance for general problems. Field agents often follow their initial assessment with referrals to outside field experts through their extensive networks of private consultants, economic development organizations community colleges and universities.

The MEP has completed nearly 392,000 customer engagements since the program’s inception including technical assistance projects, training programs, networking events and long-term strategic support. In 2008 alone, 31,961 manufacturers were served and the total federal budget was US$ 89 million, slightly lower than the previous two years that were over US $100mln. According to a survey conducted by the MEP of 5,981 clients with projects completed in FY2007, MEP assistance resulted in increased/retained sales US$10.5 billion, cost savings of US $1.44bln, new client investment of US$2.19bln. Moreover, rough estimates of employment impact find that 17,316 jobs were created and 39,763 jobs were retained.

Other countries have introduced supplier development programs. Their objective is to help a select group of firms improve their capabilities to meet the quality standards and other requirements of large locally-established buyers, typically transnational corporations (TNCs). Selected firms are provided initial assistance –sometimes together with a series of
assessment monitoring their receptivity to technical advice over time—and those with the highest potential are selected for intensive technical assistance and training. Partnerships with buyers are facilitated to allow suppliers to gain new business. The firms that complete the program become approved suppliers to TNCs who are involved in shaping the program from the very beginning. Supplier Development Programs in Ireland, Hungary, the Czech Republic (Box 6) and Serbia have allowed those countries to increase the share of local inputs purchased by local subsidiaries of TNCs. The incentive for the TNCs to participate in this program is a combination of cost saving, mainly from logistics, as well as the reliability and flexibility that comes from using local suppliers.

Box 6: The Czech experience with supplier development programs

Through a program of supplier development, the Czech Ministry of Economy created a methodology for improving the supply chain position of Czech firms dealing with transnational corporations operating in the Czech Republic. Although the automotive and electronics industries were well represented in the Czech Republic, they purchased only very low value items, small plastic parts, fastenings etc. Through supplier development, Czech suppliers were brought to international standards of production in a short time. The program also arranged meetings between suppliers and buyers. As a result of the program, 17 of the 20 companies involved achieved sales directly attributable to participation of $46 million. The pilot was followed by a larger program in different sectors and supplier development is now a standard part of economic development in Czech. It is worth noting that the Czech Ministry of Economy believes, after considerable research, that supplier development plays a large role in the attraction and retention of inward investment. The Czech Republic is now in the top five countries in the world for FDI attraction.

8.4.2 Rationale for the Recommendation

In all countries, SMEs face specific growth constraints that cannot be addressed by the market alone. SMEs are unaware of their technological and organizational needs and have a poor understanding of market needs and difficulty acquiring new skills. This stems from indivisibilities of labour which makes it more difficult for SMEs to have specialized management and engineering staff, and to other factors such as the relative isolation of SMEs from sources of knowledge, and to greater risk aversion among smaller firms. Moreover, in all countries the market for technical advisory services tailored to SMEs is limited. This is not a lucrative market for consultants due to the small contract sizes associated with SMEs as well as their greater adversity to take risks with consultants.

SMEs cannot find professional support for technology upgrading in Tatarstan. Although this reflects the experience of SMEs in many countries, the situation is more challenging in Tatarstan because there are no public support programs compensating for a market gap. Focusing on supporting existing entrepreneurs, rather than on creating new companies, is also more resource-efficient and less risky for the government.

In addition to the above, it seems that Tatarstan does not host the critical mass of qualified consultants capable of delivering high quality and hands-on services to companies. This is a necessary ingredient to nurture a successful ecosystem. The Republic of Tatarstan is blessed
with a host of large well-known companies on its territory. Although many of these conglomerates face difficulties against global competition, they still represent an important part of the regional economy. They also represent a significant source of demand that can be exploited by public support programs.

8.4.3 Expected Outputs

The outputs will be of a double nature:
- In the short-term, enhanced enterprise growth through
  - Integration in global value chains
  - Upgrading to higher value-added products and activities
  - Higher productivity
- In the medium-term
  - Development of a market for high-quality technical consultancy services, competitive on international markets.
  - Enhanced capacity and demand for innovation

8.4.4 Implementation Mechanism

Based on a review of international programs as well as from observations of international programs in OECD (1997), Kolodny (2001), Shapiro (1998), a number of best practices have been identified for programs aiming to upgrade the technological capacity of firms in particular regions:

- The program is demand-driven, in that they do not focus on pushing technologies from particular institutions onto firms, but rather operate using a market-pull approach, where the changing needs of companies are constantly monitored and addressed.
- They target information gaps among SMEs, helping raise awareness of possible areas of productivity improvements. Program staff is proactive in helping SMEs understand their needs in order to identify the right type of intervention.
- Rather than providing general knowledge and information to firms, interventions are tailored to individual needs.
- The approach to technology upgrading is comprehensive, combining technical problem-solving with the managerial, technological and organizational modifications required to adapt to technical change. The programs focus on a broad range of technologies, including both off-the-shelf as well as more highly sophisticated techniques.
- Different forms of interventions are used, including information, workshops, demonstrations, training, networking and technical assistance covering different aspects of technology upgrading.
- The program caters to a broad range of SMEs, meaning SMEs of all sizes and of different levels of sophistication.
• **Services and knowledge have a unique value added for SMEs**, meaning that there are no private sector actors able or willing to provide these services to SMEs.

• **The program leverages external sources of knowledge** and does not solely rely on the expertise of its own staff to offer support to SMEs.

• **Response-time is minimal** and companies can at least benefit from some forms of brief support at very little prior notice.

• The program is managed by a *decentralized, flexible and autonomous organization*, which can respond to local market needs and is not subject to political influence.

• **Evaluation and assessment are integrated in the program**

Technology upgrading support programs can be most effective if they target SMEs that have the highest potential to benefit. It is not within the means of most governments to provide support to all SMEs. In some case SMEs are subject to underlying factors such as lack of skills, lack of competition in the market or high risk aversion that reduce the impact of government support programs. An important component of a program must hence be a transparent detection and selection system for participating firms.

The following steps are recommended:

a. Undertaking a mapping of growth potential in existing SMEs. A *stage gate* approach can include the following:

   o Sending a questionnaire to a large number of companies (industrial and service sectors). This questionnaire can be designed to detect companies that present positive traits: the entrepreneur is willing to grow, the company has demonstrated in the past that it made attempts in this direction and the company works in a sector that has shown positive growth. This method allows the government to create a database of priority target firms.

   o Sending consultants able to carry detailed analysis of a short-list of firms selected through the questionnaires. The role of these consultants is to move from the detection phase to the selection of companies presenting the highest potential. The selection criteria must include tangible criteria as well as intangible ones with a special focus on the cultural ability of the management team to address the challenges of growth (including internationalisation).

   o Preparing *growth plans* presenting the areas in which each selected company would need help to develop itself. Growth plans could encompass any dimension of the business: product development, technology absorption, innovation, quality management, sales & marketing, production, logistics, finance, management, human resources, etc.

b. Designing a specialised support scheme for SMEs with high growth potential. This could include, for instance:

   o Free initial consultancies. The company can select a consultant within a portfolio of certified experts proposed by the Government. Initial services are provided free of charge. These consultants can further
develop the draft work plan prepared under the *growth plans* and can start giving key directions to the company.

- Match-funding mechanisms to co-finance longer term support by specialised consultants.
- Subsidizing the salaries of young graduates to work on innovation projects for a fixed period of time (e.g. one year).
- Direct support to companies that are willing to apply for grants at the Federal levels.
- Financial support granted to companies participating – for the first time – in marketing events out of Tatarstan.
- Support to convince banks and funds to support development projects within the selected firms.

c. Supporting the development of a supply of high quality consultants. One concept is to move from traditional advising to hands-on support, in which the consultant is not only responsible for advice but is also liable for direct support to the companies.

- The government can support the establishment and diffusion\(^{53}\) of quality standards and certification for consulting firms and individual consultants.
- The government can organise specific training for existing consultants to favour the creation of a community.
- When beginning public tenders, the government can require that consultants join forces together within a consortium. The European experience has shown that this methodology has enhanced the ability of a number of local consultants to become global and to internally develop to the highest standards.

d. Implementing a monitoring system enabling the government to measure with undisputable criteria the effect of this growth programme for SMEs. In addition, it will be suitable to promote these results among the public in order to demonstrate the role the government can play in regional economic development. This can be done with the testimony of companies that benefited from the Programme.

e. Finally, the Government should make sure that large companies located in the Republic are closely associated to this process. These large companies must not only support this development but must favour the creation of high level supply chains among their providers.

- The government can play a role in facilitating transparency between the needs of these large firms and regional SMEs (especially when it comes to innovation and technology). For instance, monthly meetings could be organised, in which a large company presents its processes, its products, its needs, its quality standards or the systems used for its suppliers, the final goal being to help SMEs to adapt to the needs of large players and to better respond to such needs.

\(^{53}\) Or the implementation of international or European standards
Finally, the government can provide incentives to large firms to partner with SMEs on innovation and technology upgrading projects, as part of its financial support schemes described in Section 8.5. The ultimate goal remains the same: create an innovation culture, create linkages in the innovation system, and develop a shared a same vision of the future, develop new markets and promote a positive image of the uniqueness of Tatarstan.

8.5 Financing Knowledge-Based Entrepreneurship

8.5.1 Concept

Matching grants and loans can address market failures that result in underinvestment in innovation by the private sector. These are the two most common types of government instruments to fund private sector. Grants are useful for pre-competitive innovative activities since they can increase an entrepreneur’s willingness to undertake an innovative project by reducing downside risk. Grants can be used to make investments that may not generate positive cash flows for an uncertain period of time, as is the case for early-stage firms. To ensure additionality, grant funding should require a matching investment from the beneficiary. Loans are more appropriate for later stages of the innovation process, or for technology adoption, where the probability of success is higher.

Collaborative matching grants can also be offered to promote joint projects between enterprises and researchers, between enterprises and between Tatarstan enterprises and foreign organizations. Match-funding levels can be increased for R&D projects that include foreign participants in order to increase technology transfer across borders and create incentives for conducting globally-competitive R&D. This initiative should of course be developed in coherence with existing federal programmes such as FASIE and others.

8.5.2 Rationale for the Recommendation

Availability of non-equity finance is critical to innovation. Different types of finance are generally used for research, innovation and technology development depending on the market-readiness of the technology and the growth stage of the company. In most OECD and EU countries public funding is provided to enterprise innovation in the form of matching grants and loans. In most countries, and particularly in transition countries, a major funding gap occurs in the early stages of technology commercialization. At this stage, a technology-

55 Other federal level programmes include the Federal Target Programme "Research and developments on priority directions of development of scientific and technological complex of Russia in 2007-20012". There is also support for large technological projects under the authority of the State Commission on modernization and technological development of the economy. Innovation projects of enterprises with considerable share of state ownership can be supported directly from the federal budget. In addition many R&D topics are financed by the Ministry of Defence, Ministry of Industry and Trade, Ministry of Emergency Situations and other governmental bodies. Business R&D activities in the respective industries are also supported by the Sectoral Funds of the Ministry of Transport, Ministry of Information and Communications, Rosatom and JSC "Russian Railways". In addition, 29 nonbudget funds for support of R&D and technological development have been created (16 - created by the federal governmental bodies, 13 - created by commercial organizations). The system of these funds is monitored by the Russian Foundation of Technological Development.
based start-up firm without revenue-generating activities needs to seek seed capital from business angels.

As their prospects start to look more certain, only a very small share of high-potential innovation-based firms relies on venture capital funding in high-income economies. These firms are typically based on radical innovations that present prospects for extremely high returns on investments (ten times) at the expense of high risks (90% failure rates). The vast majority of innovative firms in high-income economies is not based on radical innovation and does not do benefit from venture capital. Innovative firms often reach maturity through revenue-generating activities such as services and traditional forms of equity and bank loans become available as sources of finance. Moreover, it is important to note that although VC plays a role in supporting technology commercialization it does not address market failures associated with underinvestment in innovation. Hence, public support for VC needs to be preceded or complemented by interventions addressing innovation financing gaps. Moreover, given that there is no international consensus on best practices for publicly-financed venture capital funds, this is a highly-risky endeavour.

As mentioned in chapter 7, there is almost no public financial support to addresses market gaps in innovation in Tatarstan or in the rest of Russia. At the federal level, the FASIE program offers very scarce resources for innovation when compared to similar programs in other countries. Hence, matching grants and loans can help Tatarstan address innovation financing gaps are not being addressed by existing federal or regional financing instruments. These are preferable (and complementary) to public financial instruments such as VC or equity in a region with Tatarstan deal flow characteristics.

Moreover, innovation grant programs can be used to foster private-private and private-public collaboration. Inter-firm collaborative projects enable participants to capture more knowledge spillovers, reduce duplication of research and exploit economies of scale in R&D. Collaboration between firms and research institutes or universities promotes the transfer of knowledge and technology to the private sector and provides a better understanding of research needs to research institutions (Alic 2003).

### 8.5.3 Expected Outputs

Public financial support instruments can be used to:

- Increase private sector investments in innovation.
- Increase private sector investments in technology upgrading (which also catalyzes demand for future innovation).
- Create a culture of entrepreneurship and innovation.
- Create technology, knowledge and business linkages within the regional innovation system.
- Create linkages between the regional innovation system and external actors.

### 8.5.4 Implementation Mechanism

Different types of financial instruments should be provided to address different market gaps (Table 11). For example, in many countries, innovation agencies provide funding on more generous terms to smaller firms than to larger firms, or to collaborative projects (Table 12).
Matching grant and loan funding for innovation should be provided through an innovation agency. This entity should be ideally independent and administratively separate from policy-making bodies such as ministries to provide it with the flexibility to hire highly-qualified staff with the right skill set. The profile and experience of the staff will be critical success factors. And selection committees must also include private sector representatives. The inclusion of extra-regional and international members in project selection committees can greatly enhance the quality and credibility of the decision process. This, of course, is only justifiable with a critical mass of program funding. Funding levels should be high enough to support innovation. The current grant sizes provided by FASIE are too low. Table 12 shows typical grant sizes found in other countries. Solid monitoring and evaluation mechanisms are also necessary. Section 8.7 provides more detailed recommendations on how to strengthen innovation support institutions.

### Table 11: Examples of possible financial instruments for Tatarstan

<table>
<thead>
<tr>
<th>Target</th>
<th>Funding instrument</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>Mini-grant</td>
<td>Encourage culture of entrepreneurship and innovation, generate ideas for subsequent funding rounds</td>
</tr>
<tr>
<td>Individual SMEs</td>
<td>Matching grant or loan</td>
<td></td>
</tr>
<tr>
<td>SMEs collaborating with other firms (anywhere)</td>
<td>Preferential matching grant</td>
<td>Encourage inter-firm collaboration</td>
</tr>
<tr>
<td>SMEs collaborating with research institutions (anywhere)</td>
<td>Preferential matching grant</td>
<td>Encourage culture of industry-research collaboration and enhance market-orientation of public research institutions</td>
</tr>
<tr>
<td>SMEs with co-financing from a buyer (anywhere)</td>
<td>Preferential matching grant</td>
<td>Create linkages between SMEs and potential customers</td>
</tr>
<tr>
<td>Technology upgrading projects in SMEs</td>
<td>Matching grant or loan</td>
<td>Address knowledge-barriers involved in technology upgrading and create a demonstration effect</td>
</tr>
</tbody>
</table>

### Table 12: Applied R&D matching grant programs for SMEs & research institutions

<table>
<thead>
<tr>
<th>Country</th>
<th>Ireland (Enterprise Ireland)</th>
<th>France (OSEO)</th>
<th>Hungary (National Technology Program)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual projects (SMEs)</td>
<td>Max 45%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>Cap €650,000</td>
<td>€10mln</td>
<td>€3.8mln</td>
</tr>
<tr>
<td>Collaborative projects (SMEs &amp; research institutions)</td>
<td>Max 80%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>Cap None</td>
<td>€10mln</td>
<td>€3.8mln</td>
</tr>
</tbody>
</table>

Source: websites of the different funding programs in 2009.
Any new matching grant program should capitalize on the support provided by the FASIE Program. FASIE is a very efficient and powerful mechanism to support the creation of technology-based firms. However, more could be done locally to help companies with growth potential to “boost” their success. The government of Tatarstan could establish a specific “post FASIE” scheme aimed at growing those start-ups that have the potential to catch more markets and that can become global.

8.6 Cultivating Start-ups

8.6.1 Concept

The government can foster innovative start-ups by creating a favourable environment for entrepreneurs and helping them succeed in Tatarstan as well as outside the Republic. A core recommendation is the detection, selection and support of start-ups that have a potential for growth and internationalisation.

8.6.2 Rationale for the Recommendation

Chapter 2 finds that there are relatively high rates of new firm formation and that Tatarstan presents a good environment for starting a business relative to the rest of Russia. This points to the region’s potential for introducing innovation through new firms. However, there is a discrepancy between the goals set forth by the Government and the number of technology-based start-ups that are actually successful. Additional measures are needed to increase the efficiency of existing support mechanisms, namely the technology parks and regional venture funds.

8.6.3 Expected Outputs

Three interrelated outputs are expected from this programme:

a. Development of an entrepreneurial culture and spirit.
b. A continuous deal-flow of innovative ideas.
c. Growth of SMEs, especially those that can capture international markets.

At this stage, it is not possible to propose concrete targets in number of companies or in revenues. It is important that such targets be defined through consensus with the different support agencies (current or future such as the Joint Commercialisation Centre).

8.6.4 Implementation Mechanism

Support to entrepreneurship and incubation of new technology–based firms can draw from a multitude of experiments from around the world. Nowadays, this concept has reached a good level of maturity and it is possible to analyse what works well and what works less well. Four sub-programmes can be used to enhance early-stage knowledge-based entrepreneurship in Tatarstan:

a. Supporting a culture of entrepreneurship in Tatarstan.
b. Offering hands-on support to new entrepreneurs.
c. Creating a global bridging system for technology-based firms

d. Enhancing cross-fertilization of ideas.

Some of these recommendations have already been developed in Tatarstan but will have a much higher impact if managed differently.

a. **Supporting a culture of entrepreneurship in Tatarstan**

Increasing the entrepreneurial atmosphere of a country or region is a challenge everywhere. Several instruments launched by the Government, including the Competition “50 best innovative ideas for the Republic of Tatarstan”, are part of the solution. However this is far from being enough.

The ultimate goal is that individuals and institutions experience a cultural shift in which taking risks is seen as a positive value and in which failing after taking a risk is not frowned upon by society. Many of Tatarstan’s entrepreneur’s on the contrary have demonstrated a rather conservative culture where people value the opinion of their hierarchy but where risk-taking is not valued.

*An Entrepreneurship culture is not about asking every individual to become an entrepreneur. It is about developing a sense of curiosity, a capacity to propose innovative solutions, a right to make mistakes, etc.*

Most European regions have tried to tackle this complex issue with reasonable success. Solutions imply developing a long term\(^{56}\) packages of mechanisms:

- Continuous support for the concept of entrepreneurship by political, financial, educational and business leaders.

- Making sure that schools have programmes presenting how entrepreneurship works and its added value for individuals and for society. This information is also spread into the families of these students.

- Making sure that entrepreneurship is part of higher education, regardless of the field of study.

- Making sure that students gain practical training so that they can put their skills to work when they graduate. This could mean internships or research projects with companies during their studies.

- Organising *entrepreneur one-stop-shops* where people can come to discuss their ideas and receive some minimal help to move on. This could for instance include a *two-hours for free* meeting with consultants after a preliminary discussion that demonstrates the idea is feasible.

- Making sure incubation systems go beyond the simple model of subsidizing the rent of a team with new ideas. These teams should receive strong attention and be able to meet for free (or minimal, subsidised costs) experts in various fields.

- Organising ongoing communication campaigns, using all possible means (the internet, press, competitions, speeches from political leaders, events, etc.). The recurrence of the message is essential in such campaigns (Box 7).

\(^{56}\) In this case, “long term” means between 5 to 10 years.
Other instruments are available, but those mentioned above have proven to be simple to implement, rather cheap and cost effective. One important ingredient is the continuity of such an approach. There must be an ongoing consensus between stakeholders regardless of political or administrative changes for such programs to be successful.

**Box 7: Examples of campaigns to support an entrepreneurial culture**

As was mentioned throughout the previous chapters, to flourish innovation needs a positive and supportive ecosystem. Innovation and entrepreneurship should have positive connotations in society. Technology-based entrepreneurs must be rewarded through feedback.

Society must understand that a good entrepreneur is a person who has already experienced failures and has learned from them (a motto of American venture capitalists: “If you did not fail you will make all your mistakes with my money”).

This can be achieved through a series of means that can be bundled together into an educational and promotional programme:

- Ensure there is press coverage of entrepreneurship and innovation success stories and special news on a regular and continuous basis,
- Support life-long training for professionals in companies with a special focus on what it is to be innovative as an employee in a company.
- Develop an innovation culture in the public administration (not easy, but possible) and ensure that bureaucrats understand they are part of the innovation ecosystem.
- Help leaders in firms better understand global business trends can be done through programmes of economic intelligence, by supporting participation in international fairs, through regular seminars in which these leaders are asked to make intellectual contributions to improve Tatarstan’s innovation ecosystem.
- Promote more new entrepreneurs through prizes and contacts with international customers.

**b. Offering hands-on support to new entrepreneurs**

Hands-on support is an important missing ingredient in Tatarstan. Start-ups, existing entrepreneurs and public organisations do not have access to professional consultancy services that are delivered hands-on (in other words, not only through reports and presentations). International experience demonstrates that such intermediary services are vital to a successful RIS (see chapter 1). The problem is exacerbated by the fact that such services are only available in limited number and low quality across the entire Russian Federation.

In Kent, United Kingdom, with the support of the European Commission, the KTTC organisation developed a model that helps Business Advisors analyse the detailed needs and potential of companies. In Western Sweden, the IVF created a similar mechanism allowing its advisors to continuously coach the implementation of advice.
The government can support the development and growth of hands-on advisory services on its territory. It can, for instance, attract companies that have this knowledge from other parts of the country or from abroad and help them access local and national clients. These companies can be treated as inward investor and benefit from the relevant public support measures. It will take several years before a real consultancy market comes to maturity. The government can foster the growth of this niche market by subsidising it support through a match-funding mechanism.

Firms – especially technology-based start-ups – that receive high quality support experience growth rates far above the natural growth. An example is the EC funded project named CHANGES that was carried across five EU regions. The goal was to create a tool that could help SMEs (including low technology based firms) to boost their growth thanks to an innovation strategy. After a couple years of operation, about 30% of the beneficiaries experienced an annual growth of 20% and more. The sample was based on 250 companies.

c. Creating a global bridging system for technology-based firms

Compared to success stories around the world, many of Russia’s and Tatarstan’s companies are hampered by their lack of global vision of the market. In high-income economies as well as in emerging economies, a large proportion of companies (including SMEs) consider that markets, financing, knowledge and competitiveness are intimately linked to their ability to find clients and partner beyond national boundaries.

The government can create a cost effective mechanism to promote linkages between the most innovative local firms (SMEs and start-ups) and partners in a group of countries. These partners will be able to participate in joint R&D, gain facilitated access to the Russian market and to jointly bid for tenders in Europe. This pairing mechanism was successfully tested in Russia from 2008 to 2009. The key outcomes were the following:

- 20 technological pairs created.
- 14 of them received additional hands-on support.
- Expected value-added from the program: €1.5 million in the short-term, circa €35 million in the medium/long-term.
- About 75 highly qualified positions will be created within two years.

d. Enhancing cross-fertilisation of ideas

Science, innovation and markets are less and less vertical and depend increasingly on bundling together complementary services and products from different providers. Many entrepreneurs and scientists believe that they “hold essential secrets” and are reluctant to reveal their know-how to others, typically overestimating by far the market value of their knowledge. This is a trend in high-income economies such as the United States as well, where patenting has significantly increased in the past two decades but the quality of patent applications has decreased. The result is a market failure in the diffusion of knowledge. European experience has demonstrated that (especially in the case of incubators and scientific teams) when teams from different origin are offered the opportunity to meet on a regular basis, new ideas, new products or new processes always span out from such
mechanism. The phenomenon is known as “cross-fertilisation” and is a core component of open innovation.

Tatarstan’s technology parks (particularly Technopark IDEA) and the proposed Joint Commercialisation Team (see Section 8.7) offer excellent platforms to organise such exchange and working sessions. They can be organised around a theme (export, international tenders, etc.) or around the presentation of a product or know-how from a member of these groups. One necessary ingredient is to make sure such sessions are managed by professional facilitators and are attractive enough to continuously attract a stable audience.

8.7 Launching a Joint Commercialisation Team

A joint commercialisation team that works for all knowledge providers can strongly leverage the innovation capabilities of the region while creating a unique and innovative model in the Russian Federation.

The principle of “joint commercialisation teams” was first tested as a pilot programme in Germany at the end of the 1990’s. This model is attractive because it can reach a broad range of innovation organizations. However, it can be rather difficult to implement without sufficient buy-in from the organizations involved, which are not naturally inclined to cooperate. In 2003, an attempt to develop a similar system was designed in collaboration with the Russian Academy of Science (EuropeAid funding). Although interesting results were achieved, it never became a full-fledged programme as initially desired.

Nonetheless, with its cluster of research-oriented universities surrounded by an established industrial base, the Republic of Tatarstan is in a position to implement such an innovative approach. The successful implementation of such a program can create a unique image across the country and can attract the attention of public and private investors who do not currently consider Tatarstan as an opportunity.

8.7.1 Concept

A Joint Commercialisation Team can be established independently from existing research organisations and made responsible for commercialising the “knowledge goods” embedded in the different R&D institutions. Such a team is most effective when run under private management rules with clear goals (especially return-on-investment for the R&D organisations and the region). It can take different legal forms (public-private partnership, private, public). It always considers the world as its natural market. These teams hire staff who understand the demands of private and public clients as well as the culture and environment of universities and research teams. Finally, the team must include a portfolio of expertise and personalities that can deal with clients in Russia as well as in other parts of the world. Various countries have experimented with different models of joint commercialization teams (Box 8). Some are more closely associated with a single parent institution, but experience shows that they are more successful at dealing with a large pool of institutions when they are independent.
Box 8: Examples of international experience with commercialization teams

**Germany**

The Region of Mecklenburg-vor-Pommern in former East Germany has established a Private-Public-Partnership for commercialization of technologies and know-how for the nine R&D institutions located in the area. After a long period of consensus building among these institutions, the project was launched. It generates approximately €50Mln per year\(^{58}\) in recurrent manner for a cost in the range of 1mln€ per annum. The program has been running for five years.

**Turkey**

Inovent is a technology commercialization company based in Istanbul, which received initial seed funding from a local private university. Inovent specializes in the development, commercialization and management of intellectual property developed by universities, research institutions, technology companies and entrepreneurs in Turkey. It combines the functions of technology transfer, company formation, business incubation, investment sourcing and business development to accelerate commercialization and business growth. Its goal is to bring innovative ideas to market either by building businesses or licensing to industry. Inovent has partnered with research institutions to establish eight companies so far.

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### 8.7.2 Rationale for the Recommendation

R&D organisations and universities located in Tatarstan present an excellent mix of assets and history. However, these assets are underexploited (regardless of the goodwill of the parties) and only produce limited results in terms of recurrent high value R&D contracts, start-ups with growth potential or international joint-ventures.

In view of the dense industrial base of the Republic, Tatarstan’s R&D organisations should consider commercialisation of R&D as one of their priorities. Considering the inherent constraints faced by these organisations in terms of overall governance, financing,\(^{59}\) management, internal incentive structures, commercial competencies and understanding of international market trends, international experience suggests that it will take many years before each institution is brought up to global best practice in these areas.

Given that many of these constraints are outside of the control of the regional government, Tatarstan can most effectively address R&D commercialization by creating a structure outside of these institutions but serving all R&D providers and the Republic (Figure 56). Such a tool can deliver large results for the community in a short time scale.

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\(^{58}\) Bundling together all types of revenues: R&D contracts, royalties, FP projects, start-ups, outsourcing of R&D

\(^{59}\) although new funding streams will be allocated to some institutions from the Federal levels
8.7.3 Expected Outputs

This recommendation aims to:

- Better link the knowledge providers to the needs of the Republic including the new federally-funded nanotechnology centre.
- Promote entrepreneurship in these organisations.
- Create a regular deal-flow of innovative ideas that can lead to start-ups with seed or venture funding.
- Generate off-budget resources for the institutions involved in the system.
- Facilitate cross-fertilisation between R&D teams from different organisations.
- Develop a new collaborative culture among the R&D partners.
- Promote Tatarstan’s R&D potential in a coherent way to the world market.

International experience shows that an annual revenue stream in the range of RUB 1.2 to 1.6 billion can be achieved after a development period (with a learning curve and the necessary fine-tuning of the model). The development of this model should be based on a sound business plan showing inputs (cost, efforts, and steps) and expected outputs over a three to four years period.

8.7.4 Implementation Mechanism

The success of such an ambitious project is obviously dependent on clear methodologies. This section describes step by step an approach that will lead to ownership and implementation by the key regional stakeholders. The design and implementation of this joint commercialisation team should encompass the following:

a. Creating a strong shared ownership by participating R&D institutions.
b. Conducting competence mapping of R&D teams in Tatarstan.

c. Analysing markets.

d. Developing a business plan for the commercialisation team with clear expectations in terms of revenues and type of deals made.

e. Recruiting a commercialisation team able to achieve the proposed targets.

f. Starting with a pilot phase and working only with a selection of scientists and technologists.

g. Establishing an independent monitoring system.

For each component of this process, the Government of Tatarstan can take a leading role in stimulating, promoting organising and financing the initial steps.

**a. Creating a strong sense of shared ownership by participating R&D institutions**

This is an essential building block of the programme. Sharing a commercialisation team working for different institutions implies a shared vision and a consensus between the parties. It also implies that the perceived benefits (money, image, influence, etc.) are much higher than the natural constraints (sharing is difficult, fear of not receiving the appropriate share of successes, loss of direct authority, etc.).

The Government of Tatarstan can play a key role in facilitating this phase. It must act as a driver looking for the success of all as well as a warrant that none will be cheated when the system starts. The Government should also provide the necessary resources to make sure this consensus building phase can develop smoothly. This includes, organising the process, hiring the appropriate facilitators, financing or co-financing a pilot phase, attracting high level support from the federal level and from companies located in the Republic as well as from elsewhere.

Beyond consensus and shared vision, decision-makers will also need to agree on modalities for the Joint Commercialisation Team. This includes its future location (in one of the R&D organisations or in external organizations such as on the Technopark IDEA), its legal status, the distribution of income, internal and external communication, the management, etc.

International experience shows that it can take up to nine months to reach a consensus in which the parties sign concrete agreements and launch the joint commercialisation team. Taking into account the managerial culture of most Russian regions, this part of the process should be developed with great care and cross-checking. In the end, every R&D institution head must be convinced that they are personally going to gain something without losing any power or influence.

**b. Carrying a competence mapping of R&D teams in Tatarstan**

Competence mapping can be carried out in parallel. It allows every stakeholder to understand what type of technologies and know-how could be managed by the future commercialisation team. Many scientists have very little knowledge of the market value of their findings. A critical analysis is needed to address three points:

- Is the existing knowledge close enough to explicit market needs?
Is the expected revenue or economic benefit to regional competitiveness worth making the effort to commercialise the research?

Is the R&D team capable and willing to deal with business clients (including culturally)?

Competence mapping is about understanding what type of knowledge and technology is available in each single laboratory and deciding whether these can be proposed to clients (local, national, and international). This exercise is always fruitful. It reveals a lot of unknown assets embedded into the R&D institutions. It also helps focus on real assets versus idealistic hopes. And finally, it helps select the individuals that are the most able to enter into commercial arrangements with industrial customers.

This system focuses on existing knowledge, existing know-how and potential developments. In other words, it does not concentrate on a portfolio of technologies (in the traditional analytical way) but on the “brains” available in R&D teams. This distinction is crucial.

It is very important to stress that competence mapping is not about detecting scientific excellence. It is about detecting market potential. During the competence mapping process, scientists are never evaluated per say.

Finally, carrying this mapping with a large number of departments located in different institutions allows to detect in which fields it could become possible to create mixed teams addressing complex needs. It should be noted that around the world, an increasing share of R&D is carried out by multidisciplinary teams. The competence mapping helps to establish such a system.

c. Analysing the market

Steps a and b are the most important parts of the process:

1. Analysing buy-in and a joint vision.
2. Understanding the quality of what can be promoted to customers.

Once these components are secured it is time to carefully analyse where customers are located. At the end of this market analysis, one should be able to select the most promising markets/clients and start testing the model.

What is really important in commercialisation of research is to:

- Focus on clients who have recurrent needs and are ready to enter into long term collaboration.
- Select customers who understand that a reasonable share of the added-value created during their collaboration with the R&D teams must remain and flourish in Tatarstan.

The market analysis will consist of contacting existing and potential private and public players in Tatarstan, throughout Russia and in a series of target countries to understand the needs of these potential clients. A confidential survey can be conducted towards most of the existing clients to find out how to improve the current offer of R&D services from Tatarstan’s R&D institutions. Markets should be understood in the largest sense. They should include public authorities, international organisations, and large companies or venture/seed funds.
This preliminary market analysis will help decision-makers, scientists, the government and the Joint Commercialisation Team focus on high potential clients with near-future needs.

d. Developing a business plan

One of the most efficient ways to implement this model is to make sure the parties (heads of research institutions and the Government of Tatarstan) consider the Joint Commercialisation Team as a joint project. Once this is granted, the stakeholders will easily decide on objectives, expected return-on-investment, necessary means to launch the programme, etc.

e. Recruiting a commercialisation team

Overall, commercialisation depends on the qualities of the commercialisation staff. The current limited success in commercialisation in Tatarstan is related to the lack of specific competencies of those in charge of such activities.

Recruitment is always a complex issue but some necessary criteria can help select the right team. The staff should have the following profile:

- Extensive private sector experience with sales.
- Experience speaking and working with scientists and technologists and involvement in existing business and science networks.
- Be well acquainted with different cultures (business versus scientific, Russian and foreign). This normally leads to recruiting staff from different origins and different countries (Russian and English speaking of course).
- If possible, a good knowledge of incubation of technology-based start-ups.
- Good managerial skills in order to make sure deals between scientific teams and customers are delivered in time and in quality for the benefit of all parties.
- The chief manager of the Joint Commercialisation Team must be able to focus on return-on-investment and manage the team in a way that it serves the entire R&D community.

It is absolutely essential that the Joint Commercialisation Team be managed as a private company with a public goal. The Joint Commercialisation Team should be kept free from the intervention of public authorities, apart from their role in the board of directors (that will include all R&D organisations and representatives of the government).

After two years of operation, an independent auditor should be able to analyse the economic impact of their work in terms of R&D contracts, joint ventures, start-ups and inward investments.

f. Starting with a pilot phase

Although the model is extremely attractive, it cannot be deployed overnight and not all research teams or heads of institutions will be ready to enter into such a project. A pilot phase (one or two years) can demonstrate the proof of concept and can attract more and more research teams into the programme through a demonstration effect. International experience shows that a reasonable approach is to start working with about 10 percent of
the R&D community. This holds especially true in a complex and large area such as Tatarstan.

The pilot phase should be managed as a full-fledged project but at a smaller scale. Beyond proving the validity of the concept is also allows to fine-tune the management and methodologies.

8.8 Strengthening Existing Support Institutions

Tatarstan has unique assets with respect to other Russian regions. It has already heavily invested in creating an innovation ecosystem and created some political momentum in this direction. Nevertheless, more efforts are required to turn the Republic into a knowledge-based economy. These efforts are not about creating more buildings or venture funds. The soft dimension of supporting innovation has not yet reached its level of maturity and compares weakly with more globally competitive regions.

One reason is that the existing support organisations mainly work with captive customers and are not confronted with competition which requires them to improve to survive. For instance, in the Sophia-Antipolis Science Park, in the South of France, tenants are pursued by competing technology parks from around the world. This obliges the Science Park to continuously monitor its performance and offer innovative solutions to keep its tenants and attract new ones. In addition, in Tatarstan, the personnel currently running the various support infrastructures are locals and do not have enough experience in best practices. Often they lack the necessary international networks to be able to deliver sound assistance to their customers.

Hence, there is a gap between the potential embedded in the Republic and the manner in which the innovation infrastructure operates.

8.8.1 Concept

To improve the effectiveness of the innovation system, the government can establish a series of tangible and measurable goals for the support infrastructure. As a starting point, the government and the management of existing support institutions will need to decide how to attract new staff with additional skills and how to ensure they become accepted leaders in transforming the economy.

8.8.2 Rationale for the Recommendation

The Republic of Tatarstan can capitalize on past innovation infrastructure investments. The Republic is host to unique but underexploited knowledge assets. There needs to be constructive interaction between the different components of the ecosystem and organisations must learn how to work together for common goals. Only the regional government can play a catalyst role and leverage the opportunities provided by the federal programmes that support technoparks, nanotechnology centres, business incubators and other elements of innovation infrastructure.
8.8.3 Expected Outputs

The improvement of the support infrastructure needs to be based on expected outputs encompassed in Tatarstan’s Innovation Strategy, as spelled out in chapter 7:

- A strong share of the GRP related to knowledge.
- A large number of technology-based companies.
- A transformation of the “heavy weight” and traditional firms into more innovation companies.
- A coherent and collaborative system in the R&D organisations.
- A strong and positive image attracting inward investors and funding streams.

8.8.4 Implementation Mechanism

This section looks at increased skills, ventures and better coordination between the stakeholders and investments in the fields of technology-based start-ups.

a. Increasing competencies

Tatarstan should attract additional human capital with experience with commercialisation of science, international ventures, hands-on consultancy, seed and post-seed venture management and support to entrepreneurship and incubation.

These individuals should have some solid understanding of the globalisation of the economy and the needs of investors, customers and large corporations. Because such people are not easy to find in general and even less in Tatarstan, the government will need to headhunt these people in Russia and the CIS. Attracting people from further afar would probably be too expensive and may create excessive salary discrepancies with the current staff.

In addition, the government should ensure that there is a system of capacity building for existing staff. A good starting point would be to deploy a programme of seminars on important themes such as consensus building, raising entrepreneurship culture, risk management, incubation techniques, hands-on consultancy, etc. Such seminars should be made mandatory - especially for the heads of existing support institutions. These seminars could be conducted every two months during the first year and every three months afterwards. They will be managed by experts and consultants external to Tatarstan, including foreigners.

The expected output, beyond increasing knowledge, will be to create an “innovation community” of people who better understand each other and can easily collaborate on various issues in full transparency.

b. Risk-taking ventures

Seed, post-seed and venture capital are about taking risks. The assumption is that only a very limited number of investments will be fruitful, but these successes will by far compensate for overall costs.
Tatarstan’s innovation ecosystem does not currently work like this. There are many reasons why. One factor is the lack of deal-flow of interesting ideas to invest in. If nothing more is done, the Government of Tatarstan should question the rationale behind the existence of the Innovation and Venture Fund and the various technology parks and incubators.

Many of the recommendations in this report are based on the premise that more can and should be done to promote entrepreneurship, technology upgrading in SMEs, to support innovative firms, to facilitate the creation of technology-based start-ups. Thus, a greater share of available funds should be dedicated to the promotion and support of these essential components of the innovation ecosystem.

The risk venturers should be proactive in visiting regularly all knowledge providers. More entrepreneurship competitions should be launched with better funding, etc. The creation of a recurrent deal-flow must be considered as a system in itself and regularity, recurrence and consistency are the key words to make the system work properly.

c. **Coordination between the stakeholders**

Stakeholders located in Tatarstan have a vested and joint interest to see the Republic succeed in becoming a well-known knowledge-based economy. This holds true regardless of where the sources of funding (i.e. the “paymasters”) are located.

Even if all stakeholders know each other reasonably well, this has not led to the development of community pursuing a common ambition beyond individual goals. The creation of this community needs a leadership and the government can play this role.

Coordination between stakeholders is a natural output of the consensus building process described in chapter 7. The expected outputs are many, but the most significant ones are:

- A more rational allocation of resources.
- An ability to “chase together” funds from external Federal and/or international partner.
- A possibility to become more convincing towards inward investors.
- A real monitoring of the strategy and an ability to fine-tune it when and if necessary.
- A possibility to share staff and create ad hoc teams for complex issues.

d. **Support to knowledge-based start-ups**

Knowledge-based start-ups are in deep need of tailor-made and high quality support. The right type of support can guarantee that start-ups that have the right potential are going to find their markets and grow. Without this support start-ups remain small and stop innovating after a while.

Additional resources can be allocated to the technology parks to enable them to contract the necessary external expertise needed to carry out the following process:

- Detect the most promising start-ups.
- Map and bundle their needs into tailor-made support programmes.
o Deliver the required support as an ongoing project to meet agreed targets in terms of clientele, growth, internationalisation, etc.

o Report back to the head of the support infrastructure.
Appendix
Appendix A – Universities and Research Institutes Included in the Survey and Comparator Organizations

R&D Institutes

<table>
<thead>
<tr>
<th>Name</th>
<th>Abbreviated name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Institute of Compressors</td>
<td>Compressors</td>
</tr>
<tr>
<td>Chemical Products Research Institute</td>
<td>Chemical Products</td>
</tr>
<tr>
<td>Tatar research Institute in agro-chemistry and soil studies of the Russian Academy of Agricultural Science</td>
<td>Tatar Agro-chem</td>
</tr>
<tr>
<td>Russian Research Institute of medical instruments</td>
<td>Russian Medical Instr.</td>
</tr>
<tr>
<td>Institute of organic and physical chemistry, of the Kazan Scientific Centre of the Russian Academy of Sciences</td>
<td>RAS Org &amp; Phys Chem</td>
</tr>
<tr>
<td>Kazan Physical Technical Institute, of the Kazan Scientific Center of the Russian Academy of Sciences</td>
<td>RAS Kazan Phys Tech</td>
</tr>
</tbody>
</table>

Comparators used in the analysis include:
- Fraunhofer: Germany, 2007
- VTT: Finland, 2007
- SRI: USA, 2007
- FEDIT: Spain, 2007
- US universities: includes 161 universities, 2007

Universities

<table>
<thead>
<tr>
<th>Name</th>
<th>Abbreviated name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almetyevskiy State Petrol Institute</td>
<td>Petrol Inst.</td>
<td>University</td>
</tr>
<tr>
<td>Kazan University of Medicine</td>
<td>KU Medicine</td>
<td>University</td>
</tr>
<tr>
<td>Kazan State Technical University</td>
<td>KTU</td>
<td>University</td>
</tr>
<tr>
<td>Institute of light manufacturing, fashion and design technology, part of the Kazan Technical University</td>
<td>KTU light manuf.</td>
<td>University Institute</td>
</tr>
<tr>
<td>Institute of polymers, Faculty TRRKM, part of the Kazan Technical University</td>
<td>KTU Polymers TRRKM</td>
<td>University Institute</td>
</tr>
<tr>
<td>Institute of polymers, Faculty HTPE, part of the Kazan Technical University</td>
<td>KTU Polymers HTPE</td>
<td>University Institute</td>
</tr>
<tr>
<td>Institute of informational technologies, part of the Kazan Technical University</td>
<td>KTU IT</td>
<td>University Institute</td>
</tr>
<tr>
<td>Research Techno-park ”Center of innovative activity”, belonging to Lenin Kazan University</td>
<td>Lenin KU</td>
<td>University Centre</td>
</tr>
</tbody>
</table>
Comparators used in the analysis include:

- “US Universities” include 161 universities from 2007
- “European Universities” include 76 universities from 22 European countries from 2006
Appendix B - Legislation

Relevant Legislation of the Republic of Tatarstan

Laws

Act on Science and Scientific Activity of 18-07-1998 #1661
Main purpose: establishes Tatar Academy of Science

Act on Innovation Activity in Republic of Tatarstan (Draft)
Main purpose: empowers Cabinet to guide and coordinate the innovations activity directly

Decrees

President of Tatarstan – Decree of 17-07-2009 #UP-293
Strategy of science and innovation activity

Regulations

Cabinet of Ministers – Regulation of 12-03-2004 #121
Republican program of developing innovation activity in the Republic of Tatarstan in 2004-2010

Cabinet of Ministers – Regulation of 15-12-2008 #875
Innovation Memorandum of Republic of Tatarstan for 2008-2010

Cabinet of Ministers – Regulation of 18-05-2009
Plan of actions for implementing the strategy of science and innovation activity

Resolutions

Cabinet of Ministers -- Resolution of 13-09-2007 #1454-R
Personal membership of workgroup for improving the innovation sphere or Republic of Tatarstan
Main purpose: names members of workgroup

Implication of Federal Legislation

Republican legislation by Constitution must be consistent with federal legislation. The limits to the republican own legal activity apply both to funding sources, means of funding and to a certain degree amounts. Federal budgetary policy has an important impact on how regions implement their fiscal and spending decisions. The principal acts that establish budgetary federalism are Budget Code, Public Procurement Act 94, and various Federal Special Purpose Programs (Federalnye Zlevye Programmy).

Budget and Tax Codes establishes the following principal starting points:

4. Taxes are split between federal, regional and local municipality budget in a fixed proportion. Each tax and duty has its own split ratio.
   a. Federal-only revenue: VAT, custom duties, corporate profit tax (20%)
b. Regional revenue sources: corporate profit tax (80%), personal income tax (70%), property tax (100%), transport tax (100%), mining taxes (rates vary).

5. Regional taxes include the following taxes only, and no region can levy any other taxes:
   a. Transportation tax;
   b. Gambling tax (presently irrelevant as organized gambling is confined to a few "special gambling zones" and banned elsewhere);
   c. Property tax.

6. Revenue attribution
   a. Region and local municipality are determined based on legal domicile of the taxpayer, rather than location of its head office or principal physical assets.
   b. Property is taxed at location rather than title (Hence: if a major national company with facilities in Tatarstan has a legal address in Moscow it will pay VAT and profit tax in Moscow; Tatarstan retains only property tax).

7. Budgetary monies of any level (federal, regional or municipal) can only be assigned to:
   a. Procurement of goods, work and services
   b. Budgetary investment in non-government entities
   c. Budget subsidies to legal entities, registered entrepreneurs and individuals for goods supplied, work and services performed
   d. Inter-budgetary transfers
   e. Payments, dues and aid to international organizations
   f. State, regional and municipal debt service payments
   g. Payments of tort remedies under court judgments

8. Tax breaks
   a. Regions may provide tax breaks that apply only to the share of tax collected in favour of the region.
   b. Regions may not provide tax breaks not defined in the Code.
   c. Regions may not provide breaks in excess of the amounts set forth in the Code for each tax break defined.

9. Budgetary spending
   a. Budget money can only be used in making payments for goods, services and assets defined in Budget Code.
   b. It is a crime to spend budget money assigned by a budget to one purpose for other purpose, no matter what the reason.

Public Procurement Act establishes that:
1. All public purchases in excess of a certain amount must be made available to public bidding via paper and electronic publication (electronic publication now mandated).
2. Public RFP may not require procurement of a specific good, brand or supplier unless required so by compatibility needs; instead, functions, features or performance must be described.
   a. Exceptions include purchase of creative services (e.g. performing artists); software is not eligible.
3. Among competing bids, choice must be made based on a pre-set formula with price and other measurable indicators bearing the highest minimum required weight.

In summer 2009 Small Science-Intensive Business Act 217 established that science and higher education institutions are allowed to co-found small businesses with researchers and contribute to its capital intellectual property they own. On further review, however, the

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60 It is important to note that international experience shows that tax breaks, according to international experience, do not show any positive effect as an instrument of stimulating entrepreneurship (Lerner 2009).
nuances of this Act appear to be in contradiction with Budget Code and thus the Act is still not working, with a little number of small companies established under it.

Federal Special Purpose Programs (Federalnye Zlelye Programmy) are extended budgetary spending programs financed both from federal and regional budgets in custom proportions. They are set and enforced by Russian Government resolutions in accordance with Budget law and can span several years. Their execution has been historically their weakest spot; in absence of single management authority, special process and numerous budget receivers they have been lagging behind on both disbursements and result. A good example is Electronic Russia that was started as ambitious plan of introducing e-government and narrowing digital divide but eventually spend only about 10%, with almost no tangible results in 9 years.

In 2009, federal government decided to cut from fiscal year 2010 subsidies to regions by the amount of tax breaks that regions provide. This effectively eliminated tax breaks as most regions run significant deficits. Due to many companies turning during the crisis from profitable to loss-making and sharp reduction in real estate prices, previously significant revenue streams shrank and subsidies along with personal income tax became a significant budgetary contribution. According to Tatarstan Chamber of Trade and Commerce, Tatarstan situation in 2010 may well cause to all regional tax breaks to be suspended or eliminated. The innovation companies in Tatarstan were eligible for a 5% profit tax rate (a maximum amount of a tax break allowed by law) but in 2010 the break is unlikely to survive. Prior to 2010, commodity tax was also in part regional and formed a substantive part of aggregate republican budget (i.e. republic and its municipalities combined) - approximately RUB 3 billion of RUB 102 billion (of which 88 billion republican), but this tax was also taken from the regions away as Budget Code was amended during the crisis.

Regional governments cannot establish funding that is not defined in federal law. This is a side effect of a federal Budget Code that details in Article 69 an exclusive list of types of spending that are allowed to be paid for from the budget. This list includes financing for execution of contracts for delivery of goods and services for state needs; social provision of residents; budget investments for legal entities that are not state or municipal enterprises; subsidies for legal entities (excluding subsidies to state and municipal organizations) which produce goods, works and services; provision of interbudget transfers; provision of payments to subjects of international law; service of state debts; execution of court acts.

According to article 85 of the Budget Code expenses of the regional budgets can be made based on regional laws or contracts (agreements) when executing of powers of the regions, or powers of the joint conduct of the federal level and regional level. According to the Federal Law № 184 dated 06.10.1999 (article 26.3) the powers of the joint conduct of the federal level and regional level include organization and implementation of regional scientific-technical and innovation programmes and projects (including research organizations of the regions). These powers are executed independently by the regions at the cost of regional budgets (excluding subventions from the federal budget).

At present, the principal opportunities for the regional legislation on innovations are as follows:

1. Regional governments have the following choice of funding instruments:
   a. Grants from budget for R&D and innovation projects.
   b. Subsidies compensating certain expenses already incurred by business.
c. Debt and equity financing via direct budget.

d. Tax breaks on profit tax and some other taxes (Tatarstan is the only region in Russia which uses all possible fiscal instruments for support of business).

e. Financing for indirect support of innovation sphere and innovative companies.

f. Stimulation of consumption of innovations via its own procurement and with an ability to target local innovators. New mechanism in this field is being developed by Perm Region in cooperation with Rusnano. This is the first example in Russia. Specialists of the Perm Region Government (Ministry of Industry, Innovations and Science, Ministry of Health Care, Ministry for Development of Entrepreneurship and Trade) and the Rusnano experts analysed federal and regional legislation and main features of the Perm Region economy and identified main consumers of nanotechnology production in the Region (state enterprises and large industrial companies). Based on this a system of actions for stimulation of demand for nanotechnology production has been developed. The system includes increasing of the volume of state and municipal procurement. Special attention will be paid to promotion of nanotechnology production to the regional market and creation of the infrastructure for demand stimulation. As state officials of the Perm Government say, nanotechnology production has better exploitation parameters but is more expensive. In the present system of state procurement (determined by the Federal Law № 94) price is the main factor. It does not allow nanotechnology production (or other types of innovative products and services) to be purchased by the regional and municipal authorities. At the same time exploitation cost of innovative products is many times less than that of conventional products and it is more beneficial for the authorities to buy innovative products (including nanotechnology products).

g. Setting up investment and business development companies and non-profits.

h. State borrowings.

i. State guarantees of the regional budget.

j. Budget loans.

k. Creation of non-budget funds.

l. Conditions of provision of premises that are in the property of regions.

m. Mechanisms of interaction between the main parts of the innovation sphere.

n. Influence on the enterprises owned (or partly owned) by regions.

o. Submission of legislative initiatives to the federal level.

p. Development agencies, including "state corporations" and other vehicles such as IVF were created during years 2003-2008 with the primary purpose to ease this restriction by earmarking a pool of money as quasi-public and making the payer a legal entity, rather than a budget.

q. Providing tax breaks and grants to fund "innovation activity" requires to produce a legal definition of "innovation" that allows only one interpretation and does not leave any room for interpretation to public officials (such as taxmen) to confirm or deny "innovative" status and right to get monetary benefits with it.
i. Given the ever-changing nature of innovation, this is a legal feat that might be completely impossible on the federal level. At present, legal experts from the Administration of President of Russian Federation attempt another try to define "innovation" in law, but it must be noted that a number of previous attempts were not successful.

ii. Before the definition of "innovation" is established on the federal level and the respective Federal Innovation Law approved Russian regions can prepare and approve their own Innovation Laws. These Laws have been already approved in some regions of Russia (the first one was Tomsk region in 1999). Based on this Law the regions can identify main directions and mechanisms for support of innovation activity.

iii. Example of Tomsk Region shows that existing federal legislation gives rather good opportunities for the regions to develop and implement their own legislative acts and programmes. In 2008 a new Law on Innovation Activity was approved. The Law defines organizational, legal and economic conditions and guarantees of innovation activity in Tomsk Region and regulates relations between subjects of innovative activity and state regional bodies. The Law is aimed at provision of integrated policy in the innovation sphere; creation of conditions for transition of the regional economy to innovative way of development; development of the innovation infrastructure; creation of mechanisms of innovative activity execution in the region. The Law also establishes terminology in the innovation sphere, main directions, goals and targets, mechanisms of regulation and support of innovation activity. Forms of state support of innovation activity established by this Law are the following:

1) tax benefits on profit tax (in the part of the tax paid to the regional budget) for organizations included to the List of Innovation-Active Organizations of Tomsk Region;

2) tax benefits on property tax for organizations included to the List of Innovation-Active Organizations of Tomsk Region;

3) investment tax credits;

4) state guarantees of Tomsk Region for ensuring of obligations of subjects of innovation activity;

5) subsidies from the regional budget for reimbursement of the part of expenses in connection with production (sales) of goods, execution of works and provision of services in the framework of investment projects implementation;

6) organizations that implement innovation projects on the territory of Tomsk Region and meet requirements to subjects of investment activity can get additional tax benefits and state guarantees.


One of the ways to avoid these limitations is to set an SPV such as IVF that can, with limits, perform tasks or use funding sources not available to government bodies.
Appendix C - Innovation Support Infrastructure in the Republic of Tatarstan

**Technoparks and industrial parks:**

1. JSC «Innovation and Production Technopark «IDEA»
2. Technopolis «Khimgrad»
4. JSC «Kamskiy Industrial Park «Master»
7. «Innovation and Production Technopark «IDEA – Yugo-Vostok»
8. Scientific and Production Non-commercial Partnership «Technopark Prikam’ya»
9. JSC «Innovation and Production Park «Vostok»
10. Innovation and Technology Centre of Kazan Research Institute of Aviation Technology
11. Scientific and Technology Park «Centre of Innovative Activity of Kazan State University»
12. Scientific and Technology Park «Foresight» of Kazan State Technological University
13. Scientific and Technology Park of Kazan State Technical University n.a. A.N. Tupolev
14. Park in the sphere of High Technologies (on the site of “Khimgrad”) 15. Information Technologies Park (on the site of the Technopark “Idea”)

**Business incubators:**

1. Business Incubator of Kazan State Technical University n.a. A.N. Tupolev
2. Business Incubator «Sviyaga» (on the basis of Technopark “Idea”)
3. «Povolzhskiy Innovation and Technology Centre of Light Industry»
4. Business Incubator of Naberezhnye Chelny
5. Business Incubator of Elabuga
6. Business Incubator of Chistopol
7. Business Incubator of Almet’evsk («Impuls» - municipal property)

**City Business Incubator of Chistopol’**

The business incubator was created to support the existing innovation complex of Chistopol’ represented by the watchmaking plant and the technopark “Vostok” and a branch of Kazan State Technical University n.a. A.N. Tupolev.

The application on the creation of the incubator prepared by Tatarstan Government won in the competition of the RF Ministry of Economic Development in 2007. Federal and regional budgets allocated 30,12 mln. Roubles for this (50/50). Construction and installation works in the building of the business incubator were finished in 2008 and the incubator started operation in December 2008.

Managing company of the incubator is Chistopol Fund of Support of Small Entrepreneurship - director of the Fund is the director of the incubator. The incubator is semi-industrial – it has premises both for offices and for manufacturing. Square of the incubator is 2000 m², 130 work places, 40 small companies can be housed (which is good for a city with population of 62 000 people). Aim of the incubator – support and development of small enterprises on the
Advancing Innovation in the Republic of Tatarstan

territory of Chistopol on the early stages of their activity by providing premises for rent and consulting, account, legal and other services.

At present the incubator provides the following services: providing premises and office equipment for rent; postal and secretarial services; consulting services and training on taxation, accounting, crediting, legal issues, business development of enterprises, business planning; access to information bases; advertising and printing services; assistance in search of customers and suppliers; organizing participation of residents in exhibitions held by the Tatarstan Ministry of Industry and others. The price of rent at the incubator is two times less than in the city. The consulting services are provided for the residents of the incubator for free, but can be provided on a contractual basis for other enterprises. There is one serious disadvantage of the incubator – it is located quite far from the city centre and for some enterprises it is not convenient.

The equipment provided for the residents: work places with furniture, computers, phones, access to the Internet; equipment for collective use - meeting room for lectures and negotiations, a room with a scanner, a colour printer and a plotter. There is also a small laboratory with measuring equipment (part of the equipment was provided by the watch plant).

Conditions for becoming a resident of the incubator:
- the enterprises should be founded not more than one year before applying to the competition for selection of residents;
- the enterprise should submit a well prepared business plan to the competition;
- fields of activity of the enterprises are in line with requirements of the RF Ministry of Economic Development;
- Number of employees of the enterprise cannot exceed 60.

The maximum term for being the resident of the incubator is 3 years. This period is considered by the RF Ministry of Economic Development as sufficient for the small enterprise to grow and become more sustainable.

Administrative staff of the incubator is 8 people: director, deputy director, accountant, system administrator, programming specialist. Some services are outsourced.

The incubator does not receive any financial from the Committee for Support of Entrepreneurship of Tatarstan. This incubator is considered as a pilot project of creation of fully independent incubator. The problem for the incubator is that they have limitations established by the RF Ministry of Economic Development concerning the size of residents (only small companies with number of employees up to 60) and their fields of activity (they cannot provide premises for trade, financial and insurance companies although it would give additional money to support industrial and innovative companies). There are also limitations of the rent prices (40% of the city rent price for the first year residents – at present all residents). The incubator is located far from the city centre therefore a lot of enterprises do not want to become residents because they need considerable flow of people through the office.

Thus the income comes from rent is not enough for covering all expenses but the managing company provides services for other enterprises of the city and receives additional financing.
The watch plant “Vostok” and enterprises of the technopark “Vostok” use the incubator as office premises for development of meters and then produce them at the technopark. The incubator can be considered as a mini-industrial park for Chistopol branch of Kazan State Technical University and for the watch plant – it cooperates with both and all of them are on 100 meter patch. The incubator has an Agreement on cooperation with Chistopol branch of Kazan State Technical University. It was agreed between them that the incubator will provide premises for groups of students which work on innovative projects. The incubator works with students in order to develop entrepreneurial mentality and explain them how to create and manage a company and receive support from various sources. It is a very good basis for creating small innovative companies and commercialization of their ideas. This is also an example of a very close link between education, industry and infrastructure for support of entrepreneurship.

The incubator tried to work with the Investment and Venture Fund of Tatarstan but did not succeed as the Fund do not want to invest in high risk projects and conditions for receiving investments are not acceptable for the enterprises. In addition the Fund does not work with potential projects to prepare them for investments.

At present 15 residents are located at the incubator (25 offices are still empty). The director hopes that 2/3 of premises will be occupied by the New Year. They work in the following fields: development and production of electric meters, casting moulds, plastic articles, and energy saving devices; development of technologies for production of big clocks and devices; software; IT; accounting services; processing of agricultural production.

About a half of all residents are innovative enterprises:

- An initiative group of designers from other enterprises which works on the development and production of timers for city lighting system (the timers are already delivered to Tatenergo). The group is planning to establish a company, organize full scale production and is looking for investments or grants to buy equipment;
- Russian Watches Ltd. (development and update of mechanisms for wrist watches – it works for the watch plant);
- Vostok - Amphibia Ltd. (development and design of casting moulds and other components for car industry – for AvtoVAZ and other enterprises);
- Galvanika Ltd. (development and application of new types of galvanic coatings);
- Vostok – Sky Ltd. (development and design of electric meters, the company is organized by graduates from Chistopol branch of Kazan State Technical University and is competitor for Betar – enterprise at technopark “Vostok”);
- Vostok – Monolit Ltd. (design of cases for meters and other components, production is delivered to many enterprises);
- Betar Ltd. (development and design of devices and systems for energy resources saving);
- Scientific and Technological Centre Ltd. (group of developers and designers of the watch plant will be possibly separated from the plant in order to develop technologies for production of big clocks and devices).
Kama Industrial Park “Master” (KIP “Master”)

The KIP “Master” represents an example of effective functioning of business support infrastructure in motor industry. Its activity is aimed to development of modern and economically effective enterprises for manufacturing of automobile components for JSC “KAMAZ”.

The idea of creation of the industrial park was proposed by the General Director of KAMAZ. The goals of creation of the Park were the following:
- to get rid of non-core assets of KAMAZ;
- to stop illegal production of spares for KAMAZ trucks (a lot of small companies in Naberezhnye Chelny had been producing spares and selling them as KAMAZ spares – it damaged KAMAZ image);
- to make illegal producers of spares “visible” for tax authorities;
- to create additional jobs in the city;
- to get financial support and tax benefits from Tatarstan Government (at present the Park has benefits for property tax and land tax);
- to establish favourable conditions for creation of modern and efficient production enterprises and for cooperation between large and small companies.

The Park was founded in 2004 in the empty premises of one of the KAMAZ plants (Remdiesel). Tatarstan paid 150 mln. Roubles to KAMAZ for these premises ($ – 36 000 m²). At present the charter capital of the Park is 480 mln. Roubles: the first emission was 300 mln. Roubles and the second emission was 180 mln. Roubles. Tatarstan (represented by Technopark “Idea”) and KAMAZ have equal shares in the Park charter capital – 50/50.

The main advantages for the tenants of KIP “Master”:
- KAMAZ considers the Park tenants as the privileged suppliers (in case of same quality and price with competitors the Park tenants always receive contracts from KAMAZ);
- KAMAZ provides feedstock and technical documentation for orders to the Park enterprises;
- KAMAZ helps the tenants to promote their production through the KAMAZ distribution channels;
- Park provides convenient offices and industrial premises for the tenants;
- Rent price 20% lower than in Naberezhnye Chelny and other Tatarstan cities;
- Tatarstan provided deferment of rent payments for 4 months during the crisis;
- Support from Tatarstan Government (leasing grants – provided for 10 enterprises (in addition - deferment of leasing payments), favourable crediting, etc.);
- A branch of the “Leasing company of Small Business of the Republic of Tatarstan” was established at the Park;
- Support in organizing participation of the enterprises in exhibitions, Venture Fairs, presentations of economic potential of Tatarstan (through the Exhibition Centre “Kama” and the Committee for Support of Small and Medium Business);
- State organizations of Tatarstan (Ministry of Industry, Committee for Support of Small and Medium Business, Centre of Subcontracting) provide information about possible clients for the Park tenants.
- Services provided by the Park;
- Assistance in creation and development of business;
- Better opportunities on the secondary market of spares;
- Social and economic infrastructure (leasing company, bank, customs office, etc.).
- Opportunities for cooperation with other enterprises;
- Availability of labour resources with experience of work in automobile industry;

At present the total square of the Park premises is 138 000 m²: industrial premises - 107 800 m², offices and other premises - 21 600 m². Total number of enterprises is 137 which employ 1362 people. Total turnover of all enterprises is 4 306 mln. Roubles (in 2008 it was 5750 mln. Roubles). 50% of the enterprises are oriented at delivery of production for KAMAZ and 50% - for other enterprises. KAMAZ monitors technological processes and quality of production of its suppliers at the Park.

Innovative enterprises of the Park:
Aton Impulse Ltd. – development and production of amphibious automobiles;
Tissan Ltd. – production of polymer tubes, production of new corrugated tubes will be established in cooperation with company Leoni (Germany);
Technomet Ltd. – production of non-stick coatings for moulding;
Integral-Avomatika Ltd. – development and production of control systems of technological processes.

Services provided by the Park for the tenants:
- Internet, telephone communications, parking, canteen, medical provision;
- Customs warehouse, customs broker, logistic terminal, temporary storage warehouse, security;
- Assistance in preparation of business plans;
- Legal, bank and accounting services.

Main indicators of the Park activity:
- amount of rent payments;
- percentage of premises occupied (98% in 2008).

In 2007 the Park won a competition of the Ministry of Economic Development of the Russian Federation. The Ministry made a decision to support the third stage of the Park development and allocate 490 321,581 Roubles. The volume of subsidies from Tatarstan Government was the same. Thus the total financial support of this stage was 980 643,163 Roubles. This stage will include 3 office buildings and a production building. KIP “Master” has already received applications for 30% of these premises. The new buildings will be opened in April 2010. They will include a customs terminal, 3 customs brokers, a warehouse for temporary storage, logistic terminal. It is planned to create business units with production equipment at the premises of the Park and invite enterprises to rent this equipment and premises.

Main results of the Park creation:
1. Sustainable infrastructure ensuring creation and development of enterprises;
2. One more important element of state policy of support of small and medium business has been created in Tatarstan;
3. Increasing of economic potential of the region and creation of bigger added value;
4. Tax payments to the budgets of all levels;
5. Cost optimization of spares production;
6. Reduction of truck components cost;
7. Concentration of investment resources in key spheres;
8. Approbation of technical solutions while manufacturing of new production;
“Vostok” Watch Makers Inc. and JSC “Innovation and Production Technopark “Vostok” (Chistopol’)

The complex of the plant and the technopark is an efficient model of reorganization of a declining enterprise in order to find new niches on the market and use available assets.

The company story started in 1942 when one of the Moscow watch-making plants was evacuated from Moscow to Chistopol. Defence equipment was the only company output during war years, but as soon as the war was over the plant started making mechanical wrist watches. The plant never backed away completely from the military past - the company was appointed an official supplier of watches for the Defence Department of the Soviet Union in 1965. This year marks the creation of the world-famous "Komandirskie" ("Commander") watch. Military watch grew very popular even with people who were unaware which end of the gun bullet comes off, mainly due to high precision, excessive reliability and durability. The appearance of the watch also contributes to its appeal - functional and clear-cut design invoked the feeling of belonging to the tough world of combat professional.

In 2004 the plant management system was certified according to the Russian and international standards ISO 9001-2001 and IQ NET.

In 2005 the plant became a member of the Russian Association “Technopark”. The Association facilitates development of technoparks, innovation centres and business incubators in Russia. At present the plant “Vostok” is the only producer of watches on the territory of former USSR. Since 1995 the plant started creation of a network of enterprises in its premises in order to employ people dismissing from the plant because of production decline. Now it is a technopark with 48 small enterprises. Number of employees on the site is 3200 (the watch plant - about 1700, technopark – about 1500).

Fields of activity of the technopark enterprises:
- precision mechanics (production of components for wrist watches, alarm clocks, clock mechanisms with additional functions);
- production of time devices, energy resources saving, components for AvtoVAZ, military production;
- production of instruments, machines;
- wood processing, transportation and building;
- auxiliary services.

It allowed the plant to become one of the 5 biggest producers of mechanical watches in the world having full production cycle. The technopark can also rent out its premises at a lower price than in the city.

In 1987 a branch of Kazan State Technical University was established for training of specialists for the plant. The plant provided financial resources and premises for creation of the branch. The branch teaches 700 students. Specialists of the plant drive lectures for students and the students get practical training at the plant. On the basis of R&D of graduates from the branch the plant organized production of new water and gas meters and watch mechanisms. About 50% of the technopark employees are graduates of the branch:
among them 13 are directors of small enterprises, 3 are deputy directors of small enterprises.

The plant gained experience through development of the army watch was the foundation of the next special watch - "Amphibian". This timepiece in stainless-steel case endured the depth of 2000 meters - kind of a wrist submarine. Success of the professional watches determined the company's present philosophy - to create mechanical watches maintaining precise timekeeping at any temperature, in any environment, surviving heavy pressure and blows.

In 1996 the plant started a partnership with US "Capital Trading" company aiming to create a new generation timepiece. The synergy of traditional "Vostok" austere design and the world's latest watch-marking trends is a cornerstone of this new project launched into the oncoming century. “Vostok” introduces innovative technologies, new styles of watches; one generation of watchmakers follows another.

Every year the plant sells about 1 mln. of mechanical and quartz wristwatches, car and ship clocks, alarm clocks, wall clocks, floor clocks, table clocks, tower clocks, mechanisms for wristwatches.

Besides the main production the plant executes the following works for precision instrument making enterprises:

- Automatic turn on Tornos (Switzerland) machine tools;
- Milling radial rack- wheels on Vali-90, Shtrauzak (Switzerland) machine tools;
- Milling face of teeth on S-86 machine tools;
- Manufacturing of clockwork springs from special precision steel;
- Manufacturing of all kinds of equipment for exact instrument making (forms, stamps, the tool etc.);
- Moulding of glasses on pressure;
- Manufacturing of a flat silicate glass;
- Manufacturing of plastic products under pressure on Demag, Arburg (Germany), DE 33-30 equipment;
- Manufacturing of exact technical stones from a technical ruby;
- All kinds of galvanic and vacuum covering;
- Moulding under pressure of precision rubber products;
- Manufacturing of spare parts for the precision equipment;
- Manufacturing of custom face design watch and clocks.

The plant conducts innovative activity on the basis of R&D results obtained in Soviet times and after by the plant independently. The only research institute in the USSR watch industry closed 20 years ago therefore “Vostok” was forced to develop new models of watches and other devices by itself. The plant has developed 10 new models of watches and 4 are under development at present. There has been no support provided from federal or Tatarstan sources.

Some attempts were made to start cooperation with Chistopol branch of Kazan State Technical University but the scientists were not willing to work with the plant because of the following reasons:

- the scientists speak first about money and not results which is not acceptable for industry;
- the scientists are not ready to meet requirements of the plant in terms of quality and period of work.

**Industrial Special Economic Zone “Elabuga”**

Creation of federal service of the SEZ “Elabuga” is one of the basic measures of Tatarstan industrial policy aimed at realization of up-to-date methodology of interaction of the state and business. The SEZ “Elabuga” provides a set of conditions for investors who intend to establish new production in Russia. There is no R&D or innovation activity conducted by the SEZ residents as the residents are aimed only at production based on ready technologies. Some cooperation is conducted with Russian and foreign research and educational organizations for training of specialists and solving technological problems. The SEZ administration does not provide innovation related services.

The SEZ was created in 2005 by the Decree of the Russian Government. The SEZ “Elabuga” located in one of the biggest industrial centers of Russia and provides:
- Attractive tax and customs preferences;
- Developed industrial infrastructure;
- Decreased bureaucracy;
- Strong governmental support;
- Low cost land plots;
- Proven track record - many global companies have already established production in the SEZ.

Governmental donation for SEZ will be up to 650 mln. USD until 2011. 300 mln. USD has already been invested to industrial infrastructure, customs infrastructure, business infrastructure. By 2010 about 9 bln. Roubles from state sources have been used and more than 10 bln. Roubles of investments attracted.

Territory of the SEZ is “free customs zone”. Free customs regime means that goods and equipment delivered from foreign countries to Russia are not eligible to VAT (there are exceptions for excise goods) and import duties.

Investment incentives and preferences

<table>
<thead>
<tr>
<th>Tax</th>
<th>Tax rate for Non-residents</th>
<th>Tax rate for SEZ Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit tax</td>
<td>20.0%</td>
<td>15.5%</td>
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<tr>
<td>Property tax</td>
<td>2.2%</td>
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<tr>
<td>Land tax</td>
<td>1.5%</td>
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</tr>
<tr>
<td>Transport tax</td>
<td>0.3-3.8 USD*</td>
<td>0 USD</td>
</tr>
</tbody>
</table>

* From 0.3 USD to 3.8 USD depending on horse power

Low cost land plot rent and purchase are available for the residents:
Land plot rent: USD 0.05 per m2 per year
Land Purchase: USD 0.12 per m2

Industrial infrastructure of the SEZ includes:
- Inner-site roads
- Railway
- Gas
- Electricity
- Heating
- Water
- Sewerage
- Storm sewage
- Drainage
- IP Phone
- High-speed Internet
- Full access to all the necessary utilities

Customs infrastructure:
- Checkpoint with 4 driving lanes (entrance and exit)
- Parking for 100 trucks
- Parking for 50 trucks
- Unit of cargo and vehicle profound audit
- Unit of container profound audit
- Railway
- Railway terminal
- Container terminal (1 500 containers, 40 pound each)

Business infrastructure:
- Administrative business centre (total area – 11.000 m2) with all the necessary services needed for everyday work
- Single Window System - all necessary governmental agencies in one place
- Banks
- Conference halls
- Exhibition hall
- Offices
- Post office
- Meeting rooms
- Public health office
- Gym
- Canteen

SEZ residents

At the moment 9 residents are registered in the SEZ with the total number of employees more than 4000:
1. Limited Society "Sollers - Elabuga" - Production of “Fiat Ducato” cars;
2. Closed joint-stock company "Sollers - ISUZU" - production of ISUZU trucks;
3. Joint-Stock Company "Polymatiz" - production of nonwoven polymeric articles;
4. Limited Society "Rockwool-Volga" - manufacture of mineral-wool products;
5. Joint-Stock Company "Engineering Equipment Factory" - production of heat pumps and climate system components;

6. Limited Society "Septal" - production of equipment components for small and local sewer systems;

7. Limited Society "P-D Tatneft - Elabuga glass fiber" - glass fibres production and products on its basis;


On the territory of the SEZ an industrial park “Sinergiya” for production of components for automobile industry is being created. The project on the park creation is aimed at development of automobile components industry and enhancement of the SEZ attractiveness for SMEs.

There can be problems with highly qualified staff for the SEZ residents as the SEZ is located quite far from Kazan (about 300 km) but the residents try to solve this problem (for example company “Sollers” is planning to create its own academy). In addition the SEZ Administration is working with the Ministry of Education and Science in order to organize training of specialists needed for the SEZ residents.

Other problems for SEZ residents:
- high investment barrier according to the federal requirements (10 mln. Euros) – the SEZ Administration is trying to reduce the level to 3 mln. Euros;
- access to low cost loans – the SEZ Administration is trying to organize cooperation with banks to solve this problem.

In the SEZ Administration there are no divisions providing consulting services for residents in the field of marketing, promotion of products to the market, innovative activity.

_Innovation and Technology Centre of JSC “Kazan Research Institute of Aviation Technology” (ITC KNIAT)_

The ITC is a good example of reorganization of a research institute into the provider of premises and support services for innovative enterprises in order to receive additional revenues and create a basis for commercialization of the Institute R&D.

The Institute if owned by the Republic of Tatarstan but before it was a branch of the Moscow Aviation Institute. Not more than 2% of budget comes from RT funding. KNIAT conducts no “free” research any more, only work with R&D orders (growth of 15% per annum before the crisis).

In 1990s KNIAT faced problems with state financing. In order to use free premises the ITC was created in the framework of a pilot programme of the FASIE, RF Ministry of Education and Science, RF Ministry of Industry and Trade and the Russian Foundation of Basic
Research. Management of the Institute and the ITC invited innovative enterprises to become residents of the ITC. Thus the Centre is a source of revenue for the Institute (40% of the revenues of the Institute) but the ITC provides also some consulting support to its residents. The Centre is ISO certified thanks to support of the FASIE. Director of the ITC is a representative of the FASIE in Tatarstan and he provides good assistance to the Centre residents in applying for the FASIE support. For example, a company “ELEPS” located at the ITC received 4 FASIE grants.

ITC owns 19 000 sq.m. There are about 50 residents at the Centre with the total number of employees about 680. 85% of the residents work in the R&D and innovation sphere which is the highest proportion among Tatarstan technoparks and business incubators. Volume of shipped production by the residents in 2008 was 360 mln. Roubles.
### Appendix D - Public Venture Capital Fund Comparison

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Description</th>
<th>Similarities with IVF</th>
<th>Limitations of comparison with IVF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Russian Venture Company</strong></td>
<td>RVC is a federal venture and start-up development institution, founded in 2007. It has RUB 30 billion under management and invests in 6 venture funds. In 2009 new leadership decided to expand RVC’s investments into direct co-investments at seed stage and in developing start-up infrastructure (networking, education etc.)</td>
<td>Mixed type investor; advanced business history</td>
<td>Federal level; for-profit entity; has not performed any direct investments yet; does not issue grants; long-term results of new strategy directions are unclear and could be negative if executed inappropriately.</td>
</tr>
<tr>
<td><strong>RusNano</strong></td>
<td>RusNano is a state corporation (a type of a state-owned non-profit organization) with RUB 130 billion under management. Originally set up in 2008 to develop nanotechnology industry in Russia, currently focuses around later stage direct co-investments in companies demonstrating relevance to nanotechnology. Occasionally also invests in venture funds.</td>
<td>Mixed type investor; advanced business history; can do grants; not-for-profit entity</td>
<td>Federal level; nanotechnology only; no small projects; strategy and future unclear.</td>
</tr>
<tr>
<td><strong>Moscow Venture company</strong></td>
<td>Moscow Venture Company is an investment vehicle of the Moscow City Government with USD60 million under management. Can invest both directly and via venture funds. Set to start investing in 2010.</td>
<td>Mixed type investor (both VC funds and direct equity investments); regional IV</td>
<td>For-profit entity; operations not started yet</td>
</tr>
<tr>
<td><strong>SITRA (Finland)</strong></td>
<td>SITRA is a not-for-profit fund of the Finnish government (reporting to Parliament), in operation since 1968. As of 2009, SITRA’s assets were EUR 687 million. SITRA is involved in all types of investing, including R&amp;D grant activity, direct investments and investing in venture funds. Most but not all investment of SITRA are innovation-oriented.</td>
<td>Not-for-profit entity; mixed type investor.</td>
<td>Operates in a less “good governance” environment and thus has less control procedures.</td>
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<tr>
<td><strong>Yozma (Israel)</strong></td>
<td>Yozma was an Israeli government venture promotion program in operation during 1992-1998. USD 80 million were invested in 10 venture funds and USD 20 million invested directly at Yozma’s management discretion. The program is credited for triggering the development of the high-tech industry and was closed after being deemed successful.</td>
<td>Mixed type investor.</td>
<td>For-profit entity; no grants; operated relatively long ago. Operated in the country with the highest concentration of engineers and scientist in the world and extensive global business and scientific linkages.</td>
</tr>
<tr>
<td><strong>Calpers (US)</strong></td>
<td>Pension fund of Californian state employees, one of the largest venture investors in the nation. Invested in funds of over 40 venture firms since 1982. Commits 5% of its capital to alternative investments (VC and PE).</td>
<td>Invests public funds in innovation-oriented investments.</td>
<td>For-profit entity; only invests in funds; investment procedures are currently under intensive scrutiny, corruption and political kickbacks suspected.</td>
</tr>
</tbody>
</table>