The Difficult Priority: Building the Latvian Innovation System

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Introduction

The Motivation to 'catch up with the West' has been driving the East European countries ever since the decline of socialism. Efforts to boost the development of national innovation systems, and strengthen the knowledge base of their economies can be observed across the region. According to neoclassical growth theory, the less developed countries would eventually catch up with the leading economies by adopting knowledge and technological achievements from the latter and by yielding higher returns from investments. If this thesis does not hold true anymore, as is being argued in scholarly literature (e.g. Hamalainen, 2007), how does the catching-up process take place in countries that shape their development policies according to the Western models? How much is development based on broader knowledge creation and application practices, and how does it impact social cohesion and equality in the catching-up countries? By looking at the case of Latvia as one of the new EU member states, this report will attempt to highlight the policy context and rhetoric, the efforts taken to build an innovation system and the obstacles that render this task a difficult one. The extent to which the rhetoric and the actions aim at social cohesion and inclusion will also be addressed.

Latvia's development portrait

Latvia has seen rapid development for the most part of the past decade (GDP growth from 7.2% in 2003 to 10.2% in 2007). The country has been praised for rigorous economic reforms, giving way to forecasts that it would reach the EU average economic development level in ten, twenty or thirty years, depending on source (Investment and Development Agency of Latvia 2007; Rimsevics 2006). Latvia, if not in the group of "high-performing 7", as defined by the World Bank (2008)[1], is among the Central and East European (CEE) countries that as a whole are seen to be converging with the EU 15. The GDP per capita (in purchasing power parity) has reached 58% of the average EU level in 2007 from 36% in 1999 (Eurostat). The Latvian economy is dominated by the service sector, which constitutes 75% of economic activities. In particular, trade, construction and real estate have contributed most to the booming development of recent years, accounting for more than half of the GDP growth in 2007 (Ministry of Economics, 2008: 9). Manufacturing and commodity production sectors have been developing less rapidly and overall constitute only 11% of the economic structure (Ministry of Economics, 2008: 25).

However, recently the inflation rate has also been rising as high as 18% (in 2008), rendering the growth more relative and decreasing Latvia's competitiveness on the global level[2]. The last months of 2008 brought a "hard landing" to this fast growth, and the GDP is forecasted to shrink for at least 12% in 2009 (Diena, 13th May 2009). Furthermore, the past years' growth has not equally benefited all groups of society. The Gini index has grown from 0.3 in 1996 to 0.39 in 2006, reaching the highest level among the EU countries[3]. Twenty-three percent of people were living below the relative poverty level[4] in 2006 (compared to 16% in 2003,

[1] World Bank report "Innovation, Inclusion and Integration" by Mitra (2008) has named the Czech Republic, Estonia, Hungary, Poland, Slovak Republic, Slovenia, and Turkey as "the high-performing 7" among the East European countries.
[2] Ketels "State of the Region Report: Sustaining Growth at the Top of Europe", 2008: 68.
[3] Ministry of Welfare "National Strategy Report on Social Protection and Social Inclusion 2008-2010", 2008:8.
[4] Estimated by Eurostat methodology as 60% of the money that is available to the average consumer, 88 lats per month in Latvia, about 120 euros in 2006.

UNDP, 2005: 14) – again the highest figure in EU member states[5]. However, the budget share for social protection and inclusion has constantly been among the lowest in the EU (Kilis et al, 2008: 24).

Much like in the rest of CEE, it has become a dominant view that increasing R&D investments is the key to economic growth. Contrary to this view, statistics show that Latvia and Romania are two European countries where there has been a negative correlation between GDP growth and GERD investments in 1990-2002 (Radosevic, 2005: 30), i.e. the economic growth had no relation to the amount of R&D investments. Indeed, throughout the 1990s, GERD was very low, oscillating between 0.36 and 0.44% (Eurostat). Only in the past 3-4 years the government has significantly increased the funds, which was made possible by the overall economic growth and increased budget spending across all sectors of economy: GERD grew from 0.39% in 2003 to 0.63% in 2007. That leaves Latvia well below the EU27 average of 1.83%.[6]

In terms of sources of funding, the government is still the chief investor, with 55% of the R&D funding in 2007 coming from the state budget. Business sector investment has been growing steadily: in 2001, only 19% of R&D investment came from the business sector, while in 2007 it was already 36.5%. That is a positive trend, even if in real numbers the increase is only from 5.5 million to 32 million euro (Central Statistics Bureau of Latvia). The majority (60%) of researchers work in the public sector and only 14% - in business R&D. In relation to that, Latvia ranks very low with respect to the availability of scientists and engineers (97th position in the world, according to the Global Competitiveness Report, in Ketels & Solvell, 2006: 40). The age-structure of researchers does not promise future alleviation of the availability problem: only 8% of all staff in universities are 30 years old or younger, while fifty-one per cent are over 50 years old.

On the **Global Competitiveness Index**, Latvia ranks in the 54th place in 2008-2009, down from 45th place in 2007-2008. The country shows especially weak performance in innovation and sophistication factors, in this category ranking only in the 84th position (Porter and Schwab, 2008). The overall rating is improved by scoring much higher in higher education and training (33rd) and labor market efficiency (32nd) categories. Similarly, the European Innovation Scoreboard has been ranking Latvia as one of the weakest performers in the EU over the past couple of years. Again, even if the human resource factor is measured as advantageous to Latvia's competitiveness, the proportion of innovative firms, intellectual property rights generated, and collaboration and entrepreneurial efforts are low (Pro-Inno Europe 2008).

Only around 18% of all the enterprises introduced some innovation in their work in 2003-2005 (compared to 45% in the EU)[7]. **Innovative activities** are mostly concentrated in large enterprises and in the capital, while SMEs, especially outside Riga, hardly invest in innovation. Moreover, the majority of the investments in innovations were made for buying new technological equipment and machinery, and only a small share in actual R&D work (70 million vs. 7 million in 2003) (Adamsone et al, 2008: 10; Beverte, 2006: 21). Latvian businesses still compete largely on low production and labor costs. Production is dominated by low and medium-tech industries, whereas the share of high technology products is only 3-4% and their share in the export structure does not exceed 6%, in the EU being as high as 30% (Ministry of Economics).

[5] Ministry of Welfare "National Report 2008-2010", 2008: 25.
[6] Eurostat, www.ec.europa.eu/eurostat, accessed 27.01.2009.
[7] Central Statistics Bureau, www.csb.gov.lv, visited on 29 January 2009.

Science, Technology and Innovation Policy

While the 1990s were characterized by sweeping reforms of economy in Eastern Europe, the S&T systems were addressed less vigorously (Tiits et al, 2008: 74). The main changes were granting autonomy to higher education institutions and reorganizing research funding and institutional structure. In 1992, the **Latvian Academy of Science,** which served as the main hub of scientific research activities in the Soviet Latvia, just like similar institutions in similar grandiose buildings in the rest of the Union republics, was now reorganized into "an association of prominent scientists" (Balodis, 2008: 13). Research units under the Academy of Science were reformed either as independent research institutes or integrated within universities. By now, 20 research institutes have been incorporated in universities. Yet, there are still 12 State research institutes and 14 research institutes that work under universities but are partly independent (ibid: 17-18).

From 1990, the research funding system was profoundly reorganized. The new **Latvian Council of Science** was now entrusted with administrating research grants. Funding was now allocated by issuing grants to the institutes with the best proposals. Base-line funding for infrastructure and salaries was abandoned. The new system has been praised for its democratic nature and decentralization, since elected science community representatives were now to decide about research grants, based entirely on the quality of the proposals (Kristapsons et al, 2003). Yet, as a local scientist observes, in fact the coordination of the Latvian S&T system had shifted from one extreme to another: while under the Soviet rule there was complete centralization and research institutes were entirely under the control of the state, dependant on the state command, after independence researchers became formally completely independent, while in fact their survival now depended on acquiring the scarce grant funding.

With regard to S&T policy, the **National Concept of Research and Development,** approved by national government in 1998, was one of the earliest policy documents to announce the S&T as the key to development and therefore the importance of strengthening R&D. Yet, significant boost to S&T did not come until 2005, when a new law **"On Research Activity"** was passed. Firstly, it stipulated an annual increase of at least 0.15% of GDP in government's R&D spending for subsequent years (Adamsone et al, 23). Secondly, base-line funding for research institutes was re-introduced with a new law. Thirdly, it called for prioritization of S&T disciplines for more efficient use of government investments. Subsequently, the following priority fields were approved by the government: IT, organic chemistry and biomedicine, material sciences, forestry and wood processing technologies, energy technologies, medicine, Baltic Sea and environment, agro biotechnology, Letonics (Latvian history, culture, language studies). To boost these disciplines, nine National Research Programs were created in 2006 (Balodis, 2008: 17).

Parallel to reorganizations in the higher education and research system, ideas about innovation and the tangible contribution of S&T to economic growth were slowly entering the Latvian policy making discourse throughout the 1990s. The "Market-Oriented Research Program", funded by government, was created in 1993 to foster commercialization of research results. The perspectives of establishing technology parks and ensuring availability of funding and access to training to foster SMEs innovation were brought to the policy makers' attention. However, the government only accepted these suggestions from the academic community "for consideration", without yet committing to any specific action (Kristapsons et al, 2003: 21).

By the end of the 1990s, the awareness that innovation played a crucial part in a country's economic advancement had grown. In 2001, the **National Concept of Innovation** was adopted by the government. It stated that other "comparatively small countries, such as Finland, Ireland, Israel, not to even mention the small South-East Asian countries", as well as neighboring Estonia and Lithuania have also committed to building national innovation systems as the road to economic development (National Concept of Innovation, 2001: 2). The purpose of the Concept was to provide a vision of how to improve the state of art with respect to S&T and innovations in order to secure country's sustainable economic growth by building a knowledge economy. As the long-term goal, the Concept announced Latvia's economic "catching up with the West European countries, while maintaining civil defense, cultural and social sphere development" (ibid). More specifically, in a mid-term period it aimed at 7-9% GDP annual growth, decreasing trade deficit and increasing the high-tech export share to 20%. As a short-term goal, it was declared as necessary to change the attitude of government and society to the role of innovation in economy. The document identified Latvia's had inadequate performance with respect to all of the main indicators of innovations: low funding for R&D, lack of cooperation between research and business sectors, low infrastructure capabilities for research in universities, low number of graduates in natural sciences and engineering, an insufficiently beneficial legal environment, and difficulties in attracting risk capital or seed funding. Necessary steps were defined: devising a national innovation program, allocating budget funding for its implementation, and building necessary institutional system for developing and coordinating innovation activities.

Consequently, the **National Innovation Program for 2003-2006** (hereafter Program 2003-2006) was written in 2002 to offer specific support instruments. It emphasized that many of the separate elements, e.g. intellectual potential and entrepreneurial spirit, were already in place; therefore, the main task was, according to the document, to ensure a strategic coordination of the functioning of all the elements. The government announced that it was taking on the chief responsibility of implementing the national innovation system in Latvia. The Program defined several more specific target areas. Firstly, it set out to foster creation of new SMEs working with progressive technologies and increase number of employees working in high-tech sector, consequently raising the high-tech share in exports. Secondly, the Program pledged to restructure R&D funding by advancing business investments in R&D and by shifting the bulk of government funding from fundamental science to applied research (aiming at a proportion of 30/70%, as in the EU). Thirdly, it planned to increase the number of students studying natural sciences. Fourthly, the Program promised funding for technology parks and technology transfer centers, and for a new excellence centre – the Riga Science and Technology Park. Finally, it pleaded to the case for raising society's understanding of the role of innovations. Thus, with specific actions identified to reach these goals, the first comprehensive policy action plan was created for building the Latvian national innovation system.

In the same year of 2002, an EU-funded initiative to develop Regional Innovation Systems in the accession countries was launched. Latvian Investment and Development Agency and Latvian Technological Centre, together with a company from Germany, Inno Gmbh, and the Stockholm regional development agency, were entrusted with the task of writing the Innovation Strategy for Latvia as a future EU region. As a result, over the years of 2002-2004, the Latvian Innovation Strategy Action Plan for 2005-2010 was written. According to a Latvian scientist, involved in the writing of this document, however, the strategy was

"required by Europe and the *zeitgeist*", while local demand for it was virtually absent (it was not even translated into Latvian) (author's interview, 06.03.2009[8]).

Despite this lack of direct impact, innovation ideas did proliferate and spread in Latvia particularly with accession to the EU and availability of significant support from the European Structural Funds. Thus, in a later EU-supported project in 2005-2006, together with Italian and Israeli counterparts, Latvian scientists developed specific policy instruments for boosting S&T and innovation. These recommendations were then presented to the Ministry of Economics and most were included in the next much more specific development document: the **Program for Promotion of Business Competitiveness and Innovation 2007-2013** (hereafter Program 2007-2013). The Program, adopted in 2006, restated the significance of successful creation of the national innovation system in the view of the moderate success in fulfilling that objective up to that date. The document defined the necessary steps to foster innovation: providing funding for establishment of business incubators and competency centers across the country; increasing cooperation between academy and industry; fostering investments in human resources – training, raising qualifications - in the private sector and supporting mentoring initiatives; motivating students and young graduates that could be business start-ups. It also promises seed and venture capital for SMEs for innovative activities, and funding for enterprises that are ready to invest in large projects for creating products with high added value. Most of the initiatives are planned to be implemented by attracting the main funding share from the EU Structural Funds, with supplementary government funding. By implementing the measures of this Program, annual R&D funding from EU Structural Funds for 2007-2013 was planned to be almost seven times higher than in the 2004-2006 planning period (Karnitis, 2007: 176).

Once the notions of the knowledge-based economy and innovation had entered the policy discourse, other documents followed reiterating them. Most prominently, the **National Development Plan**, approved in 2006, puts emphasis on three main themes: (1) 'The educated and creative individual'; (2) 'Technological excellence and the flexibility of enterprises'; (3) 'Development of science and research'. In other words, the policy rhetoric now commonly defines the education and S&T as the keys to the country's development. The **Latvian Long-Term Strategy for 2030** also features innovation to be at the core of successful development. Thus, in less than a decade, the notion of innovation has become one of the development policy 'keywords'. The rest of the report aims to throw light on what locally relevant content this keyword is filled with.

Policy approach influences

As the S&T and innovation policy development process shows, the EU served as a significant 'push factor' for developing the policies and implementation programs. Accession to the EU and availability of the Structural Funds speeded up the policy development process in the whole of Eastern Europe, including Latvia (Kattel, 2008; Radosevic and Reid, 2006). The specific projects, such as the EU Regional Innovation Strategy initiative mentioned above, facilitated both policy plans and the elaboration of particular instruments for their implementation. In this respect, **Europeanisation** has had a significant effect on national innovation policy development.

[8] Hereafter, dates will be given in brackets to refer to interviews conduct by author with various actors involved in S&T and innovation promotion work in Latvia. Twelve in-depth interviews were conducted in Latvia in the period of 5-11 March 2009.

Moreover, the fact that other countries in the world were also developing national innovation systems accelerated the mobilization of political will to approve documents of national relevance with regard to this matter. In particular, as mentioned above, the National Concept of Innovation, arguing for a need of a national innovation system in Latvia, referred to other "relatively small countries" – Finland, Israel, Ireland, small South-East Asian states and the other two Baltic States – that also have chosen the national innovation system approach as their development strategy. Many examples from other countries have been referred to throughout the policy debate. Also in local academic discourse, comparisons of Latvia with other small countries, e.g. Israel, Denmark and Ireland, are made (Karnitis, 2007; Grens 2007). A public official summarizes well these shifts over the past years:

> "South-East Asian 'tigers' were fashionable at some point. Then, of course Israel, all its science, its wealth (…). Now you hear about Finland everywhere: "Small country, let's look at it!" The northern [Scandinavian] model is closer to us by definition. Overall such switching all the time. Some say again – Denmark, also a small country. Then again earlier everybody was quoting Ireland [?]." (11.03.2009.)

Overall, the **Scandinavian countries** seem to have had the most enduring and prevailing influence upon Latvian development policy making. Since early 1990s, all three of the Baltic States have received assistance from Scandinavian countries, and especially Finland and Denmark, in reforming their R&D and developing STI systems. The most stable cooperation has evolved between Estonia and Finland, and the latter has had a significant role in devising Estonia's STI strategy (Kristapsons et al, 2003). Latvia received the first significant assistance in 1991-1992 from Denmark in reevaluating its scientific research system and defining reform goals. Later external evaluation and assistance projects were related to Latvia's preparations for joining the EU (e.g. Coopers and Lybrand evaluation, on behalf of the European Commission, in 1997, ibid). Over the past decade, Latvia's involvement in several Baltic Sea Region initiatives for innovation and development of industrial clusters has served as a platform for cooperation with Scandinavian countries and has fostered policy learning.

It can often be heard from government officials, academia representatives and innovation experts that the Scandinavian approach is the most applicable to Latvia. Currently, judging from the experts and policy makers' discourses, **Finland** most prominently serves as a role model for redirecting Latvian science and industry towards innovation and high-technologies. In words of a technology transfer coordinator:

> "Latvia needs to develop by taking into account our subjective conditions: we do not have the main resources, we are not producers of oil or gas, nor we have coal. We have to take another road – the Finnish road. The global direction from resource-based industry and economy to knowledge-based and driven one… (..) This model – it is the Finnish model." (11.03.2009)

High-technologies, innovation at SME level, and regional competitiveness building are all areas where Finland's experiences are studied. Some of the local scientists, for example, are advocating implementation of the Finnish science park model: to develop regional science 'villages' which would include a regional university, technology transfer centre, business incubator, a hospital, etc.

Besides Scandinavian countries, also **Israel** has provided S&T and innovation models adopted in Latvia. Technology transfer system and business incubators have been adopted from Israel, seeing how successful the country has been in S&T and innovation. Cooperation with Israel took place within the ESTER project, funded by the European Commission, in 2003-2004. As a result, the Israeli model of technology incubators was perused that include

business incubation services and seed financing for new businesses. This model was then transferred to the Latvian situation and presented to the government as one of the main policy instruments. Albeit in a modified form (only keeping the incubation services), the business incubators' model has been included in the two innovation programs and over 20 million lats have been planned for such centers in Latvia over the period of 2007-2013.

Even though it is also often admitted in the interviews that straightforward copying of other countries' experiences is not the right strategy, at the same time the idea prevails that "there is nothing new to invent". The STI goals and the tactics to achieve them appear to be mostly shaped by the approaches of leading economies to STI development. In this respect, learning from Finland or Israel that are small economies with high economic development levels is perceived by the local actors as a reasonable option. That is why, for one, there is a strong conviction among the government officials and researchers alike that **high-tech** production needs to be increased, and it is high-tech export that will contribute to growth in the future. Like in much of the CEE, the "high-technology bias" (Radosevic and Reid, 2006) is palpable among Latvian policy makers, as well as academics and other involved actors. That is, the emphasis in support programs is put on high-technology production, which is seen as the most effective way to boost economic growth. References to "our Nokia or Skype" surface often in the local actors' narratives.

STI policy discourse on reduction of inequalities

As the National Concept of Innovation claims, the main concern with regard to inequality is the gap between Latvia and Western Europe. The STI policies are geared at reducing the gap in economic development to ensure the quality of life for Latvian people according to 'the Western standards'. Much less attention is paid in the STI policies to inequalities inside Latvia that, as statistics show, have been increasing along with the economic growth over the past decade. In analyzing the policy approach to development and inequality issues, two types of approaches will be invoked that have been identified by the ResIST policy framework work group: the knowledge economy policy paradigm (KEPP) and the social cohesion policy paradigm (SCoPP) (Cozzens et al, 2009). In the nutshell, the knowledge economy policy paradigm interprets innovation mainly as profit making activity and prioritizes high-tech production and business interests over broader interpretation of development (ibid: 6). The social cohesion policy paradigm, on the contrary, aims at more balanced development that reduces inequalities in the society and distributes the gains of development more evenly (ibid: 7). ResIST case studies have shown that the economic (KEPP) approach to innovations is dominant in Western European countries (where, at the same time, well-functioning social welfare policies are in place and overall prosperity of its citizens is rather high). In the countries of the global South (for example, Mozambique or Brazil), the social inequality and cohesion and participation issues come much more to the forefront in their STI policies.

In this respect, the case of Latvia is ambivalent. On the one hand, as highlighted above, social inequalities have been growing over the past decade, and the welfare system has not been effective enough to reduce them. However, Latvian S&T and innovation policies are mostly focused on boosting economic growth and competitiveness, while notions of "distribution, diffusion and spillover" that characterize more inclusive STI approaches and broader "social productivity" issues (Cozzens et al, 2006: 13) surface only fragmentarily in the policy documents. Even if the first page of the Program for Promotion of Business Competitiveness and Innovation 2007-2013 declares that the innovation policy goal is to "ensure economic growth, in the meantime securing development of culture, civil defense, social sphere", the

rest of the document is focusing on economic growth, development of entrepreneurship, business innovation, and the issues of "culture, civil defense, social sphere" do not surface any more in the instrumentalization part. The following slogan has gained popularity in local circles of policy makers and implementing actors: "Science is a process whereby money turns into knowledge! Innovation is a process whereby knowledge turns into money" (Egle et al, 2008: 7). This reflects the overall understanding among both policy makers and the ones implementing the policy that innovation is for enhancing competitiveness in the global markets that would foster Latvia's economic advancement. In this respect, the Latvian STI policy fits within the knowledge-economy policy paradigm. It emphasizes growth and economic development; innovation is to be driven by businesses and is supposed to increase the country's competitiveness in the global markets. Emphasis in the Program 2007-2013, which is the main innovation strategy plan, is put on raising the competitiveness of companies, creating support instruments, such as competency centers, for activities in those fields of R&D and production that focus on high technologies, and others – all measures that are geared at boosting growth. Innovation is reduced to commercializing research outputs, while social innovation issues are not included in the conceptualization. A representative of the Ministry of Economy, the institution responsible for creating the Latvian national innovation strategy, puts it clearly, "If such new [innovative] products foster social equality, then it is welcomed. However, the Ministry's priority is the overall economic growth and raising the competitiveness of businesses" (24.02.2009). The measures directly aimed at social inclusion and cohesion are the competence of the Ministry of Welfare, meaning the system of social benefits for those in need.

Also the broader debate about Latvia's development strategy and necessary actions is framed by economic reasoning. When calling for more commitment on behalf of the government for S&T funding and supporting universities as research centers, the head of the University of Latvia, largest higher education and research institution in the country, appeals to "market economy principles" in his argument for not cutting funds for science in the present challenging economic situation (Auzins, 2009). Ideas outside the economic reasoning are not drawn for the support of the argument. The view prevails that economic development will result in overall improvement of life quality.

The one social cohesion problem, however, that is granted attention in the policy planning is **regional inequality**. Regional differences are profound in Latvia: GDP per capita was more than two times bigger in Riga than in other parts of Latvia in 2006 (Central Statistics Bureau). The gap is particularly visible with regard to entrepreneurial and innovative activities. For example, 52% of all business owners are registered in Riga region; 71% of all new entrepreneurs in 2006 were active in Riga; and they have also attracted the highest figure of foreign direct investments (88% or 1.4 billion lats) (Program 2007-2013). After many years of neglect, STI policy instruments in the recent years aim to tackle this issue by directing part of the funding especially towards regional activities. Two specific programs have been implemented in regions within the Program 2007-2013, funded mostly from the ESF. In 2007, 8 technology transfer contact points were opened in universities, 6 of which in regional universities and the same year 8 business incubators were opened in regional towns. The Program 2007-2013 also includes a new initiative "Investment in development of SMEs in Specially Supported Territories", which would contribute to more cohesion between regions and rural territories. Even if belated, the regional support initiatives are a significant contribution to reducing structural inequalities and raising regional capacities. However, there are critics who argue that the investments are not justified, since the research potential in regional universities is rather uneven and the R&D demand and readiness to invest in

innovation on behalf of the local entrepreneurs is low (05.03.2009). Furthermore, the criticism goes, "regions" are not a cohesive whole and having the same measures and tools for all of them is not a sustainable policy approach. Despite these objections, the regional initiatives continue, giving hope of more cohesive development of the country.

However, a more general issue is that, even if the regional development is a concern, the efforts are mostly directed at the economic capacity: both the technology transfer contact points and the business incubators are aimed at raising the commercial potential in the respective areas. The social cohesion – again – is expected to emerge as a consequence. As a head of a university technology transfer centre notes, "There is funding available [for innovations], but only for something that brings direct profit" (05.03.2009). Whether it is the adherence to the simple principle that any investment has to yield more or less tangible benefit, or the national peculiarity of discrediting leftist ideas ever since the early 1990s, the absence of rhetoric about reducing inequalities is notable in the Latvian public sphere. As a result, social inclusion and inequality reduction are not among the priorities that innovation and S&T should contribute to, according to the policy documents. The underlying idea appears to be that it is crucial to raise Latvian firms' competitiveness and high-tech performance to ensure catching-up with the West, which eventually will bring along development and welfare for the entire population. The "qualitative content" (Cozzens et al, 2006) of this growth is not pondered over in policy discourse, nor, for that matter, in broader public debate.

In terms of the inclusiveness that the STI policies promote, the **engagement of society** in creating the innovation economy is limited: a citizen is either perceived as a potential entrepreneur who can be offered incentives to start a (innovative) business, or as a member of general "society" that needs to be informed about the role of innovations in the country's economic growth. 'Awareness raising' events are being organized, aimed at informing the public on scientific research and business innovation matters. But the emphasis is on educating and informing the public, rather than engaging the citizens in STI policy debates. Moreover the scientific community does not advocate more involvement of citizens in STI policy making. The view predominates among R&D and innovation field activists that the desired models have already been applied in other countries. Latvia needs to focus on adopting these "best practice" models and there is hence no particular need for engagement of society at large. Furthermore, this reasoning goes, people often lack knowledge to participate in such a debate, if it were to be held. The following excerpt from an interview with a technology transfer coordinator represents such an opinion:

> "Some surveys could be done but overall people who are not competent often do not even understand what it is about and they can give bad advice. It is another matter, however, that their needs ought to be studied. But there have been already quite a few surveys for that and it is not difficult to forecast that." (11.03.2009)

Innovation Policy Implementation

As is admitted now by public officials and the responsible institutions, the Program 2003-2006 remained to a large extent "on paper", meaning that government funding was not allocated to many of the planned activities. Only with the accession to the EU and the new SF planning period, were new possibilities seen for implementing the principles. Accordingly, the new Program 2007-2013 offered a revised and updated action plan for boosting entrepreneurship and innovative capacities. Several **State Aid Programs** have been approved and launched: (1) introducing production of new goods, (2) elaborating new products, (3) support for businesses for formalizing intellectual property. A fourth program – for attracting

highly educated workforce – was also started, but it has not gained much popularity among entrepreneurs due to complicated application procedures and limited benefits. Financial support instruments are slowly being developed: a "first seed fund" started functioning only in 2008 with small financial resources; risk capital fund and export guaranty fund are functioning already for a few years but have these also not gained much popularity due to complicated application terms (Egle et al, 2008: 12-13). An innovation and entrepreneurship motivation program is also being implemented by organizing seminars in regions, innovation days, conferences, competitions for innovative business ideas, etc.

Implementation of several other support instruments, however, has not taken plan according to plan. Several programs, including establishment of industry competency centers, have been delayed for already more than two years, because the Ministry of Economics has not managed to prepare all the necessary administrative documents for the launch. This is affecting also the technology transfer contact points and the business incubators – two initiatives that were started already under the Program 2003-2006. Several of these institutions are experiencing significant problems in sustaining their work, while waiting for the delayed state funding. Some are supported by the local municipalities until the beginning of the government funding, while, for example, one center has put its work completely on hold.

While some programs are delayed, others have been entirely cancelled. For example, clusters support program, international competitiveness boosting program, technology transfer centers (planned to work in synergy with technology contact points, managing proof of concept studies for potential commercial ideas and identifying international buyers for technology offers), and business angels program have been abandoned. That raises questions about the attainment of the goals of developing the innovation system, if policy is only partially implemented.

With respect to the efforts to increase regional cohesion, the success of **business incubators** can be noted. Despite the current funding delays, regional incubators have gained recognition in the local communities and a future potential is seen: in one of them, satellite technologies are being developed in cooperation with a local university, in another IT sector predominates, also because a local university has specialists in this field, in yet another – aerodynamic technologies are developed. Apart from few successful high-technology firms, however, the SMEs' capacities are being built in a wide variety of industry sectors. The incubators also provide advice on support from European programs, help with writing project proposals, and offer other business consultations. Local municipalities see them as an opportunity to boost business activities and employment in the region.

Emphasizing that many of the crucial elements of a national innovation system are in place (innovative potential, businesses willing to develop new products), the government has striven to intensify the collaboration between the various actors to increase knowledge and technology transfer. Indeed, the problem is rightly recognized as a long-standing issue. The weak links between industry and researchers are inherited from the Soviet S&T system, when production and innovation processes were separated: research and innovation was organized to take place in science academies, while 'branch' industries only fulfilled production function and no innovation took place in-house (Meske, 2004; Freeman, 2006). Hence, technology transfer initiatives deserve more attention. A scheme has been designed by the Ministry of Economy as to how the system should work. This scheme depicts links and elements necessary for enhancing cooperation between research and industry. **Technology transfer contact points** at each of the universities are a significant part of the system. Eight such points have been established over the past few years. Their activities include gathering

information on inventions and research findings with commercial potential, preparing technology offers for industry, and reaching out to business associations and individual owners to probe cooperation possibilities. Their main tasks are: (1) to promote the awareness outside university of its scientists' research capacities and attract businesses for cooperation, (2) to protect and manage intellectual property, (3) to support spin-off firms by university scientists. Representatives of several of such centers admit that considerable work needs to be invested in educating scientists about innovation, commercializing their work, patenting it, etc. Furthermore, they remark that demand for R&D is also an issue: only on very rare occasions do industry representatives approach these contact points. They either seek cooperation directly with scientists they have previous connections with, or they need support in identifying and formulating their R&D needs before they are at all ready to look for cooperation. It is also a slow process to 'translate' into a business language the research capacities and ready inventions that universities can offer. For example, since a year of work, the technology transfer center of the biggest university in Latvia has identified seven ready ideas that could be sold for introduction to the market, and ten cooperation projects have been started between industry and researchers to develop innovative solutions for the market. Those are still tiny numbers for the size of the university and the research potential that it has.

While technology transfer contact points at universities have been established, the overall system for technology transfer, however, has remained only partially implemented. A central coordinating unit, envisioned in the scheme, has not been established due to lack of funding. Critique has also been raised by technology transfer experts that, by providing funding only for the university contact points, the system for technology transfer has been created unbalanced, with too much emphasis on the university side but not enough mechanisms to raise the business capacities to formulate their R&D needs and engage in innovation (05.03.2009). Currently the only technology transfer body that works with all industry associations and all research institutions is the **Enterprise Europe Network Latvia,** based at **the Latvian Technological Centre** and **the Investment and Development Agency of Latvia**. Their mission is to assist businesses in looking for innovative solutions to their problems, find partners in European countries to work together with. However, as EEN representative admits, the willingness of the associations to cooperate differs greatly, and with some industry sectors due to leaders' reluctance the cooperation is almost inexistent. In the period 2005-2008, 43 technology transfer agreements were been signed.[9]

While cooperation between research and industry is certainly a problem, and it is recognized as such by all the involved parties, various authors in the scholarly literature criticize too strong an emphasis on creating bridges and networks for technology transfer to happen, while technological and learning capabilities are not increased to a level necessary for such transfers at all to take place (Kattel 2008: 18-19). The risk is to experience ""bridging failure" but primarily due to "agent failure"" (Radosevic, 2005: 35). That is, if the capacities of some (or all) of the 'elements' are not sufficient, then the cooperation will not result in success even if the 'bridges' are present. This is partly admitted by a Latvian public official who observes that:

[9] The Latvian Technological Centre over the course of 2004-2008 has gathered 40 technology offers from researchers and 49 technology requests from industry. The fields of industrial manufacturing, material and transport technologies have both the highest amount of offers and requests, compared to other disciplines. On the demand side, also agro-food industry has a comparatively high amount of technology requests. Source: "TT Market in Latvia: Role of Enterprise Europe Network" by Gundega Lapina, Latvian Technological Centre, 25.02.2008. Unpublished report.

> "there is nowhere to transfer from and to. The classical innovation scheme implies that there has to be a strong entrepreneur, strong science, strong financial support mechanisms and strong legislative support. (…) The overall innovation system is determined by its weakest element. And the elements in our system are all weak…" (11.03.2009.)

At present, the technology transfer centers (national and university ones), as one of the representatives admits, are trying to create the demand by themselves: reaching out to businesses, informing about university research capacities, helping businesses to formulate their R&D needs, informing about benefits of such cooperation. Yet, they alone cannot ensure a successful development of innovation.

The 'weakest link' in Latvia, arguably, are the SMEs: they have low innovative capacities and lack ability to and experience with formulating their R&D needs, as well as low incentives to invest in innovation. Their knowledge absorption capacities are wanting, and hence the demand for R&D is low. For example, for participation in EUREKA – a Europe-wide initiative to support innovation at SME level, a majority of initiatives are started by scientists who have found a firm to cooperate with (rather than vice versa). The following quote highlights the problem of low demand from SMEs and indicates its roots:

> "Usually the initiative comes from scientists who are short of money (..). Wanting to promote their topic not only by grants from the Latvian Council of Science, which only supports fundamental science, but also in EUREKA, they find the SMEs themselves, because a [research] institute cannot participate alone. An SME has to take part, too. And, unfortunately, I would say it applies to some 80% of cases. Maybe in the last years it has got better, about 50%, because those firms have finally sprung up. Because one needs to imagine what the situation was in 1991 – the private entrepreneurship tradition was cut for 50 years! An entire generation was not familiar with such an economic form. It needed first to be established, started off. At first they [the firms] acted as distributors, as some simple manufacturers, based on the old roots, and then it slowly developed…." (11.03.2009)

Even the relatively more advanced companies, which invest in innovation, are often not in a position to commercialize local inventions. For example, the Latvian Organic Synthesis Institute produces more patents than any other institute or company in Latvia. However, many of their inventions have to be sold to Japanese or American pharmaceutical companies because local pharmaceutical companies do not have the resources and capacities to develop most of their inventions into the market. It takes too extensive testing for it to be affordable for relatively small local pharmaceutical companies, even if they have the highest R&D investments among Latvian companies.

European initiatives – EUREKA, 7th Framework Program's sub-section for SMEs, Enterprise Europe Network – are used mostly by such enterprises that have the R&D capacity already or have ability to formulate their R&D needs, or have long-established links with R&D institutions. According to observations of the national coordinators for these programs, often the same, already well-established, "couples" - a firm and a research institute - participate in project consortiums, according to a coordinator of the 7th Framework Program for SMEs (05.03.2009). In this respect, for a share of these participants, participating numerous times, projects funded by the EU have become a 'business' in itself. Many of these enterprises that participate have been founded as spin-offs, by (ex-)researchers. In this respect, participation in European projects benefits those that already have innovative capacities, which is of course supportable. Yet, the numbers are small, therefore, it is yet another example of a "narrow

client base" (Radosevic and Reid, 2006): e.g. in EUREKA up until 2006, 48 organisations were involved from Latvia. Of all of them, such spin-offs constituted about 60% (Beverte, 2006: 41). Such situation does not foster innovation in the wider community of SMEs, most of which, as another transfer center representative admits, often can only diagnose that they "have a problem" but do not have the capacities to define their R&D needs in the detail often necessary for taking part in such European projects.

Consensus is lacking among innovation experts, practitioners and policy makers about **knowledge absorption vs. creation of new high-tech knowledge**. For one, differing understandings can be observed of what knowledge absorption implies. While some claim that it is already dominant in Latvia, since majority of innovation investments are in new machinery and equipment, others argue that the country would downgrade itself to a "banana republic", if it only chose knowledge absorption, rather than new knowledge creation with the eventual goal of producing world-class high-technologies. It is presented as a matter of national pride, as well, to produce high technologies. The success of the Minox (the smallest photo camera in the world, created in Latvia in 1930s) is still alive in the public memory and the Estonian example of Skype is too tempting.

Experts from the World Bank have emphasized that, given the actual and potential scope of Latvian R&D and innovation resources, the government should be aware of the objectively limited local opportunities and put much larger emphasis on the absorption and diffusion of innovation approaches and knowledge produced outside Latvia (Watkins & Agapitova, 2004: 5). Also in order to promote the catching-up process with the Western countries, it is argued to be especially important to promote general S&T capabilities across sectors that would allow spillovers and technology transfers from frontier economies (Rindicate, 2007; Cozzens et al, 2006: 9). Even though some of the planned activities are aimed at increasing potential of knowledge absorption (e.g. training programs and seminars for various audiences), to a large extent it is directed at increasing R&D investments and especially at promoting high-tech production and first-hand innovations.

However, while at the policy rhetoric level, high-tech enterprises are particularly singled out as central to development, 'on the ground' the high-tech 'bias' (Radosevic and Reid, 2006) is less distinct. In various initiatives aimed at innovation, also 'low' or 'medium-tech' businesses get support. For example, the support program for SMEs under the 7th FP gives opportunities to firms with R&D needs to find other companies across Europe with similar needs and research institutes which could address these needs. As the national coordinator claims, most of the projects are in fact in low-tech fields: foodstuff production, manufacturing, while some also in material sciences and medicine (05.03.2009). Also the regional business incubators do not exclusively support only high-tech firms but much more commonly serve as general entrepreneurial capacity enhancers in the region[10]. In such a way, the capacities of SMEs in a variety of sectors are being developed, slowly upgrading the industry capacities on the whole.

Hindering factors

[10] Firms active in the following sectors can be admitted to a business incubator: manufacturing (NACE C), except for drinks and tobacco production; (2) computer programming, consulting and related activities (NACE 62), and information services (NACE 63); (3) scientific research (NACE 72); (4) architecture and engineering services, technical control and analysis (NACE 71), (5) other professional, scientific and technical services (NACE 74).

One of the main arguments, used by the local policy makers, for lack of success in creating knowledge-based economy and a well-functioning innovation system has for years been the insufficient financial resources. Even where there have been clearly defined actions for policy implementation, it has often been the case that the government's support for STI development has remained rather **low in actual funding**. As a result, many of the plans have simply never been realized. As a representative of a government agency for innovation policy implementation explains:

> "From 2000 until 2005 it was just talking. Well, ok, the Innovation Program existed for 2003-2006 but real funding…. (..) Real funding emerged only in 2006 when ESF support programs started operating." (10.03.2009)

Indeed, the situation changed with accession to the EU and availability of the Structural Funds. Moreover, over the past few years the GDP growth was fast and the government spending increased notably in virtually all sectors. And yet, even with the increased availability of financial resources, the STI policy implementation success is being deemed low by all the involved actors, including the ones directly responsible for it. With the funding argument, hence, not entirely satisfactory, other issues that obstruct the development become more visible.

To start with, **institutional capacities** are an issue. The plans for attracting ESF support for S&T and innovation, envisioned in the Program 2007-2013, are extensive, and, in order for these plans to be realized, the Ministry has to prepare terms and conditions for each of the support programs. At the end of 2008, two years after the start of the Program, the necessary administrative documents have been prepared for only about a half of all the planned programs (Egle et al, 2008: 24). The insufficient administrative capacities, thus, cause delays in receiving the funding and implementing the programs.

The Latvian Council of Science is criticized by academics and public officials alike for somewhat authoritative and subjective approach to assigning research grants. New disciplines and multi-disciplinary projects are not easily acknowledged. Furthermore, grants mostly serve as subsistence benefits, rather than significant investments in research projects. Since the local research community is small, it is often easy to tell who is submitting the proposal, even if anonymously, and gerontocracy prevails (Freeman, 2006).

Furthermore, the **division of roles** between the Ministry of Economics and Ministry of Education and Science is not clear: each ministry has an innovation department, while the chief responsible for implementation of the national innovation system is the Ministry of Economics. The Ministry of Education and Science is meant to coordinate the work of universities and research institutes, including the technology transfer 'offer' side. The Ministry of Economics is responsible for technology transfer 'demand' side and the industry development. However, certain institutions responsible for the research capacities and technology transfer in the industry sectors are still under the provision of the Ministry of Education and Science, but are receiving reduced funding because the Ministry does not consider them as its main sphere of responsibility. Insufficient horizontal coordination between the two ministries, let alone the rest of the institutions involved, is admitted to be a problem by all of the actors, including some of the ministry level officials themselves. Such division of spheres of responsibility in a fragmented way is further enhanced and cohesion – obstructed by the common practice of designating certain ministries as being within interest (and power) spheres of certain political parties. Accordingly, it does not help for cooperation when ministers belong to different political parties. Horizontal policy co-ordination, hence, is a problematic factor. In the present scheme, the Ministry of Economics is responsible for

boosting business competitiveness, the Ministry of Education and Science focuses on higher education and research, while the Ministry of Welfare distribute social benefits and is responsible for social inclusion issues. This ministerial demarcation and lack of horizontal coordination and cooperation does not contribute to social cohesion, inclusion and equality issues.

Another problem is **cooperation**, which, moreover, seems to prevail at several levels. While collaboration between research and industry is being addressed by developing bridges between the two, there is another level that the problem exists at. As some of the research and innovation community representatives point out, cooperation between the various actors is challenging. Latvian entrepreneurs are reportedly not keen on engaging university scientists in their work, suspecting that they have mostly theoretical, and hence impractical, knowledge (Program 2007-2013). Young research personnel, though, are seen by business owners as in need of too much investment to train (ibid). Researchers in most cases are said not to be very 'interested' in industry, since their 'mentality' is not to direct their invention to a certain result within a specific deadline (10.03.2009). There is also distrust among an entrepreneur and a scientist, namely, whether the former is going to pay for something that the scientist develops for him, while the latter does not trust the entrepreneur enough to start working on an order before having been paid. In a situation of creating new knowledge or new applications, and when the outcomes are uncertain, mutual trust and willingness to cooperate is crucial. However, technology transfer experts point to this as one of the major problems in their work. Furthermore, as several interviewees note, cooperation between people is often simply "humanly unpleasant", and therefore "it is difficult to work together" (06.03.2009). All in all, these issues point to the fact that the lack of social capital obstructs the cooperation. Indeed, it has been argued that "the basic failing in transition countries is not so much 'market failure' or 'government failure', but pervasive 'network failures'", caused by lack of trust (Varblane et al, 2007: 117, also Lundvall and Archibugi, 2001: 4-5). Hence, even if the 'elements' are there, as the policies claim, even if there are excellent researchers, technology transfer experts and firms with innovative potential, the functioning of the system is impeded by the lack of trust in cooperation, as well as lack of tradition with multidisciplinary collaboration.

Lack of strategic and synergic coordination is further hindering factor. For most of the independence period since 1991, there has not been consistent **long-term planning** taking place. This low long-term planning capacity is explained in some sources by the disenchantment with planning that had built up during the Soviet period (Varblane et al, 2007). Arguably, only with EU accession mid and long-term strategic planning documents were again prepared (ibid). Due to EU requirements for planning the spending of Structural Fund resources, longer-term strategies were devised for both EU funds programs but also more generally for the national development and innovation (National Development Plan 2006, Program for Promotion of Business Competitiveness and Innovation 2007-2013). Also budget planning was extended to medium-term for 2008-2010. However, the question of effectiveness still remains, since, as many argue in Latvia, these programs and plans are, yet again, skillfully and dutifully produced "for Europe" with little local effect (even to such an extent as not at all being translated into Latvian). Moreover, due to recent economic crisis, there has been a more recent return again to annual budget cycles, which of course impedes strategic long-term development planning (Kristapsons et al, 2009). As a result, also researchers and entrepreneurs have difficulties with their planning:

> "The chaotic structure of managing the Structural Funds in Latvia [is a problem]. (…) The entrepreneur cannot plan, it is not known when these calls [to apply for support] will be open; the entrepreneur cannot align it with his plans, he has to adjust to some

> sudden ‘jumps’ when some programs become open (..) That, I think, is a hindrance for entrepreneurs.” (10.03.2009)

Support programs have at times been too fragmented to ensure long-term effect. For example, in 2004, business incubators in seven regional towns started work with EU PHARE funding. However, when in two years this support came to an end, national funding was not ensured and the incubators were either closed or changed their activities to whatever would bring profit (e.g. giving English classes). As mentioned before, there has also been a significant delay in the second-phase funding for the presently running regional business incubators. In this way, good initiatives have failed to deliver any significant results, since a coherent development plan and support has been missing.

Coordination and strategic planning is an issue also with regard to science priority fields. While there is informal consensus among scientists and innovation experts that biomedicine, pharmacy and material sciences are the strongest disciplines in terms of their scientific and innovative potential, the official **priority** list (cited before) includes many more disciplines. Evidence suggests, at the same time, that the allocation of funding for many years has not actually been coherent with the designated priority fields. For example, two of the priority fields – forestry and IT – have received one of the smallest amounts of funding among all science fields in 2006, despite their priority status (Denins, 2007: 213). Besides, local lobbying is very prevalent in priority selection: “Who gets closer to one or another government, one or another prime minister, will advance the status of his discipline” (11.03.2009). This is a valid observation with regard to many East European countries (Kutlaca, 2005).

As a foresight expert notes, the importance of strategic management is not recognized by the policy makers (06.03.2009). While there are over 300 strategies written (by government, individual ministries, political parties and various working groups), lack of long-term planning and strategic management of development is a major issue. The critique goes that the policy documents may contain sound analysis of the present situation and key statistics over the past years, while they lack in rigorous forecasting and outlining of future targets and actions necessary to reach them (Grens, 2007: 187). “Latvia does not have a goal” is a phrase that could be equally often heard in conversations with policy makers, academics and representatives of technology transfer centers and business incubators.

These issues are becoming particularly urgent with the present economic crisis. As one innovation expert points out:

> “The biggest hindrance is the lack of understanding on behalf of the leaders, lack of knowledge about these [S&T and innovation] matters. It is at the level of prime minister, the Parliament, ministers, ministry employees. (…) [They are] excusing [the funding cuts] with the crisis, while other countries like Sweden and the Czech Republic increase their funding for these things… Finland used the crisis in 1992 to create its innovation system, to reorganize from wood-processing or rubber products to Nokia (…). Instead here they cut all opportunities, cut programs, investments – that is simply the leaders’ lack of understanding about the direction – whether we will continue to support sawmills with falling turnovers, or we will support those that have some new products, those that can grow.” (10.03.2009.)

The **current situation**, when Latvia had to borrow 7.5 billion dollars from IMF, EU and several European countries to cover the budget deficit for the coming years and keep the national economy afloat, is affecting STI development considerably. There are radical cuts again in funding for research and innovation. Some of the biggest universities have received

up to 40% less in their government subsidies for 2009, which has meant putting a halt to a considerable number of research projects, support for scientists and PhD students, any initiatives, indeed, that go beyond the very critical continuation of daily teaching work[11]. The Latvian Technological Centre has seen 40% cut in government support for 2009. The 'Market-Oriented Research Program' may be halted. The overall R&D spending, even if set by law to increase by 0.15% annually, has already been reduced to mere 0.39% in 2008 and may fall even lower in 2009. The government is debating restructuring of the use of the Structural Fund resources and there is a lack of consensus that research and innovation support should not be reduced. While ministry officials claim that "innovation remains a priority", science appears not to be regarded as one. A story, regarded as a real-life anecdote, has spread in the local science circle that a high-level government representative has recently remarked to a university rector, "If you do not understand that now it is not time for science, then you do not understand anything at all" (11.03.2009). Needless to say that such changes of plans and short-sighted governance yet again threaten the execution of longer-term projects of research and industry.

Conclusions. Europeanisation, but also fragmentization

It is argued that CEE S&T and innovation policies and structures have been reformed and adjusted to the EU models and requirements, so that we can speak of a considerable degree of "Europeanisation" (e.g. Radosevic 2005: 34; Bruszt and McDermot, 2008). It cannot be denied that from the writing of STI policies to instruments for their implementation, EU demands, advice and funding have had profound influence also in Latvia. At the same time, as the evidence presented in this report shows, the impact of "Europeanisation", despite its scope, should not be overestimated for various reasons. Namely, policy documents, innovation strategies have been written within the frameworks of various EU-wide initiatives (e.g., the Regional Innovation Strategies project in 2002-2004); however, several such documents have remained solely "on paper" due to lack of national government's understanding and lack of commitment for funding their implementation. As several of the Latvian research community representatives have argued, policy documents and programs are written "when Europe requires" and often without considering their relevance locally. Moreover, availability and usage of EU funding for support instruments to boost innovation and R&D has not always lead to sustainable results. Business incubators are an often-cited example of opportunities taken to apply for EU funding without further plan to maintain these newly created institutions. Thus the support instruments that are implemented are often short-term and not synergic; instead of forming a part of a larger plan for building a system, they are executed in a piece-meal fashion and without a long-term vision. This sort of fragmentation of support and short-term planning hinders establishment of a stable infrastructure, steady networks, and synergetic efforts towards a de facto national innovation system. As a result of this insufficient coordination and planning, those success stories that there are (like several high-tech companies that produce highly specialized products for distinct international clients) cannot quite be explained as consequences of an effective national innovation system.

In 2007, an analysis by a local scholar emphasized that the economic stability, fast economic growth, location in an economically active region are among the chief strengths promising successful development of the Latvian innovation system (Denins, 2007: 217). At the

[11] Rector of the University of Latvia, Marcis Auzins (2009); Riga Technical University, open letter (http://www.rtu.lv/content/view/2211/955/lang,lv/ , visited on 20.02.2009).

beginning of 2009, the inflation level only slowly falling down from two-digit figures and the negative GDP growth have eradicated these strengths. There are some optimistic voices, though, suggesting that decreasing state investments may provide (pressing) incentives for scientists to seek cooperation with industry to secure funding for their work, which in turn can foster innovation. As a representative of the largest technical university in the country, Riga Technical University, claims, in early 1990s when there was virtually no government support, scientists took initiative to start joint projects with business sector. However, that does not ease the fear that if again, like in early 1990s, Latvia is not able to maintain long-term strategic planning in a situation of an economic crisis and not make the necessary investments in raising learning capacities, S&T and firm-level innovation, it will seriously threaten its sustainable growth potential and cohesive development.

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