

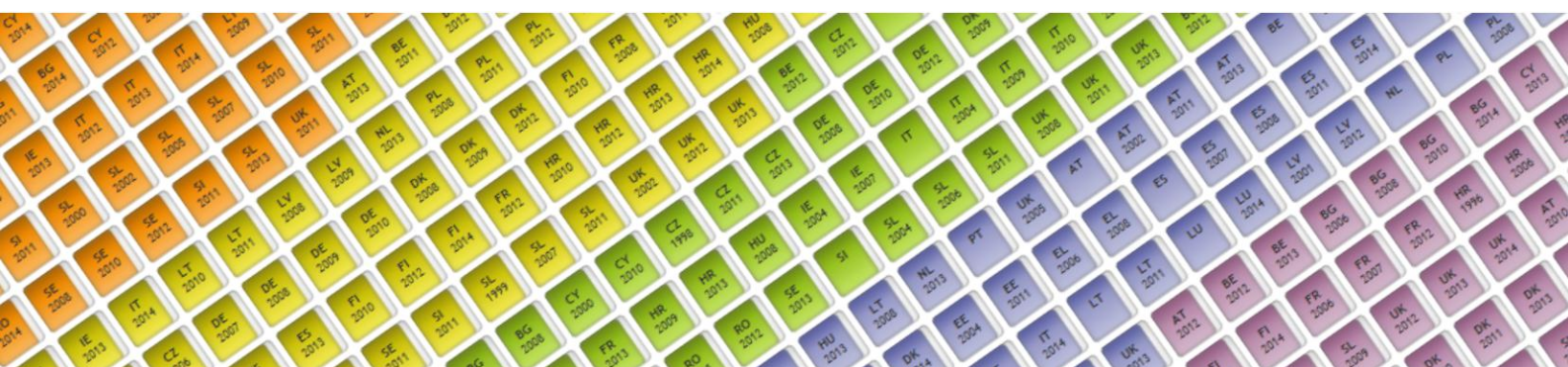


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Abstract

The report offers an analysis of the R&I system in Latvia for 2014, including relevant policies and funding, with particular focus on topics critical for two EU policies: the European Research Area and the Innovation Union. The report was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites etc. The report identifies the structural challenges of the Latvian research and innovation system and assesses the match between the national priorities and those challenges, highlighting the latest policy developments, their dynamics and impact in the overall national context.

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Executive summary

This report was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites, etc. The quantitative and qualitative data are, whenever possible, comparable across all EU Member State reports. The report provides an up-to-date overview of the country's R&I system (including funding), examining developments towards two central topics of EU policies – the European Research Area and Innovation Union.

Latvia has made rapid progress since the economic crisis, implementing austerity measures and entering the euro area at the beginning of 2014, but this growth model is based on low base competitiveness of national economy indicators, availability of EU structural fund resources, complexity of business environment and business entry barriers, poor innovation performance and high income inequality.

The distribution of GERD by sources of funds still demonstrates the predominance of the government sector, while in the more advanced EU countries the major contribution comes from the business enterprise sector. The main barriers to private R&D investments are related to the low R&D demand of indigenous firms, to geopolitical turbulences, and to the essential decrease of exports to Russia, combined with more longstanding problems such as the small industrial sector performing below EU average, poor knowledge intensive FDI attraction and export performance, weak cooperation between public research institutes and universities and private sector, as well as emigration, lack of technical human resources, and gaps in the scope of policy measures facilitating external technology absorption readiness.

The share of innovative enterprises in Latvia is one of the lowest in the EU (EUROSTAT 2013, 2014). The share of high-tech products in exports is small, value added is below EU28 average and productivity should be increased.

The R&I policy framework has measures including direct support (grants) and fiscal incentives. Direct support measures are almost entirely based on structural funds. Early stage start-ups have limited access to loans because of collateral requirements, and the overall company base consists of low and medium tech B2B focused firms requiring strategic support to increase competitiveness and move their exports up in the value chain. The newly introduced tax incentive has a risk that it will not catalyse innovative activities for early stage businesses as tax incentives do not involve immediate tax refunds and might not be attractive for new exporters with usually small profit.

RIS3 is aimed to foster competitive advantages of indigenous firms thus increasing capacity of innovation and achieving better performance of the national innovation system (NIS). Five identified smart specialisation areas should exploit better available local resources (forest, sea, agro-land etc.) and reduce exports of low value added products and increase demand for R&T&D in the growing products at upper value chain. Strong focus on horizontally important technology sectors like ICT and smart energy should provide knowledge and competence platforms also for increasing demand for innovation. The sectors that the RIS3 Strategy and the Industrial policy guidelines identify as future growth sectors are biomedicine, medical technologies, biopharmacy and biotechnologies, smart materials, technologies and engineering systems. The key for structural reforms is based on Latvia's capability of restructuring traditional sectors, sectors in transition and present

“locomotives”, supporting emerging new innovating companies on the way to become mature innovators, introducing new strategic approaches, providing access to growth capital and reducing energy costs and administrative barriers, supporting reorientation to new markets, introducing new upper value chain products and inter-sectoral collaboration forms and networks.

The quality of education in all its levels, the new role of vocational education, e.g. “centres of competence of vocational education”, needs continuously to be improved to meet the requirements of a catching-up economy. Strong focus on talent growth, retention and in a medium term – attraction policy measures should be balanced with high value added and wage increase policies. For decades the missing part in NIS has been the support to companies of scale, the segment highly motivated to invest in R&D and collaborate with industrial research performers.

Dynamic remote regions and emerging regional growth centres with their own applied research capacity should have enough capacity to provide knowledge intervention into active and innovative firms in the region, to increase their knowledge and technological absorption readiness from both external and local scientific centres. This should go in line with selective FDI attraction, export promotion, start-up creation and lean and incremental innovation based training and support system to regions and rural areas.

To keep the focus on global excellence in fundamental and industrial research, raising the number of young researchers and invited foreign world-class scientists, it is important to keep on with the strong government consolidation policy. The existing fragmented and financed from public funds HEIs will be reduced to 20-30 and PROs, in the first step reduced from around 150 to 90 with the aim to reach approx. 30-40 after second consolidation stage. This should be strongly linked with increasing international openness of public institutions and growing supply of knowledge and services to local and international business needs in all available channels demanded by industry.

The government has ambitious goal to increase R&D spending to 1.5% of GDP from today's 0.6%, substantially increasing financing of the state research programs, institutional competitive funds and local grants from the state budget. The increased funding is exclusively channelled to applied research; this may weaken fundamental research and lead to a lower number of doctoral and post-doc graduates in basic science.

The present R&D policy mix is characterised by a considerable range of measures aimed both at public research organisations and private companies as well as at encouraging their collaborative efforts. Nevertheless, the major emphasis is still on measures geared towards increasing R&D in the consolidated number of public sector research institutions with high research excellence, which is seen to have a potential catalytic effect for leveraging business R&D. One major weakness of the Latvian NIS is missing efficient soft and hard components of the knowledge and technology transfer, commercialisation, testing and prototyping support system in all larger HEIs. We can conclude that there are three main priorities to tackle this weakness: firstly to develop one or two efficient Technology Transfer Offices serving the majority of the best PROs at commercialisation of their research results; secondly, HEIs should create support infrastructures which ensure testing and prototyping services and foster various incremental innovations; and thirdly, promotion of innovations in the regional businesses in line with the RIS3 priority sectors.

As the majority of the current main R&D&I policy measures rely almost exclusively on the availability of EU Structural funds, the introduction of longer term policy provides a

challenge to increase effectiveness, efficiency and impact by increasing the quality of NIS planning and continuity and evaluation at different levels of investment cycle. The performance of Latvia's NIS requires the elaboration of independent and regular peer-reviewed assessments and studies, involving best EU researchers and policy experts in particular areas of evaluation and governance, combining the expertise of the ESF program administration (in the CFCA agency at the MoF) with that of private companies of high level. A new administrative management solution for ESF programs should achieve very concrete restructuring targets of the national economy, install regular monitoring services based on international assessment quality, and essentially reduce time from submission of the application till its approval, reducing existing administrative workload for beneficiaries and replacing the existing administrative practices in Latvia with ones from FP7 and H2020 program. Reduction of direct administrative personnel of ESF programs should go in line with the increase of the capacity of responsible ministries to design and control particular aid programs and to quickly change them according to the evaluation outputs. The key challenge is to keep focused on the priorities of the innovation policy set in NDP, RIS3 and other planning documents during the quite long dialogue procedure with all involved stakeholders and social partners while designing a particular program.

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1. Overview of the R&I system

1.1 Latvia in the European RDI landscape

Latvia is a small economy with a population slightly below 2 million (in the beginning of 2014)¹ that makes 0.4% of the EU-28 population. The GDP per capita in PPS in 2013 constitutes only 67% of the EU-28 average. GDP growth in the last 3 years has decreased from 5.3% in 2011 to 4.1% in 2013 (in 2012 GDP growth was 5.2%).

GERD witnessed a drop from 0.70% in 2011 to 0.66% in 2012 and 0.6% in 2013 (see Table 3 in chapter 2.5.1.). The situation in 2012 and 2013 was improved by the inflow of the EU Structural Funds and FP7 project funding. Latvia no longer adheres to the GERD target of 3% of GDP by 2020. [The National Reform Programme of Latvia for the Implementation of the “Europe 2020” strategy](#) (2011) and the [National Development Plan of Latvia for 2014-2020](#) (NDP) have lowered this target to 1.5%. The contribution to R&D from the national budget (GBAORD) in absolute figures has declined from €34.7m in 2012 to €33.3m in 2013. From 2010 to 2012 BERD fluctuated around 0.7 to 0.8 EUR per inhabitant while the estimated value of BERD in EU-28 in 2010 was 21.6 EUR per inhabitant and 22.7 EUR in 2012. The lack of political will to set education and science as real and sufficiently financed core priorities in both NDP and state budget has put Latvia in the last but one place in the modest innovators’ group of EU countries showing innovation performance below 50% of EU average.²

1.2 Main features of the R&I system

The national R&D funding in Latvia is dominated by the public sector and has demonstrated rather notable fluctuations over the last decade at a comparatively low general reference level. GBAORD as a percentage of total general government expenditure in 2012 was only 0.40% in comparison to the EU-28 average of 1.42%³. The annual allocations of state budget funding for R&D have so far been low and highly dependent on the economic performance of the country, with low commitment of the government under conditions of tight national budget. Since 2009 public funding for R&D has become excessively dependent on EU SFs, which is a questionable approach in a long term perspective. The national governance system has not been conducive enough to secure and maintain the strategic role of R&D&I in the social and economic development of the country.

R&I policy in Latvia is predominantly developed, funded and implemented at the national level (monocentric development), therefore the institutional role of the regional administrations in research governance is limited. The five planning regions have neither the level of responsibility nor the funding capacity to develop their own R&D policies. An attempt to rectify the situation is placed in the Guidelines for the Development of Science,

¹ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps00001&plugin=1>

² Innovation Union Scoreboard 2014. http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf

³ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00007&plugin=1>

Technology and Innovation for 2014-2020 in the form of polycentric development principle⁴ and the Guidelines for the Regional Policy for 2013-2019.

1.3 Structure of the national research and innovation system and its governance

The governance of the national research and innovation system can be characterised by the main actors at the political, operational and performance levels (see Figure 1).

The highest management level in the national research and innovation system is occupied by the Saeima (Parliament) and the Cabinet of Ministers where the Saeima has the supreme legislative power and the Cabinet of Ministers is the highest executive body.

Considering the second, third and fourth paragraphs of the article 13 in the Law of Scientific Activity, the Cabinet of Ministers determines the country's scientific, technological development and innovation policy, but its development is the responsibility of the Ministry of Education (science and technology policy) and the Ministry of Economics (innovation policy). The Cabinet of Ministers approves the priority directions of the science and national research programs and determines the control procedures of the use of allocated financial resources. Significant role in the implementation of support programs is played by the Ministry of Finance with its power to determine the allocation of financial resources.

MoES and MoE cooperate with other ministries and if necessary consult with industry associations and social partners, including the [Employers' Confederation of Latvia](#) (ECL), [Latvian Chamber of Commerce and Industry](#) (LCCI), the [Latvian Rectors' Council](#) (RC), [Latvian Academy of Sciences](#) (LAS), National Association of Scientific Institutions (NASI), [Latvian Trade Union of Education and Science Employees](#) (LIZDA), [Council of Higher Education](#), [Latvian Association of Local and Regional Governments](#), planning regions and others. Among these advisory bodies interests of companies are represented by ECL and LCCI.

LAS is the science centre of national importance, designed as a membership organization based on scientific excellence the main tasks of which include active participation in the development of the science policy, participation in scientific expertise, fostering engagement of new researchers in science, protection of research ethics, discussion of principles and traditions, development and promotion of international networking, as well as popularization of science.

An important advisory authority to mention is the National Development Council which is a collegial coordinating institution set up by the Prime Minister. It provides planning and evaluation of long-term national development and also encourages structural reforms in public administration, in order to facilitate the link between development and financial

⁴ NDP 2014-2020, p.54, states: "balanced polycentric approach foresees focused investment in national and regional development centres (9+21). Investment in human capital, capital goods and infrastructure will make these the driving forces behind the 'economic breakthrough', providing the neighbouring territories with an impetus for economic activity. A development centre is a territory where resources (including human resources) and social and economic activities are concentrated and which promote the development of the surrounding area. The network of the most important (primary) national development centres consists of development centres of international, national and regional importance, as they are the sites of the greatest concentration of population and economic and social activity". This requires also targeted R&TD policy based on the polycentric approach which is found in the planning documents but does not translate in resource allocation.

planning, and mutual coherence of decisions taken by the state and local governments. The Council's work is provided through the secretariat functions of the [Cross-sectoral Coordination centre](#).

STI funding is administered by the MoES itself, [the State Education Development Agency](#) (SEDA), [Administration of Studies and Research](#), [Central Finance and Contracting Agency](#) (CFCA), [Latvian Council of Science](#) (LCS), [Investment and Development Agency of Latvia](#) (LIAA) and [the Latvian Guarantee Agency](#) (LGA).

The main research performers in Latvia include higher education institutions and their research institutes as well as 12 independent state research institutes⁵ with certain research activities undertaken also by enterprises.

According to an expert assessment⁶ the overall level of research quality, management and infrastructure in Latvia is not satisfactory. Only 15 out of 150 evaluated research institutes and research departments of HEIs received the highest evaluation and were recognized as international players from which 13 are situated in the capital city Riga, 1 in Ventspils and 1 in Daugavpils. Until April 10th, 2013 150 research institutions were registered at State Register of Research Institutions. After amendments in the [Regulations No 1316 "Order of calculation and allocation of institutional funding to research institutes"](#) the number of registered institutions was reduced to 90, 46 of which were founded by public organisations. The international evaluation stimulates further consolidation of research resources by merging weakest institutions with excellent ones, by consolidating similar research structures (representing the same area or subsector) and limiting further support only to PROs which after the consolidation process will have more than 25 FTE of research personnel (in several specific sectors 10 or 5).⁷

As regards the affiliation of researchers (3,904 FTE in 2012⁸) by sectors of performance, 66.8% are currently affiliated to HEI, 15.2% - to the business sector and 18% are employed in the government sector.

The current enterprise structure of Latvia is composed mainly of small- and medium-sized enterprises (SMEs) (99.6%), of which 86.2% are micro-enterprises, the majority in low labour cost and low and medium technology sectors.⁹

⁵ <http://izm.izm.gov.lv/nozares-politika/zinatne/zinatn-instit.html>

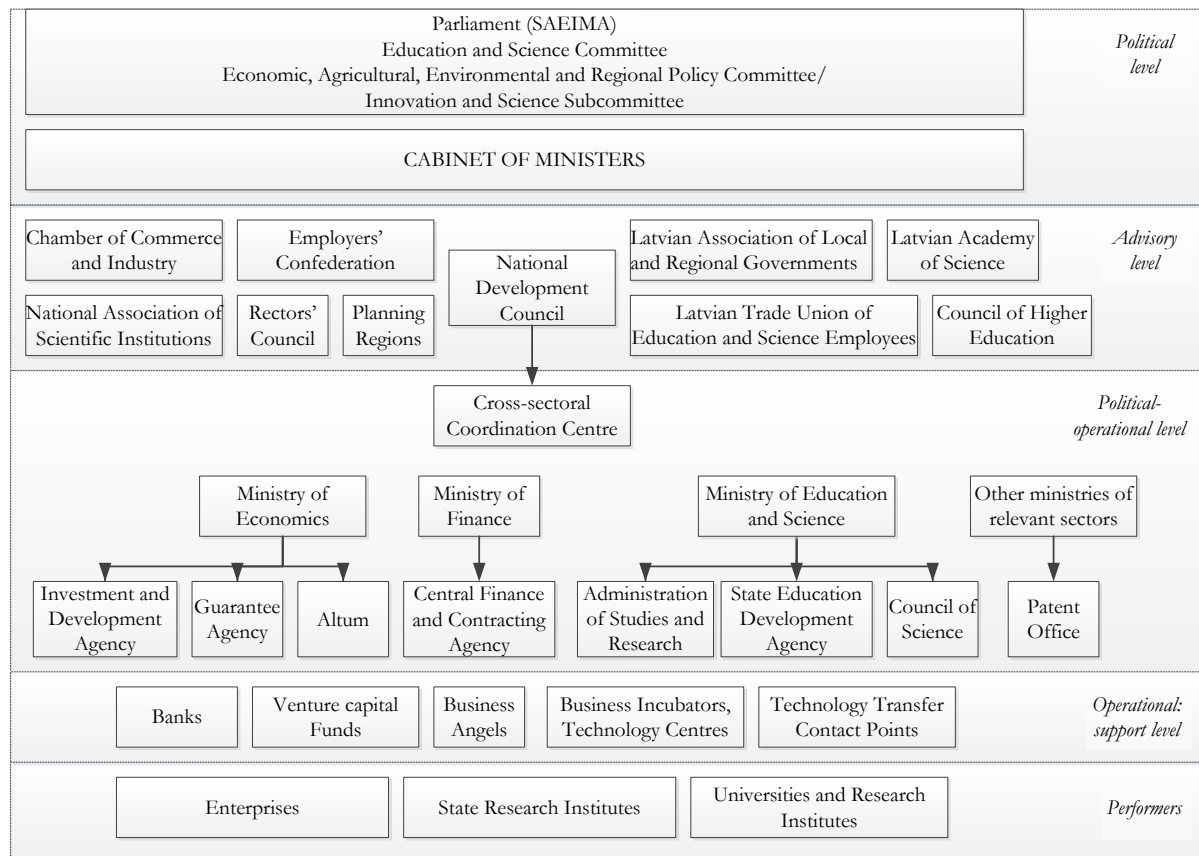
⁶ Informative report "On the international scientific assessment", <http://polsis.mk.gov.lv/view.do?id=4645>

⁷ Information Report in State research structural reforms implementation till July 1st, 2015 from September 11th, 2014), p.20

⁸ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00004&plugin=1>

⁹ Report on National Economy Development, MoE, December, 2014, p.126, see: https://www.em.gov.lv/files/tautsaimniecibas_attistiba/2014_dec_lv.pdf

Figure 1 Organisational structure of the Research and Innovation system in Latvia



Source: compiled by the authors of the Report

Main changes in 2009

Approval of the Guidelines for the Development of Science and Technology for 2009-2013, attempt to re-introduce medium-term planning
New policy announced to concentrate the best performing PROs in 9 consortia of Scientific Centres of State Significance able to demonstrate high research quality
Dominance of investment policy measures supporting higher education and science in research institutions compared to soft policy measures

Main Changes in 2010

Focus on R&D demand side stimulation: launch of the Competence Centre Program.
Qualitative and immediate shift in local competition criteria determining international performance of research institutions
Introduction of stricter rules to calculate FTE of academic personnel involvement in research activities separating from teaching workload

Main changes in 2011

V. Dombrovskis government was approved with its strong focus to introduce wide reforms in MoES, Research and Education systems; in the meantime key priority remained to enter the Eurozone market and to follow tight IMF austerity policy and financial guidelines without real focus on economic development and structural changes
ESF based policy measures helped to retain PhD students in Latvia, stimulated several talented post-docs to return and essentially contributed to start scientist generation renewal
Policy measures designed to foster private R&D investments: Competency centres, industrial clusters, support to new product design and testing, support to applied research, Market orientated research scheme etc.

Main changes in 2012

Approval of NDP 2014-2020 by Parliament lowering GERD target from 3% to 1.5% of GDP, but meanwhile stressing too optimistic economic growth forecast
Latvia followed the EU requirement to introduce three year policy and budget planning practice
Reorganisation of MoES

Main Changes in 2013

Independent international evaluation executed of the research system and individual research institutions dividing all in five performance based levels
New competitiveness driven procedure for the distribution of state funded research grants
Continued government support for international science and research collaboration as financial support to participate in EU funded competitive research programmes

Main Changes in 2014

Review of the Institutional funding allocation system aiming to cut support to the two lowest levels of research institutions
Introduced further policy measures to consolidate and merge research institutions aiming to integrate the weak ones into excellent ones thus reducing overall number to approx. 30
Strengthened the approved state research program's projects by allocating additional financing to the best proposals in priority research areas
Creation of National Innovation and Technology Council under Prime Minister's Office

2. Recent Developments in Research and Innovation Policy and systems

2.1 National economic and political context

The high economic growth and inflow of foreign capital in the pre-crisis period increased private consumption and investments in Latvia. Average GDP growth in the period 2004-2007 reached 10.5% per annum and was accompanied by growing state budget deficit, rapidly increasing imports, high current account¹⁰ deficit and high state foreign debt (133% of GDP). Due to the global financial crisis foreign capital inflow halted and the overheated economy (mainly caused by investments in real estate) slid into a deep economic downturn, which led to borrowing from international finance organisations and implementation of strict austerity policies for the next 4-5 years.

Table 1 Latvia: Key Economic Development Indicators¹¹

Position	2008	2009	2010	2011	2012	2013	2014f	2015f
GDP at current prices, billions EUR	24.4	18.9	18.2	20.3	22.0	23.2	24.0	24.8
GDP growth, % compared to previous year	-3.2	-14.2	-2.9	5.0	4.8	4.2	2.3	2.0
Exports, % compared to previous year	2.4	-12.9	13.4	12.0	9.8	1.5	1.7	1.0
Export – Import balance, % of GDP	-13.6	-1.5	-1.5	-5.0	-4.4	-3.2	-2.6	-1.7
Public budget balance, % of GDP	-4.0	-8.9	-8.2	-3.4	-0.8	-0.9	-1.4	-1.0
Changes of number of employed (aged 14-75), % compared to previous year	-0.2	-13.9	-6.4	1.3	1.6	2.1	1.1	0.2
Unemployment rate	7.7	17.5	19.5	16.2	15.0	11.9	10.9	9.8

f - forecast

Since 2010, the economic downturn in Latvia was replaced by moderate growth. In 2011 and 2012, GDP has increased by almost 5%, but in 2013 – by 4.2%. The growth slowed down to 2.8% in the 1st quarter of 2014, compared to the respective period of the previous year. Although the economy of Latvia has been growing during last three years, the GDP is still by 5.3% lower than before the recession – at the end of 2007.

Exports of Latvian goods and services are the driver of the economy surpassing the pre-crisis volumes by 20% in 2013. Positive export trend in 2013 showed the sectors of machinery production, wood and timber products, agriculture and food products. So far the global competitiveness of indigenous firms has been achieved mainly due to the cuts in labour costs, but further improvement of competitiveness will depend on productivity growth and their readiness for technology absorption. Turbulences at external markets like

¹⁰ At the end of 2007 unbalanced current account deficit for several years reached 22.5%. Report on Economic Development of Latvia, June, 2014, MoE.

¹¹ Data source: Report on Economic Development of Latvia, December, 2014, p.9, see: https://www.em.gov.lv/files/tautsaimniecibas_attistiba/2014_dec_lv.pdf

the ones introduced by the EU trade restrictions to Russia and the crisis in Ukraine will also play a role.¹²

The reduction of investments in the Latvian national economy in 2013 by 4.3% compared to 2012 (21.1% of GDP) was related to still weak lending and uncertain external situation. The investment trends were influenced also by the completion of large investment projects launched in the energy sector in 2012. The investment amount in the 1st quarter of 2014 was by 2.2% higher than a year before. The state intervention with EU SF to co-finance so far weak bank lending provides a significant support for private investments. Incoming foreign direct investments (FDI) have been gradually increasing since 2010. The net incoming FDI flows, reaching 5.1% of GDP in 2011, constituted 3.9% in 2012, while in 2013 – 2.6% of the GDP.

The GDP of Latvia in 2013 is, in current prices, €23.3b, of which only 13% was provided by the industrial manufacturing sector ([CSB, 2014](#)). The major share of Latvia's GDP (73%) currently derives from the service sector, where only a few companies have a turnover above €100m. Service sectors, however, do not need and do not include significant contributions in terms of local research based product innovation. The state budget for 2015 was approved with 1% deficit at 2.8% GDP growth rate. In January MoE and National Bank reduced GDP growth forecast to 2.0% in 2015.¹³

The current enterprise structure of Latvia is composed mainly of small- and medium-sized enterprises (SMEs) (99.5%), of which 92% are micro-enterprises, the majority in low labour cost and low or medium technology sectors. Their low and actually decreasing capacity to invest in R&I is demonstrated by the fact that, according to the Innovation Union Scoreboard 2014, only 10.3% of SMEs introduced product or process innovations in Latvia, while the EU-27 average was 38.4%. As summarised by the Global Competitiveness index, Latvia is still in the transition from an "Efficiency driven" to an "Innovation driven" economy¹⁴.

During the period 2008-2010 only 364 enterprises were innovation active enterprises (19.2% from the total number of enterprises) out of which 51.6% were small enterprises, 38.5% - average size enterprises and 9.9% - large enterprises¹⁵. Total high-tech trade exports in 2012 were €435m¹⁶ with dominating product groups – electronics-telecommunication (52.4%), computer-office machines (20.5%) and electrical machinery (11.3%).

¹² Report on Economic Development of Latvia, December, 2014, p.9.

¹³ See: https://www.em.gov.lv/files/tautsaimniecibas_attistiba/2014_dec_lv.pdf , p.9.

¹⁴ Global Competitiveness report 2014-2015.

http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf

¹⁵ http://data.csb.gov.lv/pxweb/lv/zin/zin_inovac/IN0010.px/table/tableViewLayout1?rxid=cdbc978c-22b0-416a-aacc-aa650d3e2ce0

¹⁶ <http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

2.2 National R&I strategies and policies

The period before entering the EU was characterized by lack of real political will to design high quality innovation policy strategy. The first attempt for systemic targeted innovation policy was through the FP5 project “RIS Latvia”¹⁷.

The growth encouraging [National Development Plan 2007-2013](#) (NDP) showed strong political will to reach the three defined priorities – 1) an educated, satisfied and creative individual in the centre of whole NDP, 2) technological excellence and flexibility of companies, 3) development of outstanding science and research. However, the [New Program for Promotion of Business Competitiveness and Innovation for 2007-2013](#) was an attempt by MoE to merge four policies¹⁸ in one with less focus on RTDI.

Since 2008, under sharp economic recession, the government followed the strict formula: “expenditure reduced – taxes increased” required by the IMF experts.¹⁹ The NDP 2007-2013 was replaced by [Latvian economic stabilization and growth revival program](#) and several short-term measures for cutting budget expenses dominated over long-term development prospects of the national economy. Policy of balanced budget and joining the Eurozone were the key priorities until 2014 dominating over sufficient investment in sectors like education, science, research, and innovation.

In 2009, the [Cabinet](#) of Ministers adopted a nation-wide strategic document on the [Guidelines for Development of Science and Technology for 2009-2013](#) – which was drafted by the MoES in collaboration with the MoE. The document highlighted the goal of establishing science and technology as a basis for the enduring development of civil society, long-term economic growth and cultural progress, thereby securing the evolution of the knowledge-based economy and sustainable development. On April 26, 2011, the [Cabinet of Ministers](#) approved the [National Reform Programme of Latvia for the implementation of the “Europe 2020” strategy](#) (NRP) setting the following targets: 1.0% of GDP by 2015 and 1.5% by 2020.

The new [Guidelines for the Development of Science, Technology and Innovation for 2014-2020](#) (STI) were approved by the [Cabinet](#) of Ministers on December 28, 2013. These Guidelines implement new horizontal approach to science and innovation policy, linking research and industry sectors in a single system, targeting policy problem analysis and suggested solutions to the fields of science, technology and innovation and their links with the industry issues. The main directions of the development of Latvian innovation system are the following: 1) the development of the potential of scientific activity; 2) the development of the platform for long-term cooperation between researchers and enterprises; 3) the support of the development of innovative enterprises.

The aim of the STI Guidelines is to raise the global competitiveness of Latvian science, technology and innovation, satisfying the development needs of Latvian society and economy.

¹⁷ The project's outcome (The Latvian Innovation System. Strategy and Action Plan 2005-2010, was assessed as success story among CEEC regions. See: RIS Latvia as an example of a successful RIS. In: Innovating regions in Europe. Today's network for tomorrow. EC, DG Enterprise and Industry, 2005, p.16.

¹⁸ The merged ones were: Industrial Policy, SME policy, Innovation Policy and Plan to reduce administrative barriers

¹⁹ Bikse V. et.al. Causes of Economic Contraction and the Evaluation of the Economic Stabilisation Program in Latvia. Proceedings of UoL. Economics, Management Science. 2009, vol.743, pp.251-265 (in Latvian).

The STI Guidelines underline the main weaknesses²⁰ in the Latvian innovation system: weak orientation of the current business model to innovation; weak cooperation between business and science and insufficient use of creative and intellectual capital in the creation of innovation; weak capacity of the education system to provide a match between labour demand and supply; insufficient capacity of science, research, technology development and innovation; growing regional disparities²¹). These weaknesses are planned to be reduced or eliminated through four types of actions (and sub-priorities):

1. increasing the competitiveness of STI;
 - 1.1. developing human capital;
 - 1.2. promoting research excellence;
 - 1.3. reducing fragmentation of resources;
 - 1.4. support internationalization and global collaboration of research;
2. linking the STI with the development needs of society and economy;
 - 2.1. creation of 6 main research platforms in priority areas relevant to society;
 - 2.2. encourage ministerial and local government procurement of research services;
 - 2.3. integration of education, science, technological development, innovation, and entrepreneurship;
 - 2.4. strengthening of innovation and knowledge absorption capacity in enterprises;
3. effective management of STI;
 - 3.1. improvement of coordination;
 - 3.2. Increase of investment performance;
 - 3.3. state budget increase for STI implementation;
 - 3.4. increase of Institutional (State budget) and allocation in accordance to Regulations on Institutional financing;
 - 3.5. increase of competitive financing;
 - 3.6. design of new financial policy measures;
 - 3.7. support for science in HEIs;
 - 3.8. create policy monitoring and economic impact control system;
4. raise awareness of society and promotion of science and innovations.

For the implementation of activities planned in the STI Guidelines the required total state budget for the period of 2014-2020 is €603m. Total financing from the Structural Funds for this period is planned to be €548m from which €231m will be administered by the

²⁰ STI Guidelines full SWOT is presented in chapter 4 of STI, p.34-35.

²¹ Guidelines for the Development of Science, Technology and Innovation (STI) for 2014-2020, p.17. Sustainable policy for the country is based on spatially equal polycentric development where territory is divided into 5 historical regions, their development is based on four level division: three level administrative centres each of them having different roles, resources and competitiveness: international recognised growth centres (Riga and ones in distance more than 100 km from Riga) – Riga, Daugavpils, Liepaja and Ventspils, Regional centres of national significance – Rezekne, Jekabpils, Valmiera, Jelgava and Jurmala; small cities and villages and rural territories all together forming 112 districts (novadi).

Ministry of Education and Science, €221m – by the Ministry of Economics and €6m – by the Ministry of Culture and €90m – by other ministries. At the end of 2014 the medium term budget planned in the law for the year 2014 is €30.4m, for the year 2015 – €39m and for the year 2016 – €49m which is not enough to achieve the objectives of the National Development Plan 2020 to reach the R&D investment of 1.5% of GDP.²²

The STI Guidelines are connected and developed in accordance with the following policy planning documents:

- [Sustainable Development Strategy of Latvia until 2030](#);
- [National Development Plan for 2014-2020](#);
- [Guidelines for the National Industrial Policy for 2014-2020](#);
- [Guidelines for the Regional Policy for 2013-2019](#).

In the years 2013-2014 the following policy initiatives (laws, regulations and support measures) have come into force:

- [Guidelines for the National Industrial Policy for 2014-2020](#) (28.06.2013.);
- [Guidelines for the development of Information Society for 2014-2020](#) (14.10.2013.).
- [Regulation of Research and Innovation Strategic Council](#) (Reg. of Cabinet of Ministers No.553, adopted 16.09.2014.).
- [Latvia's Stability Programme for 2014-2017](#) (29.04.2014).

The aim of the Guidelines for the National Industrial Policy for 2014-2020 is to promote economic structural changes, increasing the production of goods and services, which provide a higher added value, including increasing the role of industry, allowing to modernize the industry and services, as well as improve and expand exports.

The aim of the Guidelines for the Development of Information Society for 2014-2020 is to provide opportunity for everyone to use possibilities offered by information and communication technologies, to develop knowledge based economy and improve the overall quality of life contributing to the increase of effectiveness of public administration, national competitiveness, economic growth and jobs creation.

It should be noted that development and confirmation of regulations occurs with a significant delay. For example, the [Guidelines for the Development of Education for 2014-2020](#) in the Cabinet of Ministers have been approved only on May 22, 2014 but the [Guidelines for the protection and security of intellectual property rights for 2014-2018](#) at the end of October 2014 have not been confirmed yet.

Development and implementation of the policy planning documents is one of the weakest components in the national innovation system in Latvia. The laws developed by the government and the investment in the education and science determine whether innovative solutions emerge, and whether it is possible to convert them into specific products. Without strategic and coherent public action, fostering of innovation and strengthening the knowledge base and fundamental research it is not possible.

²² Guidelines for the Development of Science, Technology and Innovation (STI) for 2014-2020

The Ministry of Agriculture is responsible for the [Rural Development Program 2014-2020](#) which states that there is insufficient collaboration and application of science outputs in rural farms and food processing units, as well as to the forest and woodworking sectors. The Ministry of Regional Development and Environmental Protection manages substantial financing for balanced polycentric development reducing existing regional disparities and promoting the development of national and regional growth centres, however there is no role foreseen for regional research and scientific centres.

[State Environment Development Program's Guidelines for 2014-2020](#) were adopted by Cabinet of Ministers on March 26, 2014 (decree No.130) and it emphasises the importance of increasing research potential for the Environmental sector, creating a new research institute for Applied Ecology and merging all distributed scientific disciplines in this new organisation.

Sectorial RTDI policy measures are integrated into generic or basic RTDI / STI policy programs and Operational sub-programs. For the new planning period the government has defined six priority research directions (in Regulation No.551 from 20.11.2013; Rec. No.60 34.§):

1. Environment, climate and energy (environment, ecosystems and biological diversity, renewable resource usage, energy independence, power safety increasing technologies, carbon low intensity manufacturing promotion, reduction of climatic changes and adaptation to climatic changes).
2. Innovative and upgraded materials, smart technologies (multifunctional materials and composites, nanotechnologies and photonics, informatics, computer science, information and communication technologies, signal processing technologies).
3. Society health (prophylaxis, diagnostics, medicine, clinical medicine, medical techniques and technologies, medications and biomedical technologies).
4. Investigation and sustainable use of local resources (earth, water, agriculture and forest resource acquisition technologies and food technologies, biotechnologies).
5. Sustainable development (society, governance, resources, national economy, demography, environment).
6. Letonics (history of Latvia, language, culture, values).

For the development of the Latvian scientific potential in 2013 there were continued activities aimed at establishing competitive research institutions with modern infrastructure and equipment and increasing the number of people employed in science and research. The Ministry of education and science in the year 2013 continued to provide support to the five National research programs²³ for the implementation of the interdisciplinary research in the five priority areas approved by the Cabinet of Ministers.²⁴ There were continued activities financed by the EU Structural funds in the development of research infrastructures and support for practically oriented research projects through the activity "Support for science and research".

²³ <http://izm.izm.gov.lv/nozares-politika/zinatne/valsts-petijumu-progr/7303.html>

²⁴ Priority areas are fixed in a Law on Personnel Income Tax, published in Likumi.LV.

Table 2: Latvia's smart specialisation and research priorities²⁵ and societal challenges addressed by Horizon2020

Horison2020 priorities	Main specialisation and priority sectoral areas	Planning document
Health, demographic change and welfare	Biomedicine, medical technologies, biopharmacy and biotechnologies Society health	S3 CoM No.551,
Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bio-economy	Knowledge intensive bio-economy Local resource investigation	RIS3 CoM No.551,
Secure, clean and efficient energy	Smart energy	RIS3
Smart, green and integrated transport	N/A	
Climate action, environment, resource efficiency and raw materials	Environment, climate and energy Local resource investigation	CoM No.551, 2013
Europe in a changing world - inclusive, innovative and reflective societies	Sustainable development	CoM No.551
Secure societies - protecting freedom and security of Europe and its citizens	N/A	
Other from H2020	Smart materials, technologies and engineering systems; ICT (and signal processing) Multifunctional materials, smart technologies, nanotechnologies Letonics	RIS3 CoM No.551

Note: CoM N0.551 – Decree of Cabinet of Ministers, No.551, from November 20th, 2013 “On priority research areas in 2014-2017”²⁶

RIS3 – smart specialised strategies for Latvia

2.3 National Reform Programmes 2013 and 2014

The implementation of Latvia's RDTI strategy has been specified by MoE in its [National Reform Programme](#) (NRP, 2011) – a document which presents the country's policies and measures to sustain growth and jobs and to reach the Europe 2020 targets. The National Reform Programme is presented in parallel with the Stability/[Convergence Programme 2012-2015](#), which sets out the country's budgetary plans for the coming three or four years. The NRP remains the most recent²⁷ strategy document and sets the following priorities with regard to the R&D domain, reaching the target for R&D intensity of 1.5% of GDP in 2020:

²⁵ There are several documents defining sectorial priorities and this is attempt to visualise all of them in accordance to Horison2020 societal challenges

²⁶ <http://likumi.lv/doc.php?id=262091>

²⁷ http://ec.europa.eu/europe2020/pdf/nd/nrp2013_latvia_en.pdf

- Advancement of the potential of scientific activity: the aim is to increase the number of employed persons in science and research, to turn existing scientific institutions into competitive excellence centres with up-to-date technical supply – 9 national level research consortia. The total public financing is €120.52m, including the EU funds financing – €106.72m (2011-2013), which is aimed to attract also financing from the private sector to the amount of €22.34m during this period.
- Development of a long-term cooperation platform between enterprises and scientists; and supporting joint research as well as fostering technology transfer. The measure includes support to competence centres (2010–2015), technology transfer contact points (2009–2013) and development of promoting commercialization research infrastructure (2011–2015) and practice-oriented research. Public financing provided for this priority in 2011–2013 is €99.04m, including EU funding – €96.90m that might allow attracting also private financing in the amount of at least €33.44m.
- Support for development of innovative enterprises: entrepreneurs can receive grants for introduction of new products and technologies in production (2011–2013), support to high value added investment projects (2010–2013), support to Technology (Green) Incubator for development of innovative environmentally friendly products and technologies and their introduction in production at the technology incubator (2011–2015). The public financing for grants in 2011–2013 is €140.73m, including the EU funds financing – €134.18m and Norwegian Financial Instrument – €5.7m that allows attracting private sector investments in innovations in the amount of €270.35m.

The Convergence Program addresses the last two priorities, focusing more on promoting collaboration between academia and industry in 6 competence centres and 8 industrial clusters, new innovative start-up creation in Technology Incubators and promotion of new products in SMEs. Another priority is to increase the number of high quality PhDs in natural sciences and engineering disciplines – both local and foreign students. The bottleneck here might be missing technology service intermediaries (design bureaus, experimental / pilot prototyping centres, specialised innovation centres etc.) as SMEs according to several sources²⁸ need more testing and experimental knowledge services and more post-doc scholarships to stop talent outflow.

These priorities have been selected mainly because of the low share of R&D in GDP, which is explained by extremely small amount of state budget funding, and weak firm demand resulting in insignificant contribution of the private sector to research. Having such continuously limited investments in RTD for more than 20 years, the key challenges to be addressed by the listed priorities are:

- (1) the small number of employed and the ageing of personnel in science and research²⁹;
- (2) underdeveloped scientific and research infrastructure³⁰, lack of targeted finance needed for frontier large scale research infrastructure development, maintenance and operation;

²⁸ Research Guidelines 2014-2020, p.30, Informative Report on 3S, p.13; National Industrial Policy Guidelines 2014-2020, p.24, p.35

²⁹ 2-3 times less than EU average “per capita” indicators, but successful in international quality tests. Ageing of scientists. Insufficient number of doctoral candidates.

³⁰ Insufficient number of up-to-date equipped laboratories for implementing technology-oriented projects. Technopolis. The role and added value of large-scale research facilities. Final report, 10 February, 2011, 57 p. And Simmonds P., Kraemer-Mbula E., Horvath A., Stroyan J., Zuijdam F. Technopolis. Big Science and Innovation. 5 July, 2013, 144 p., www.technopolis-group.com

- (3) undeveloped commercialisation potential of research output³¹;
- (4) lack of motivation to cooperate between academic and industrial sector;
- (5) low share of high-tech products in export;
- (6) limited capacity of research performing SMEs, small number of high growth start-ups, growth companies and greenfield companies needed to move Latvia towards a knowledge based economy and high added value production.³²

The [NRP Progress Report](#) (April 29th, 2014) outlines that a pre-condition for the cohesion financing investment is further consolidation of the number of research institutions, reducing fragmentation and increasing their international competitiveness and capacity for the period 2014–2020, as well as concentrating investments in smart specialisation areas. This goal can be achieved by supporting the design of applications in 2014-2015 for Horizon2020 programme, allocating additional financing for PROs on competitive basis in total available amount of €2m for second call of program 2.1.1.2.³³ In 2013 were approved 48 ERDF financed projects for science thus creating new jobs for young researchers and stimulating collaborative research between industry and academia with total amount of €23.1m. 24 projects with financing of €9.2m reflect research activities performed in state's science priority areas.³⁴

2.4 Policy developments related to Council Country Specific Recommendations

On 2.6.2014 the Council of the European Union adopted [Country Specific Recommendations](#) on Latvia's 2014 national reform program and delivered a Council's opinion on Latvia's 2014 stability program.

The Evaluation of the European Union Council regarding science, research and innovation is "that despite an originally ambitious plan to reform higher education, Latvia has made no progress in setting up an internationally approved accreditation system, plans to introduce a new financing model are uncertain, consolidation of higher education institutes has been weakened and restrictions on the use of foreign languages remain unchanged"³⁵.

In the medium to long term, Latvia faces a number of challenges, in particular to improve the quality of higher education and science output, to reform social assistance, to build energy links to European networks and further improve the efficiency of the judicial system.

Other science and research recommendations include establishing independent accreditation agency and a financing model that rewards quality, providing career guidance at all education levels, improving the quality of vocational education and training,

³¹ Acute lack of professional science managers having natural science or engineering background,

³² There are very few companies of scale able to invest substantial amount annually in RTDI, there is missing any entrepreneurship program like in Scotland to promote such medium or high-tech firms. See: Reid A. A smart, sustainable nation? A review of Scottish research and innovation policy in the context of the smart specialisation agenda. Technopolis, August, 2012, 56 p.

³³ Regulations of CoM No.571 from September 23, 2014, available at <http://likumi.lv/doc.php?id=269331>

³⁴ CoM Decree on priority areas in research in 2014-2017, No.551, from 20.11.2013;

<http://likumi.lv/doc.php?id=262091>

³⁵ http://ec.europa.eu/europe2020/pdf/csr2014/csr2014_latvia_en.pdf

developing more integrated and comprehensive research system by concentrating financing towards internationally competitive research institutions³⁶.

The Commission Staff working document³⁷ in the overview assessment (page 27) includes the already discussed warning about Latvia's R&D target: 1.5% of GDP in 2020: "The R&D target is very ambitious. In order to reach it, Latvia needs an average annual growth rate of 9% for R&D expenditure".

Recommendation On June 2 2014³⁸ repeats this, stressing that the higher education system is too large in view of the declining population, offers too many distinct study programmes and has a limited attraction for foreign students and teaching staff. Only 10% of research centres can be considered as high-level international research centres. Moreover, Latvia had an R&D intensity of only 0.66% of GDP in 2012 and is not on track to achieve its Europe 2020 objective of devoting 1.5% of GDP to R&D.

These points show that the Council Country Specific Recommendations towards HE and RDI policy developments provided in the period 2013-2014 demonstrate that Latvia faces serious problems and that urgent reform actions are required.

Some policy initiatives aimed at addressing the Country Specific Recommendations include:

- Policy instruments (launched in 2012) managed by the Latvian Investment and Development Agency and geared towards the industrial sector should also be mentioned: [Support for development of new products and technologies](#); [Support for establishing industrial property rights](#); [Support for introduction of new products and technologies into production](#);

Specific note should be taken about the activities aimed at enhancing [motivation for innovation and business start-ups](#). The proposed instrument is theoretically well-designed, but is not sufficiently well adjusted to the realities faced by a research community, where the employment position of researchers is extremely insecure. When employed full-time on one or two projects; a researcher has no time to think about start-up projects. Furthermore, research institutions have little institutional funds to retain researchers for creative work on new scientific or applied project ideas. Together with the above-mentioned shortage of RTD personnel, such instruments face a risk of ineffective implementation.

2.5 Funding trends

2.5.1 Funding flows

GERD as a percentage of GDP in Latvia reached a historical maximum of 0.70% in 2011 but then started to decrease, going down to 0.66% in 2012, and 0.6% in 2013 (see Table 3 below) in the conditions of stagnating R&D funding from the state budget. The situation in 2012 and 2013 was improved by the inflow of EU Structural Funds and FP7 project funding.³⁹ In absolute figures, total government budget outlays on R&D (GBAORD) have

³⁶ http://ec.europa.eu/europe2020/pdf/csr2014/csr2014_latvia_en.pdf

³⁷ Brussels, 29.5.2013 SWD (2013) 364 final Commission Staff Working Document Assessment of the 2013 national reform program and convergence program for LATVIA

³⁸ P.4. http://ec.europa.eu/europe2020/pdf/csr2014/csr2014_latvia_en.pdf

³⁹ Latvia's success in FP& is analysed in MIRRIS Interim Report, 2014, see http://www.mirris.eu/Downloads/MIRRIS_Scoping_Paper_vs_16.5.14_Part_1.pdf and

decreased from €53m in 2008 to €33-34m in 2013. According to the three year state budget forecast, this is unlikely to change before 2016. In its overall trend in GERD Latvia is still far behind the EU-27 average of 2.07%, ranking among the most lagging EU MS since early 1990s. According to Eurostat, GERD by sectors of performance in 2012 was as follows: higher education sector 2%, business enterprise sector 23.7%, government sector 23.9% and from abroad 50.4%⁴⁰.

Following accession to the EU in 2004, a national target of 3% of GDP was set for GERD. However, the provision stipulated by the [Law on Research Activity](#) (2005 and still in force), which envisages an annual increase of GBAORD by 0.15% of GDP until it reaches 1%, has not been enforced because of the economic crisis. This is not expected to change in the coming years. It will be difficult for Latvia to reach the revised GERD target of 1.5% of GDP by 2020 as referred in National Development Plan for 2014-2020. Yet, in line with financial trends (see table 3 below) the growth scenario forecasts around 1% as a more realistic value in 2020.

Table 3: Basic indicators for R&D investments.

	2009	2010	2011	2012	2013	2014 e	EU28 (2013)
GDP growth rate***	-17.7	-1.3	5.3	5.2	4.1	3.5	0.1
GERD (% of GDP)	0.46	0.60	0.70	0.66	0.6		2.07 (2012)
GERD (€ million)	84.88	109.6	141.4	145.4	139.2		
GERD (euro per capita)	39.0	52.94	69.15	71.84			530.1 (2012)
GBAORD – Total R&D appropriations (€ million)	37.997	28.9	31.9	34.7	33.3		90 505.611
R&D funded by Business Enterprise Sector(€ million)	30.89	42.50	35.1	34.6	30.4		
R&D funded by Business Enterprise Sector (% of GDP)		38.77	24.82	23.79	21.84		1.12% (2011)
R&D funded by Private non-profit (% of GDP)							0.03% ^e (2011)
R&D funded from abroad (% of GDP) (€ million)		36.6	72.1	73.3	71,8		0.19% (2011)
R&D funded by Framework Programmes (€ million)							
R&D funded by the Structural funds (€ million)							
R&D related FDI (€ million)							
R&D performed by HEIs (€ million)	33.1	43.8	69.2	73.1	59.5		
R&D performed by HEIs (% of GERD)	39	39.96	50.21	50.27	42.74		23.6% (2012)
R&D performed by Government Sector (€ million)	21.0	25.2	33.0	39.4	40.3		
R&D performed by Government Sector (% of GERD)	25	22.99	23.39	27.10	28.95		12.2% (2012)

http://www.mirris.eu/Downloads/MIRRIIS_Scoping_Paper_vs_16.5.14_Part_2.pdf. See also Technopolis NIS Review Report, p.26.

⁴⁰

<http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsc00031&language=en>

	2009	2010	2011	2012	2013	2014 e	EU28 (2013)
R&D performed by Business Enterprise Sector (€ million)		40.5	39.3	32.9	39.4		
R&D performed by Business Enterprise Sector (% of GERD)		36.95	27.79	22.63	28.30		63.3% (2012)
Share of competitive vs. institutional public funding for R&D	83.0	83.0	89.6	89.7			
Employment in high- and medium-high-technology manufacturing sectors as share of total employment	2.5 (3.0 in year 2007)	2.5	2.5				5.6% (2011)
Employment in knowledge-intensive service sectors as share of total employment	45.8	45.6	45.6				38.9% (2011)
Turnover from Innovation as % of total turnover*	5.9 in 2008	3.1					13.4% (EU-27, 2010)

* <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsdec340>

** http://ec.europa.eu/enterprise/policies/finance/data/enterprise-finance-index/venture-capital/index_en.htm

*** Ministry of Economics, Report on Economic Development of Latvia, June, 2014

As seen in Table 3, the last 10 years have witnessed considerable growth in the share of EU SFs (ERDF/ESF)⁴¹ in total R&D funding in Latvia, reaching 50.99% in 2011 (EU SFs and FP7 contribution together) and 50.45% in 2012. The same dominance was present in 2013 with a gradually decreasing trend in late 2013 and in 2014 due to a decrease in the money available from Structural funds and EU Framework programme projects due to the transition period between programme and planning cycles.

As for the contribution made by the business enterprise sector to GERD, so far it has been rather low in relative and absolute terms and has been seen as one of the main critical issues in Latvia. Yet, between 2008 and 2010 it has increased slightly (from roughly €35m to €40m) decreasing again to €34.6m in 2012. In 2010 BERD had increased to 37% of all R&D funding in Latvia (25% in 2008), decreasing again to 23.7% in 2012.

Public funding in Latvia is mainly allocated from the budgetary sub-programme covering funding for five national research programmes.

It should be also mentioned that, until recently, there have been no government indirect R&D funding incentives in place to promote RTDI in Latvia, such as R&D tax credits, R&D allowances, reductions in R&D workers' wage taxes and social security contributions, and accelerated depreciation of R&D capital. On the contrary, the Government is taxing VAT in case of FP7 project implementation costs and does not support the amortisation costs of equipment purchased in such projects. However, on November 6, 2013 Saeima adopted [amendments to the Law on Corporate Income Tax](#), which provides that from July 1, 2014 new incentive of the corporate income tax is in force with the aim to encourage the investment of private sector in R&D, providing that certain corporate R&D costs are written off the year in which they arise in the application of value-enhancing coefficient 3. Eligible costs are: compensation of scientific and technical personnel of enterprises, costs of the

⁴¹ Since Latvia is categorised as a single region at NUTS I level, funding co-financed by the ERDF/ESF pertains to the country as a whole.

services of research institutions, services of accredited certification, testing and calibration institutions.

2.5.2 Project vs. institutional allocation of public funding

Funding for science, research and development comes from three main sources in Latvia: state (public) budget funding, European structural funds allocated nationally, and international competitive project funding. At present funding available to Latvian scientists from the state budget is channelled to research institutions through several funding schemes.

Institutional funding (operational in its current form since 2006⁴²)

“Basic” research funding is transferred to research organisations registered in state research institution register using a [formula](#) based on three variables of previous year: sum of average operation costs and research personnel⁴³ costs multiplied by development coefficient. The first variable reflects office space running costs obtained from fixed space (15 sq.m. per one employed individual in research) multiplied by number of FTE researchers, then multiplied by standard calculation of fixed operation costs of premises and further multiplied by coefficient 2.0 in the case of natural and engineering sciences or 1.3 for social and humanitarian sciences. The second variable (average personnel costs) in the formula reflects the number of personnel FTE in organisation in the previous year multiplied by half of a professor's minimal annual income set by [state regulations](#). The third variable (development coefficient) varies in the interval from 1 to 12 and includes contribution of last year outputs such as peer-reviewed scientific papers in various categories, monographs, patents and doctorates produced, as well as the number of international research and development projects generated.

This funding fluctuates around €14m per year and is calculated and distributed to research organisations directly from the [Ministry of Education and Science](#). There have been relevant changes in the legislation regarding allocation of R&D funds in the year 2013. In November 12, 2013 the Cabinet of Ministers accepted amendments in the [Regulations No 1316 “Order of calculation and allocation of institutional funding to research institutes”](#). Every year (by April 1st) research institutions submit to MoES a report containing fair values of all required indicators of the previous year and MoES (by June 1st) should calculate the respective individual share for each research organisation. Finally, institutional funding is corrected proportionally to the available funding in State Budget Law for next year. In the last years it happened quite often that corrections were made to downsize the amounts. When the State Budget Law approval process in Parliament was delayed, the first month

⁴² Until 2005 the Latvian public research organisations as such received no direct funding from the state budget. The necessary financial resources for the maintenance of the scientific institution were obtained as overhead percentages of each grant received. <http://m.likumi.lv/doc.php?id=120650>; http://www.aic.lv/rp/Latv/PROT/200711_seminari/131107_Finans/Meksa.pdf, see page 3, Kristapsons, 2003, p.27 states: “Latvia chose the most radical path: funding was allocated only in the form of grants to research projects”

⁴³ According to Regulations No.1316 the term "research personnel" means elected and employed in research organisations senior researchers, researchers and research assistants. The term “full working time equivalent” (FTE) is the share of worked in research organisation hours from total number of determined by Labour law working hours in particular financing period (in 2013 – 1995 hours, based on 40 hour working week).

of the next year started with payments amounting to 1/12th of the previous year's funding and the real proportions were implemented only later.

Paragraph 11 of the above mentioned Regulation foresees an increase by 10% of the calculated basic infrastructure grant to those research institutions which received an evaluation score 4 or 5 and are among excellence science organisations (since January 1st, 2015) and exclude those whose evaluation marks are 1 or 2 (since January 1st, 2016). Another new development is that since July 1st, 2015 MoES will subtract from the available in the Law on State Budget financing to cover costs of full science paper data bases, operational costs of access to GEANT, costs to maintain local academic network, costs of joint data centre and national research web-site, thus reducing the share of overall institutional financing.

The state budget financing for PhD study programs is also included in the share of total block financing. The total number of doctoral students in a year 2013/2014 was 2404; the state budget covered the study costs of 1628 of them and 776 paid for their studies themselves. In addition, the state plans to allocate €0,85m (€0.17m annually) for doctoral scholarships and €29.88m for thematic doctoral study centres during the period 2016-2020 from the EU SF (Research Guidelines 2014-2020, p.59). The coefficient for doctoral study program is 3 compared to bachelor programs - one. The CoM Regulations No.994 from 12.12.2006 "On state budget financing for HEI and Colleges" determines the formulas with which MoES calculates doctoral study base financing. In reality, like other Institutional funds, it is transferred to HEIs or Colleges in less than full amount. Also, the whole calculation process is only partly transparent.

Project funding

Project funding is in the form of grants for fundamental and applied research projects (operational since 1991), from the [Latvian Council of Sciences](#). Five sectorial councils distribute funds in response of peer review evaluated calls for proposals in five thematic areas of state research programmes – energy and environment, innovative materials and technologies (ICT and signal processing and nanotech), national identity, public health, sustainable use of natural resources (food, forestry). The success rate is about 15% and the average amount distributed annually is of €4.3m.⁴⁴

The [State research programmes](#) (operational since 2005) are in more applied areas and are used for financing joint research projects (operational since 1995). The implementation period of the programmes is four years. In 2012, the total budget for five research programs was €5.69m. The same amount of funding was used in 2013. For 2014 the allocated funding increased up to €6.19m EUR. This financing can be considered as the only state-ordered medium-term applied research funding aimed to meet and explore important for the society challenges and resolve problems in specific priority directions based on RIS3 and relevant in science with the goal to catalyse structural reforms in the Latvian economy.

The *market-oriented research programme* is operational since 1993. To support facilitation of the cooperation between science and business, the Ministry of Education and Science financially supports implementation of market oriented research projects. Within the framework of market-oriented projects scientists and manufacturers cooperate to develop new products and technologies. In this way, scientists do research in close collaboration

⁴⁴ Technopolis Report, p.22

with manufacturers, receiving state budget funds for scientific work, while manufacturers get new competitive products. Funding for this program is allocated annually from state budget. In 2012 it was €157,654, in 2013 – €215,991, in 2014 – €51,334 respectively. From 2015 the market-oriented research programme will be eliminated.

University research projects funding (operational since 2005) was delivered by MoES directly to HEIs which were obliged to organise internal competition among researchers for small competitive grants in the amount of €10-15k. This line of funding was stopped in 2008 with the economic downturn and introduction of strict fiscal measures.

Other forms of allocation are mainly co-financing of approved competitive local or international projects in the form of block funds, e.g. automatically after submission of confirmation letter from Program's secretariat after approved project proposal to MoES. Support was provided by MoES directly as co-financing and non-interest loan for pre-financing in cross-border programs, as well as ERA-NETs, EU Technological platforms, Bonus etc. with total annual funding of €1.43m. In this category we could count also funds allocated within the Academic Network project⁴⁵ aimed to provide better access to internet networks and licensed software, as well as to full text scientific publication data bases.

The main public bodies responsible for allocating state research funds are the [Ministry of Education and Science](#), [Latvian Council of Science](#), while EU structural funds are distributed by the [State Education Development Agency](#). The [Administration of Studies and Science](#) execute the supervision of public research financing administrated by the Latvian Council of Science.

The most recent trends in R&D funding demonstrate that in 2011-2013 the state budget funding for R&D in absolute figures faced minor changes. This will be also the case for the years up to 2016 according to the national budget [Law for 2013](#). In 2012-2013, the national budget was split between institutional funding (40%) and competitive (project-based) (60%) funding.⁴⁶

European funding comes from:

- EU Structural Funds, distributed nationally on competition basis, and
- Framework, cross-border, Regional or thematic research programs, also allocated accordingly to competitive evaluation bases.

When adding to the overall research budget the fully competitive European funding, the research community in Latvia received only 17% of its funding in 2010 in the form of block institutional funding.⁴⁷ Annual reports of particular research institutions give values of approximately 10% or even less.⁴⁸ The minimal viable proportion of institutional funding is believed to be 50%,⁴⁹ as lower levels negatively impact on the stability, continuity, ability to invest in facilities and equipment, recruitment, and finally undermine the efforts to

⁴⁵ Academic Network Project

⁴⁶ Erawatch Reports Latvia for 2014, 2013.

⁴⁷ ERAWATCH Country Report, 2011, p.16.

⁴⁸ VIRAC, Annual Report 2013, FEI Annual report 2013 etc. Informative Report on Research structural reforms from September 11, 2014

⁴⁹ Research and Innovation Council of Finland, Research and Innovation Policy Guidelines 2011-2015, Helsinki, Research and Innovation Council, 2011, See also Technopolis report, p.22

establish collaborative links with industry.⁵⁰ Policy measures aimed to increase share of competitive funding as a tool for yielding higher returns in terms of research output and performance (OECD, 2011a),⁵¹ implemented at the situation of extremely low level of institutional funding lasting for decades are doomed to failure or at least inefficient. Finally, allocated Institutional funding is the main source for Universities and HEIs to find co-financing, pre-financing resources to implement EU SF or other competitive projects. In several occasions such programs do not foresee administrative costs as eligible costs and research organisations cannot always find financing sources.

The available data on budget allocation and planned estimations with moderate growth trends suggest that the competitive funding will continue to dominate in Latvia for the years 2014-2020.

In the new [Guidelines for the Development of Science, Technology and Innovation for 2014-2020](#) MoES on p.50 states that government provides only a small fraction (constituting approximately 25%) of all calculated according to legal acts⁵² amount of research organisations' budget. The Guidelines (p.50) show a will to increase institutional funds up to legally fixed upper level, which means that in 2015 the government needs to find additional €22m to match the planned base financing for research in the Medium term state budget law (€24m). The deficit for 2016 is €13m, and for the years 2017 – 2020 – €58m, €64m, €71m and €77m respectively (Guidelines, p.50). A sign of gradually increasing political will is the minor increase of institutional funds through the allocation of funding for reform and consolidation of research institutions (€11.8m).⁵³ The new Government⁵⁴ Declaration and Action Plan⁵⁵ do not yet foresee to provide Institutional funding in full calculated amount (e.g. 100% instead of 25%, see p.8 of Informative Report and task 9 of Guidelines), or to renew the provision of competitive research grants in universities and HEIs – task 52 of Guidelines, p.70. The optimistic forecasts are that in line with the increase of institutional financing there will also be a gradual increase in the number of researchers in public research organisations (from 1880 FTE in 2015 to 3000 FTE in 2020) mainly due to attracting young researchers and PhD students and replacing ERDF funded project jobs with more stable institutional financing and competitive grants. However, even though the legal regulations have set the lowest rate of gross salary for the position “research assistant” (the most probable occupation for young scientists) in the amount of €587.66 monthly,⁵⁶ the wage rate paid from institutional funds to young scientists almost never exceeds the legally determined lower rate. On the other hand, competitive projects financed from the state budget are limited by hourly gross wages⁵⁷ so it is difficult to generate a smooth continuous flow of projects to avoid part-time unemployment among young researchers. Efforts to find a stable job for such young

⁵⁰ Technopolis Report, p.22., p. 44 TECHNOPOLIS, 20 January 2014 Latvia Innovation System Review.

⁵¹ OECD (2011a): Issue brief: Public sector research funding, OECD Innovation policy platform, <http://www.oecd.org/dataoecd/34/16/48136600.pdf>

⁵² See also Technopolis NIS Review, p.21

⁵³ CoM Regulations No.729 from 25.11.2014., see <http://likumi.lv/ta/id/270790-noteikumi-par-darbibas-programmas-uznemejdarbiba-un-inovacijas-papildinajuma-2-1-1-3-3-apaksaktivitati-zinatnisko-instituciju>

⁵⁴ Approved by newly elected Parliament at November 5, 2014

⁵⁵ Action Plan, see: <http://www.pkc.gov.lv/vald%C4%ABbas-priorit%C4%81tes-2014>

⁵⁶ CoM Regulations No.836 from 28.07.2009 sets wage lower limits for teaching staff in HEIs and universities, but CoM Regulations No.1316 from 12.11.2013. introduces wage value for one FTE research personnel unit as 50% from professors' gross wage lowest rate, which gives us €1175.29 :2 = €587.66

⁵⁷ See more information in Chapter 3

researchers' families for a longer period usually end up with emigration to more developed countries where doctorate scholarship average is at least €1400 monthly.

Table 4: Structure of public research funding, in EUR million.

Funding line	2011	2012	2013	2014	2015	2020
Base infrastructure (Institutional) funding, Budget program 05.02.00	11.30	11.58	11.30	16.76	22.87*	77**
Grants of the Council of Science	3.31	3.30	3.27	4.36	4.38	~5.00
State Research Programs (05.12.00)	5.1	5.69	5.69	5.69	6.19	
Market orientated research grants (05.05.00)	0.168	0.157	0.216	0.051	eliminated	
University research projects	0.0	0.0	0.0	0.0	0.00	3.0
Doctoral base funding (Block funding)***	6.9	6.9	7.0	7.1	7.2	
Financing for participation in EU programs (70.06.00)	1.02	1.02	1.02	1.43	6.81	
Total State Budget Funding****	31.87	34.7	33.3	31.2e	42.08p	

Source: MoES, MoF⁵⁸

*- the value of Base infrastructure budget for 2015 is less by €22m anyway as needed according to MoES calculations based on legal acts, in 2016 this deficit will be €13m as the Law on mid-term budget requires €38m, such practice is in force since financial crisis influence in 2008;

**- total needed financing for Base infrastructure budget for 2020 according to legal acts, source: Guidelines 2014-2020;

*** - reflect only financing paid to universities and HEIs from MoES, which is part from total;

**** - is sum of state budget programs 05.00.00 + 70.06.00 + financing for science, reallocated by separate decisions of CoM from 80.00.00

e-estimation; p-plan in Law on State Budget for 2015

In conclusion, PROs cannot obtain predictable and stable information on available institutional financing and it is almost impossible for research institutions to plan income and budgets for medium term, which makes also personnel policies extremely short term and project financing dependent.

2.5.3 R&I funding

Latvia is characterised by exceptionally low R&D intensity both by the public and the private sector. Low financing from the state budget can be explained by the limited financial resources⁵⁹ and lacking SMEs need targeted approach of existing funding mechanisms to encourage increasing financing from the private sector is caused by the structure of economics and low firms' demand for research⁶⁰.

⁵⁸

http://www.fm.gov.lv/lv/sadalas/valsts_budzets/valsts_budzeta_likums_arhivs/2011_gads_ar_grozijumiem/

⁵⁹ Technopolis NIS Review Report, 2014, p.26.

⁶⁰ OECD, 2015, p.32-33 states that "existing research activities are not very well tuned to business needs"; Technopolis Report, 2014 states at p.23 that "science-industry linkage in Latvia is generally regarded as low".

Table 5: Programs and activities for R&D&I: plan and implementation, 2007-2013.

Classification	Measures	Planned budget, €m	Value of signed contracts*, €m
R&I FUNDING			
Target group – business companies. Managing agencies: MoE			
Innovation-friendly environment	<ul style="list-style-type: none"> • Business incubators • Support for investments of micro, small and medium-sized enterprises in specially assisted areas • Clusters 		<ul style="list-style-type: none"> • 7.83 • 4.56
Technology and knowledge transfer and cluster cooperation	<ul style="list-style-type: none"> • Competence Centre • Technology transfer contact points • Development of new products and technology 	<ul style="list-style-type: none"> • 53.8 • 2.71 	<ul style="list-style-type: none"> • 53.08 • 2.57 • 46.08
R&D in firms; financing	<ul style="list-style-type: none"> • High value added investments • Availability of financing <ul style="list-style-type: none"> -venture capital -seed capital -start-up capital -growth capital -loan fund -micro loans -competitiveness guarantees -export guarantees -security guarantees -mezzanine guarantees • External markets 		<ul style="list-style-type: none"> • 99.32 • 12.1 • 2.34 • 1.26 • 12.24 • 1.8 • 22.06
Total			
RESEARCH FUNDING			
Target group – mainly HEIs and PROs and their researchers. Managing agencies: MoES, SEDA			
R&D Infrastructure	<ul style="list-style-type: none"> • Development of research infrastructure • Improvement of information technology infrastructure and information systems in scientific activity 	<ul style="list-style-type: none"> • 119.00 • 14.96 	
National and international programs for research	<ul style="list-style-type: none"> • Support for science and research • Support for international cooperation projects in 	<ul style="list-style-type: none"> • 75.3 • 6.11 	

MoE stresses that local economics is based on low and medium technology firms with low demand of research (Report on National Economy, December, 2014) but support schemes to foster linkages are more built on competitive advantages of the domestic research for registered in Latvia enterprises and less focused to testing, experimental services and prototyping (see Report on Smart specialisation strategy monitoring system, March, 2015, p.17). Both OECD and Technopolis reports contain recommendations to improve quality of R&I policy governance, evaluation and monitoring which is in a large extent integrated in recent reports of MoES (R&T&D Guidelines, 2013, RIS3 monitoring System 2015 etc.). Meanwhile Technopolis (p.26) indicates to the complexity and high level of administrative bureaucracy of ESF grant programs which demotivate firms to participate at lower level aid intensity calls.

Classification	Measures	Planned budget, €m	Value of signed contracts*, €m
	science and technology (EUREKA, 7th Framework Program, etc.)		
Human Resources for research	<ul style="list-style-type: none"> Attraction of human resources for science Support for implementation of doctoral studies 	<ul style="list-style-type: none"> 79.54 52.89 	
Total		347.80	

* by October 13, 2013

Source: <http://esfondi.izm.gov.lv/1173.html>; Report on Economic Development of Latvia, December, 2013

Table 6 below presents an overview of the budgets that are related to research and innovation based on the latest data available.

Table 6: Total funding for scientific research in Latvia, 2010-2013 (€m).

	2010	2011	2012	2013
Total private (companies) financing of scientific research	42.5	35.1	34.6	30.4
Total public (state) financing of scientific research	28.9	31.9	34.7	33.3
Total universities' financing of scientific research	1.6	2.3	2.8	3.7
Total foreign financing of scientific research	36.6	72.1	73.3	71.8
TOTAL	109.6	141.4	145.4	139.2

Source: http://data.csb.gov.lv/pxweb/lv/zin/zin_zin/ZI0030_euro.px/table/tableViewLayout1?rxid=cdbc978c-22b0-416a-aacc-aa650d3e2ce0

Total funding of scientific research in 2013 compared with previous year has fallen by 4.26%. The decreasing trend is seen in private, public and foreign financing, and only universities have increased their spending in scientific research. Financing from the private sector has been decreasing already from 2010, and also financing of innovation has fallen from €333.50m in 2008 to €131.80m in 2010⁶¹. Innovation activities of companies are dominated by transfer of existing technology and almost 77% of business investment in technological innovation consists of investments in machinery and equipment, and fewer resources are allocated to research and development activities in the company or for contracting research outside the company⁶². Public funding and provided support instruments do not encourage greater investments from the private sector.

Innovative financing solutions (including public-private partnerships) are absent and tax incentives are very recent. Only on November 6, 2013 Saeima adopted [amendments to the Law on Corporate Income Tax](#), which provides that from July 1, 2014 new incentive of the corporate income tax is in force with the aim to encourage the investment of private sector in R&D, providing that certain corporate R&D costs are written off the year in which they arise in the application of value-enhancing coefficient 3. Eligible costs are: compensation of scientific and technical personnel of enterprises, costs of the services of research institutions, services of accredited certification, testing and calibration institutions.

⁶¹ http://data.csb.gov.lv/pxweb/lv/zin/zin_inovac/IN0030_euro.px/table/tableViewLayout1?rxid=cdbc978c-22b0-416a-aacc-aa650d3e2ce0

⁶² Guidelines for the Development of Science, Technology and Innovation (STI) for 2014-2020

Access to finance for innovative companies is provided by the Latvian Guarantee Agency, the Latvian Development Finance Institution Altum and venture capital funds. The [Latvian Guarantee Agency](#) provides mezzanine guarantees, security guarantees, export guarantees, micro loans and support for the organization of training⁶³. The [Latvian Development Finance Institution Altum](#) administers the Competitiveness Improvement Program that provides financing (in form of investment loans and loans for working capital) for micro, small and medium-sized enterprises, which have economically justified further action plans, but do not have available credit financing due to increased risks. Venture capital is provided mainly by Imprimatur Capital (start-up and seed capital) and BaltCap as well as Flycap, ZGI Capital and Expansion Capital.

The best target fulfilment is reached in the guarantee and loan activities – 99.9% and 93.7% respectively from the planned payments to the final beneficiaries. The least utilized are the venture capital and mezzanine guarantees activities – only 46.9% and 27.2% from the planned volume of payments.⁶⁴

2.6 Smart Specialisation (RIS3)

Latvia is treated as one NUTS region. However, to promote balanced development of all territories, five planning regions of Latvia (Riga, Kurzeme, Latgale, Vidzeme and Zemgale) have been created. With its population of slightly above 2 million, Latvia has six NUTS 3 regions – Riga, Pieriga, Kurzeme, Zemgale, Latgale, Vidzeme⁶⁵.

At the level of regional planning, the main bodies are the Planning Region Development Councils, which are elected by the municipalities of the respective planning region. They are responsible for setting the main principles, objectives and priorities of long-term development, drafting the regional development programme and undertaking territorial planning in compliance with the national development strategy and [Regional Policy Guidelines 2013-2019](#).

Latvia has large regional disparities in knowledge design and transfer capacities⁶⁶ as 83% of all research institutions and the majority of higher education institutions (HEIs) in Latvia are concentrated in Riga, the capital city. In 2009 Latvia showed the fourth worst GDP per capita dispersion value for NUTS 3 statistical regions (43.3%).⁶⁷ There are significant regional disproportions as two thirds (66.9%) of GDP in 2010 were generated in Riga planning region. Riga concentrates 83% of total high technology firms, 60% of export volume, 70% of TOP 500 companies. Outside Riga, economic development and research activities are undertaken in regional growth centres – largest cities. In fact, each of the planning regions hosts at least one HEI – Kurzeme has HEIs in Liepāja and Ventspils; Latgale has HEIs in Daugavpils and Rezekne, Vidzeme hosts Vidzeme University of Applied Sciences in Valmiera and Zemgale hosts Latvia University of Agriculture in Jelgava.

⁶³ LIAA. Piejamie atbalsta instrumenti uzņēmējiem 2014.gada oktobrī

http://www.liaa.gov.lv/files/liaa/attachments/aktualie_atbalsta_instrumenti_2014_oktobris.pdf

⁶⁴ Ekonomikas Ministrija. Ziņojums par Latvijas tautsaimniecības attīstību. 2013.gada decembris

⁶⁵ <http://ec.europa.eu/eurostat/web/nuts/overview>; <http://www.csb.gov.lv/en/node/28607>

⁶⁶ 3S strategy, p.13, 14, Regional Policy Guidelines 2014-2020, p.20. Policentric policy as a priority is also determined by Leipzig Charta for sustainable cities, approved at Leipzig, on May 24-25, 2007 and Territorial Agenda of the European Union. Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions, 2011, 11 p.

⁶⁷ 3S strategy, p.14. This variation coefficient characterises deviations from countries average level: if indicator is equal for all regions, it becomes zero and regional disproportions do not exist

Regional HEIs see themselves as potential centres for research and technology development. These universities or university colleges should emerge as engines of development in the regions and can catalyse a more balanced research and economic development across the country. Development of the Eastern part of Latvia also means contribution to strengthening of distant border regions of the EU.

In a situation in which the entire research system in the country faces a shortage of financial and human resources, regional HEIs are lagging behind their capital city partners in levels of support despite having excellent research capacities⁶⁸.

The formal setting of new national research priorities was placed on the agenda in 2013 by the need to determine the list of regional innovation smart specialisation areas, in line with the ex-ante conditionality to be able to access Structural Funds over the period 2014-2020, as well as to respond to certain HORIZON 2020 calls. The broad domains for smart specialisation were fixed on December 17, 2013 when CoM approved Guidelines for Development of STI for 2014-2020 and approved Informative Report on Regional Smart Specialisation Strategy.⁶⁹ The Cabinet of Ministers already had a hearing of the report "[The design of smart specialisation strategy](#)" on December 17, 2013⁷⁰. The 5 priority domains are: biotechnologies (knowledge based bio-economy); health (biomedicine, medicine technologies, bio-pharmacy); smart materials and smart engineering system technologies; smart energy; information and communication technologies. However, the existing practice of fund distribution and lack of political will to keep set strategic priorities in line with decided budget structure would make it difficult to achieve the EU target of investing 44% of ERDF investments in research and innovation and in competitiveness of SMEs.

The strategies of Latvia's Planning Regions like [Kurzeme 2020](#), [Kurzeme 2030](#), [Zemgale Planning Region Development Program 2008-2014](#) and [Vidzeme Planning Region Development Program 2014-2020](#) have a component for knowledge based entrepreneurship promotion but one may find weaknesses in the planned returns from human capital, knowledge transfer, absorption, adoption, diffusion and spillovers as it is doubtful that the structural changes and breakthrough developments in the region would be possible to achieve without involvement of regional universities, HEI's and research centres and allocation of adequate financial resources.

The bottom-up initiatives in "Photonics, Quantum Sciences and Technologies" succeeded in FP7 project competitions bringing to the country around €10m of funds and creating recognised research segment for an additional smart specialisation in Latvia.⁷¹

The new government, formed in November 2014, is working to strengthen the role of the National Innovation Council to start implementation of the RIS3 strategic document, create the monitoring system and refine if needed the RIS3 and set a clear link between the RIS3, expected research excellence and the programming documents for the 2014-2020 EU funding cycle. The "Smart specialization strategy monitoring system" document outlining the RIS3 monitoring framework and its indicators has been finalized in March 2015.

⁶⁸ Excellence of research centres in Daugavpils and in Ventspils was confirmed by already cited TEHNOPOLIS reports of peer review evaluation of science in Latvia.

⁶⁹ Innovation and Research Strategy. for Smart Specialization. The initial position of Latvia. 27 March 201

⁷⁰ <http://mk.gov.lv/lv/mk/tap/?pid=40291636&mode=mk&date=2013-12-17>

⁷¹ See Erawatch Country Report for Latvia in 2013

2.7 Evaluations, consultations, foresight exercises

At the end of 2009, the national research and innovation policy was comprehensively evaluated by the CREST Policy Mix Peer Review⁷². It was concluded that Latvia needs significant reform in order to promote the recovery and development of the innovation system. The recommendations of the Review included the following:

- (1) to establish the importance of innovation (broadly defined) as an issue through debate at both political and public levels;
- (2) to establish a Strategic Innovation Policy and governance system, and a national arena, involving key ministers and stakeholders, to discuss and agree the elements of such a policy;
- (3) to move endogenous company innovation to the centre of research and innovation policy;
- (4) to set thematic priorities based on the actual and potential strength of the economy and to align research and innovation policy with these priorities;
- (5) to reform the PhD education system through internationalisation of Latvian research;
- (6) to alter science-funding rules and give priority to research relating to the thematic priorities;
- (7) to establish programmes that develop contacts and networking with the Latvian industrial and research diaspora; and
- (8) to link to instruments providing incentives for successful entrepreneurs and researchers to move home.

While this review has been generally well accepted by the research community and its recommendations have been considered by policy-makers, there has been little official Government response.

Due to the reorganisation of CREST, the review was not officially submitted to the Cabinet of Ministers of Latvia. Reference to this evaluation, however, was provided in the Informative report prepared by the Ministry of Education and Science⁷³ and submitted to the Government. The Cabinet of Ministers adopted a decision (Protocol No 27, §29, April 26, 2011) on the need to conduct an external assessment of the implementation of the science and innovation policy in Latvia during 2011/2012, in order to perform the necessary measures for the implementation of structural reforms in science and to ensure well-founded strategic planning of the future cohesion policy of the European Union. The outcome of the Nordic Council's subsequent evaluation undertaken by TECHNOPSIS was published in late January 2014⁷⁴. It assessed 150 research institutions in Latvia according to five internationally recognised criteria: scientific quality, impact on science, economic and social impact, research environment and infrastructure, development potential.⁷⁵ A key result is that 15 institutes (out of 150) received a score 4 or higher (1-very poor; 5-excellent). Experts concluded that the largest problems are acute lack of funding and, even

⁷² CREST (2010): [Policy mix peer review: Latvia. Peer Review Outcome Report \(Final\), May 2010](#). Prepared by Erik Arnold et al.

⁷³ Informative report on the evaluation of science and innovation policy, Riga. (In Latvian)

⁷⁴ Technopolis Group (20 January 2014) Latvia Innovation System Review, and Research Assessment Exercise: Draft Final Report. http://izm.izm.gov.lv/upload_file/2014/Latvia-systems-review_2014.pdf

⁷⁵ Technopolis NIS Review Report, 2014, p.34-35.

more importantly, lack of human resources. The formation of large science centres and world level research activities was recommended. As a result, CoM Regulation No.729 from 25.11.2014 On Program's Entrepreneurship and Innovation amended activity 2.1.1.3.3. "Development of Institutional Capacity of Research Institutions" providing (on limited competition basis) additional €9.9m of funds to support "excellent" institutes, to develop their strategy and to integrate or consolidate weaker institutes until November 2015. Besides the main report, five discipline-related reports comprising evaluation of institutes were also submitted.⁷⁶

The CREST reports highlighted the main problems in the capacity and competitiveness of the RTD system in Latvia, which has been under examination since 1999, when Latvia became an associate member of FP5. The Latvian National Contact Point System for EU Framework Programmes has a full record of the country's participation (success and failures) and provides some analysis of Latvian research entities in Framework Programmes and structured ranking among different groups of players. This ranking complements the results of participation in national level calls (including competition for SFs projects) and in other EU programmes and provides a clear picture of the strong and weak points of each institution. The latter have also been specifically highlighted in the recent TECHNOPSIS reports.

The research and innovation system in Latvia faces vital structural and quality problems⁷⁷ and its reform should be directly linked to tackling the existing fragmentation to reach a "critical mass" of scientists and laboratories (currently the number of researchers is 2-4 times less than in advanced EU MS) to be able to compete for new projects under various sources of public funding (on national and EU levels) and to react to the requirements of industry for applied research efforts.

The [long term development strategy until 2030](#)⁷⁸ used foresight and other improved strategic intelligence activities, such as technology foresight or roadmaps, industrial research and innovation surveys, studies related to research and innovation policies that provide international analysis of strengths and weaknesses at national and regional levels as well as analyses of emerging opportunities (smart specialisation) and market developments.

Ex-post evaluations are aimed to improve the allocation of the state science budget in a systematic way by increasing the amount of money and by giving priority to research related to the thematic priorities, such as [EU key enabling technologies](#), as well as to traditionally strong research institutes well recognised in the European Research Area

⁷⁶ <http://www.izm.gov.lv/lv/zinatnisko-instituciju-starptautiskais-izvertejums>

⁷⁷ See Chapter 7.4 Policy implications on page 41 of TECHNOPSIS report: "The biggest question is, as earlier indicated, the absolute lack of money. This is completely understandable in the current economic context. However, a country cannot build and sustain a modern economy without making a significant expenditure on research and higher education. If this investment is not made, the supply of high-quality human resources to society and industry is too small and those people who could be driving socio-economic development and growth tend to drift abroad. The production of knowledge is of course one very important reason for funding research; but the production of human capital is probably an even more important reason for doing so. A lack of human capital means not only that the country has difficulties in exploiting its own knowledge production but also, crucially, that it is hard to exploit the more than 99% of new knowledge that is generated abroad. Without these capabilities, the country will enter a declining spiral that affects the performance of the economy as a whole."

⁷⁸ See also

http://www.varam.gov.lv/in_site/tools/download.php?file=files/text/dokumenti/pol_doc//LIAS_2030_en.pdf

(ERA). This could be particularly encouraging if the 15-20 traditionally scientifically strong and internationally recognised national research institutes or their associations could be promoted to become world class centres of excellence in terms of research infrastructure, staff competencies and remuneration. Foresight exercises are now in strong demand to sustain success and to participate in the calls of HORIZON 2020 under the programme "Spreading excellence and widening participation", specifically targeted to Convergence regions. MoE has a Department of structural policy of national economy, and there is a Division of forecasting of economic development and labour market, specialising in economic forecasts already since 1993. The other group of economic forecasting is based in RTU.

As regards measures to modernize research institutions, as was already mentioned above, the international assessment of science in Latvia (launched in February 2013), carried out in cooperation with the Nordic Council of Ministers' Office in Latvia (undertaken by TECHNOPOLIS) was completed in the end of December 2013 as part of the preparatory work for the EU funds programming period 2014–2020. The assessment was aimed at objective analysis of the science in Latvia within the context of the EU Common Space in Research and Cooperation in the best interests of the cooperation between the Baltic Sea region countries and the Nordic countries. The international assessment was conducted at 150 research units, including scientific institutions, higher education institutions and their structural units, private institutions, commercial foundations, foundations, including all 41 scientific institutions receiving the science base financing. The results of the assessment showed that there were 15 or 10% strong and internationally recognized scientific institutes and structural units of higher education institutions, 33 or 22% strong local scientific institutes and structural units of higher education institutions working in Latvia, while 70 or 47% of institutes and structural units of higher education institutions were assessed as satisfactory. According to expert recommendations, those institutes should merge with stronger institutes or implement mutual thematic merger, thus achieving the critical mass for quality development. A total of 22 or 15% institutes and structural units of higher education institutions were recognized as weak. Experts rendered no opinion regarding a total of 10 (or 6%) of the assessment units as they found that these institutions had not been engaged in research or they had not provided self-assessment reports and requested publications.

The assessment results are being used in decision-making on implementation of reforms in the science field, including consolidation and streamlining of the activity of scientific institutions around the current "centres of excellence". MoES according to its science reform plan should revise and approbate the criteria for granting base financing to scientific institutes by September 1, 2014 in order to reduce institutional fragmentation, achieve scientific excellence and encourage knowledge transfer. More strict requirements will be introduced by the second half of 2015 for registration of scientific institutions in the Register of Scientific Institutions aimed at concentrating critical mass necessary for scientific excellence.

Finally, the assessment of ERDF and cohesion policy in 2009⁷⁹ showed good progress of activities such as "Guarantees for development of enterprise" and "High value-added

⁷⁹ Expert [evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013. Task 2: Country Report on achievements of cohesion policy. Latvia](#), November, 2010, BICEPS, EC, 38 p.

investments”, but the risk capital instruments showed better performance since 2013.⁸⁰ The government has had a slowly changing attitude (since 2010) from observant to proactive towards more active promotion of innovation by enhancement of applied research, pilot production lines and by support to Key Enabling Technologies⁸¹ through Smart Specialisation at the national level.⁸² Cohesion policy in the research and innovation field should be more closely aligned with the Horizon 2020 framework program⁸³ and opportunities for synergies should be identified.⁸⁴

⁸⁰ Avots K., 2013. The positive changes happened after the transfer of administration of the Holding Fund from EIF to LGA in 2012. The main problems were lack of experience at national level and EIF in dealing with JEREMIE and inflexible rules in using Financial Engineering Instruments in Cohesion Program. See Vanags A., 2012.

⁸¹ A European strategy for Key Enabling Technologies – A bridge to growth and jobs’ Brussels, 26.6.2012, COM(2012) 341 final”.

⁸² http://ec.europa.eu/research/regions/index_en.cfm?pg=smart_specialisation, <http://izm.izm.gov.lv/nozares-politika/zinatne/zinatn-instit.html>

⁸³ <http://www.ris3.lv/documents>; http://ec.europa.eu/research/horizon2020/index_en.cfm

⁸⁴ Materials from the National Event from Latvia. The Synergies with Research and Innovation Funds: Stairway to Excellence, April 15, 2015, organised together with JRC, Riga, see http://viaa.gov.lv/lat/zinatnes_inovacijas_progr/viedas_spezializacijas_iev/vieda_spezializacija_jaunumi?text_id=38290

3. National progress towards realisation of ERA

3.1 ERA priority 2: Optimal transnational co-operation and competition

The existing governance culture and frequent changes of ministers at MoES and MoE, as well as the budget shortages result in a lack of involvement of independent external experts in policy design, monitoring, feasibility studies, performance evaluation and ex-ante and ex-post evaluation procedures. The process goals usually dominate over practical goals. Preference is given to local experts or consultants with ability to report back to decision makers in Latvian. The more significant exchange of competences, sharing of best practices or transfer of pioneering pilot measures take place between the Baltic States, but they are more based on personal contacts or initiative rather than systematic practices.

The national policy mix is, to various degrees, aligned with the ERA pillars. Most of the ERA objectives are addressed, though with variable rates of performance, and with support of the EU Structural Funds and FP7 / Horizon2020 project financing.

Almost all national policy measures to support research are targeted to registered in Latvia research organisations and foreign partners could be involved only on a subcontracting basis which is not usually welcomed because of the co-financing requirement. The cross-border cooperation programmes as well as the Norwegian Government Financial Facility and the Switzerland Government Financial Facility include measures available for joint research activities. At the same time research sectors and activities are restricted by the rules and criteria of particular programs. The [ESTLAT](#), [LATLIT](#), [Central Baltic](#) and the Crossborder Programs [Estonia-Latvia-Russia](#) and [Latvia-Lithuania-Belarus](#) during the period 2007-2013 were mainly focused on regional, municipal or local government interests and only few of them had RTD as a core priority. The EU Crossborder Cooperation (known as Interreg A) and the Baltic Sea Region programs reflect mostly the interests of developed countries, as they have better developed lobbying networks compared to EU13 countries. The existing practice of the Latvian PROs to look for minor roles in international consortia competing for research projects at international level can be explained by the limited amount of available financing and human resources they are able to allocate for project proposal elaboration. The bilateral programs (Latvia – Lithuania – Taiwan; Latvia – Belarus) support few projects and represent a small share of organisation's financing. The key importance for integration in transnational research cooperation is played by FP7/H2020, Bonus, Life, Erasmus+ where rules are pre-determined by the EU and not by the Latvian government or PROs. Institutional funding is not sufficient, they are used for pre-financing and co-financing of approved projects, sometimes also for external consultants, but not for transnational cooperation.

On March 15, 2013 Latvia signed Framework Agreement with ESA as a 7th ESA European Cooperating State⁸⁵ (the first level Cooperation agreement was signed already in 2009) opening new knowledge transfer dimensions for space industry and applied research. On April 8, 2014⁸⁶ Cabinet of Ministers decided to apply for ratification of the Cooperating State Agreement in Saeima (Parliament) with obligation to design Sate's Space Strategy and allocate in the State Budget for 2015 the needed €1.3m to implement the treaty's conditions. Taking seriously Latvia's Government promises to sign the Charter of Plan for

⁸⁵ http://www.esa.int/spaceinimages/Images/2013/03/Latvia_becomes_seventh_PECS_state

⁸⁶ <http://izm.izm.gov.lv/aktualitates/informacija-medijiem/11059.html>

European Cooperating States and pay the cooperating state fee in 2014, ESA approved the regulations in advance and announced the first PECS project application call in 2013. Unfortunately, the government didn't allocate funding for ESA investment neither in 2013, nor in 2014. In December, 2013 CoM decided to allocate the needed budget in 2015,⁸⁷ but in March, 2014 CoM finally decided⁸⁸ to postpone its payment till 2015. This was accepted as exception by ESA,⁸⁹ but in October 14, 2014 CoM⁹⁰ discussed the issue again and decided to solve the payment issue in 2015 (within procedure of the medium term budget planning process for years 2015 till 2017 as a part of new policy initiatives to be still decided by MoC by a separate decision). All relations with ESA would have formally ended on January 31st, 2015, when the First Cooperation agreement ended and the second one was still not ratified by Saeima. However, because of the active position of a disappointed science community disagreeing with the government position,⁹¹ a solution was found and the law was ratified in Saeima on January 22nd, 2015. The Plan for European Cooperating States was finally signed, payment has been successfully transferred in March 2015 and 5 out of 10 approved PECS projects were saved and reinitiated in April, 2015. However, the consequence of the above described developments is lost confidence and trust among space technology professionals and top-level decision makers.

3.2 ERA priority 3: An open labour market for researchers. Facilitating mobility, supporting training and ensuring attractive careers

3.2.1 Introduction

Latvia's academic sector is characterised by institutional autonomy. This is determined by the Law on Research Activity and the Law on Higher Education Institutions providing similar to EU practice autonomy level to Universities and HEIs.

In 2011 there were 3.84 researchers (with PhD qualification, full time equivalent) per thousand active labour force in Latvia. 5593 people were employed in the research sector in 2012; from those 3904 represent research personnel,⁹² and 0.5 PhDs per 100 citizens, much below EU27 value of 1.5 per 100. 42% of all employed researchers are over 50 years old⁹³. These figures correspond to countries with low or medium technology based economy. The figures for 2013 are: 5396 employed in the research sector and 3625 are research personnel, showing continuing decreasing trend in Latvia.⁹⁴

Providing high-quality education for all, attracting more young people into graduate-level and postgraduate science and technology studies, and promoting the country's R&D and

⁸⁷ <http://likumi.lv/doc.php?id=263401>

⁸⁸ CoM Regulations No.408 at July 15, 2014, see <http://likumi.lv/doc.php?id=267936>

⁸⁹ <http://likumi.lv/doc.php?id=269644>

⁹⁰ Protocol No.55, 2014 from 14.10.2014, see <http://likumi.lv/doc.php?id=269660> and [http://titania.saeima.lv/LIVS12/saeimalivs12.nsf/0/b62393addb5fa79dc2257d860063500c/\\$FILE/pavadvestule.doc](http://titania.saeima.lv/LIVS12/saeimalivs12.nsf/0/b62393addb5fa79dc2257d860063500c/$FILE/pavadvestule.doc)

⁹¹ <http://www.irir.lv/2015/1/12/kapec-latvijai-japiedalas-eiropas-kosmosa-agenturas-darba>

⁹² Research Guidelines 2014-2020, p.77

⁹³ Ibid, p.78

⁹⁴ CSB, see <http://www.csb.gov.lv/statistikas-temas/zinatne-galvenie-raditaji-30423.html>.

innovation system are part of the National Development Plan and RIS3 aimed to shift the economy to more hi-tech industrial sectors⁹⁵.

Supply in terms of doctoral graduates shows increasing trend during the period 2008-2013 (respectively by years: 139, 174, 132, 287, 267, 315).⁹⁶ However, the reduction of doctoral scholarships (financed by ERDF) resulted in a small decline in the number of both doctoral students (by 4.6%) and graduates in 2014 (forecasted also by Technopolis in their 2014 report). The share of PhD graduates in natural sciences and engineering sectors in 2014 represent 40% which is above EU27 average. However, taking into account researchers' age structure these figures are not sufficient even for replacing retiring professors, let alone being able to reach a share of 23% of researchers employed in private sector by 2020. In Latvia doctoral graduates (ISCED6) aged 25-34 per 1000 population represent only 0.4 which is the third lowest share among EU27. The private sector in 2013 employed 570 FTE as a research personnel representing low demand for it.⁹⁷ The 28th activity of the RTI Guidelines aimed to integrate PhD students in enterprises but there is no allocated budget for that measure so it seems to represent only a formal attitude without a strong political will.⁹⁸ The discontinuation of doctoral scholarships paid by funds from the ESF⁹⁹ and the upcoming gap of competitive EU SF project calls between two planning periods is likely to decrease the success rate of doctoral studies and increase dropouts as from November 2014. A further reduction in the number of researchers might cause further consolidation reform of research institutions.

3.2.2 Open, transparent and merit-based recruitment of researchers

Latvia's universities and (independent) state research institutions enjoy a high degree of freedom to set hiring and promotion conditions, as well as career structures. Career progression is decided on institutional level. The importance of transparent and merit based recruitment, as well as the importance of openness and of attractive research careers is only partly determined by the legal environment and depends more on the institutional level, thus influencing the local level of mobility.¹⁰⁰ In Latvia, no national-level legal measure specifically related to gender equality could be identified.

The European Social Fund (ESF) and the European Regional Development Fund (ERDF) are key instruments for the development of R&D in Latvia, including support for doctoral studies, post-doctoral research, development of human resources in R&D, partnerships between businesses and academia, and the development of research infrastructure. Better education and training is at the heart of Latvia's ESF Programme. ERDF projects play a role

⁹⁵ Deloitte. Researchers' Report 2014. Country Profile: Latvia

⁹⁶ The source of the doctoral student statistics is RTDI Guidelines, p79 and recent Post-doctoral research assessment report by the MoES, 2014, see:

http://esfondi.izm.gov.lv/sites/default/files/root/2014_2020plan.doc/Sakotnejais%20novertejums%20Pecdoktoranturas%20petijumu%20atbalsts.pdf

⁹⁷ Guidelines for the Development of Science, Technology and Innovation (STI) for 2014-2020

⁹⁸ Research Guidelines 2014-2020, p.65

⁹⁹ Doctoral students in a case of failure should repay back scholarship, this creates also strict time-pressure to students; if possible students prefer to be paid from projects and try to find close Project and doctoral research themes. Scholarships are tax free which do not socially protect students (social tax is not paid) and this time is not included in pension calculation time in Latvia.

¹⁰⁰ P.39-40. Mathieu Doussineau, Elisabetta Marinelli, Mariana Chioncel, Karel Haegeman, Gérard Carat, Mark Boden ERA Communication Synthesis Report, JRC Scientific and Policy Reports, EC, JRC, 2013, 68 p.

in particular in the promotion of partnerships between businesses and academia, and the development of research infrastructure.¹⁰¹

The programmes implemented under the European Social Fund (ESF) and the European Regional Development Fund (ERDF) set researchers' maximum pay levels. Universities and research institutions can fix researchers' salary brackets based on the levels defined by the ESF/ERDF programmes. They enjoy a high degree of flexibility in defining the salary levels for their academic staff. The researchers' income can vary considerably depending on the research project and the source of funding.¹⁰²

The Law on Scientific Activity and the Law on Institutions of Higher Education grant autonomy to Higher Education Institutions (HEI). As autonomous institutions of education and science with the right to self-governance, HEIs can decide on the overall administrative structure and develop their own academic profiles.¹⁰³

[The Law on Immigration](#) and the Law on Research Activity regulates the employment of foreign researchers in Latvia. In addition, the [Law on Research Activity](#) (2013) and the [Cabinet of Ministers Regulations](#) (2008) include legal norms for admitting third-country researchers for the purposes of scientific research. Scientific institutions are entitled to recruit third-country nationals to participate in scientific research projects.¹⁰⁴

Foreign job seekers, irrespective of the duration of their stay, are required to have a temporary residence permit. EU researchers and third-country nationals with a permanent residence permit and/or the status of a long-term EU resident may apply for any research position in Latvia. The recruitment of non-national applicants is limited in practice by the requirements on knowledge of the Latvian language contained in the Official Language Law (1999) and the related regulations.¹⁰⁵ While foreign scientists with Residence and Work permits can be employed as guest-scientists in respective academic positions, they cannot be elected without Latvian language skills and participate in administrative activities of research institutions. Still, the main barrier to recruitment is low, non-attractive and regulated with ceilings salary level compared to the EU average.

Table 7: Legal environment influencing the labour market for researchers.

No, issue	Name of the law	Content
Law	Law on Research Activity	<p>§3 all society groups have equal rights to be employed in research area</p> <p>§4 sets three groups of personnel – researchers, technical staff and science servicing personnel.</p> <p>§10 p.1. Doctoral degree obtained in foreign countries are equated according to international agreements mandatory to Latvia.</p> <p>§10 p.2. Person obtains status of scientist when decision on assigned research degree or equation of foreign degree comes into force.</p> <p>§11 p.5. Doctoral work (thesis) can be submitted in state</p>

¹⁰¹ Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹⁰² Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹⁰³ Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹⁰⁴ Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹⁰⁵ Deloitte. Researchers' Report 2014. Country Profile: Latvia

No, issue	Name of the law	Content
		<p>language or in one of EU official languages, providing translation of Executive Summary in State language. The same rule is for public defence process.</p> <p>26§ sets list of available for election for 6 years academic positions in research at only one institution</p> <p>§37¹ determines that elected personnel has wage rate according to legal acts on institutional funds or contracts, where wage rate based on internal regulation for wage system, but for non-elected personnel wage is paid in accordance to the Law on State or local government personnel reimbursement with exceptions in this Law, describing wage paid from Institutional funds or if source of salary are contracts concluded within particular research institution</p> <p>§37² determines employment of third country researchers. They should have PhD degree or academic degree allowing obtain PhD degree. Non-residents can work on contract bases for period until their scientific project termination</p>
Law	Law on Higher Education Institutions	<p>§27.p.4. all personnel in academic positions is elected for 6 years</p> <p>§28, §30 professors, associated professors are elected according to open procedure Professors Council</p> <p>§32, §36, §37 Assistant professors, lectors and assistants are elected by Faculty's Council or Research Council of Research Institution</p> <p>§40 Guest professors, guest associative professors, guest assistant professors, guest professors and guest assistants can be contracted until two years on the same requirements as respective basic position without competition if there exist unoccupied respective position</p> <p>§85 p.1. Responsible organization for equation of obtained in foreign countries an academic degree and a diploma is the Academic Information Centre.</p>
CM, Reg.No.836, 28.07.2009. with several amendments	Regulation on work payment for teaching stuff	<p>p.2. Teaching stuff in HEIs is paid according to worked astronomical hours including breaks between lectures. The payment order is determined by HEI's Senate.</p> <p>p.3. The lowest salary level is limited by Annex 1 of these Regulations</p> <p>p.35. The work duties for teaching stuff of the HEI included into one work load are determined by HEI's Senate.</p> <p>Annex 1 set lowest available rates of monthly salaries in Euros, respectively – professor – 1175.29, assoc. prof. – 940.52, assist. prof. – 752.70, lecturer – 601.87, assistant – 480.93.</p>
Law	Language Law	<p>§6 p.4 states that foreign specialists, who work in Latvia, should know and use state language at a quality which is necessary according to their professional and position's activities and responsibility or they should provide</p>

No, issue	Name of the law	Content
		adequate translation to state language. p.6 the amount and quality of state language knowledge is determined by CoM regulations
CoM Reg. No.733, 7.07.2009.	Regulation on State language amount and knowledge and procedure of State language skills testing to perform work duties aimed to gain permanent residence permit and EU citizenship and for state duty paid for language skills testing	§17.4 states the C1 – highest level of state language knowledge required by professional positions – skills to communicate, read and negotiate and design and defend arguments, write necessary documents and different structure texts Annex 1 states positions according to their levels of State language skills (Latvian language), C1 grade is allocated to positions: senior researcher, researcher, assistant and professions like astronomer, radio-astronomer etc., as well as for professor, assoc. prof., assist. prof., lecturer and assistant
CoM Reg.No.568, 21.07.2008.	Regulations on procedure how research institution concludes and terminates work contract with foreign scientist	§2 Work contract with foreign scientist research institution is allowed to conclude only if this person works in research project approved by authorised person of this particular institution §3 monthly salary for foreign scientist is defined by CoM Reg.No.515 from 12.07.2012.
CoM Reg.No.1085, 30.11.2010.	Regulation on used time and performed work accounting system aimed to implement projects, financed from state budget, EU and foreign financial funding	§2 and p.2.1. Scientific personnel cannot overspend 35-40 hours working 5 or 6 days a week according to Labour law §4 scientific personnel performing also other duties in the same organisation can spend for research projects only work hours up to one full workload ¹ , e.g. difference between one full workload and their regular duties per week
CoM Reg.No.1316, 12.11.2013.	Procedure how Institutional (base) financing is calculated and assigned for research institutions	§4 states that one position unit of research personnel FTE cannot receive monthly salary from Institutional funding more than 50% of professors minimal monthly FTE salary in accordance to CoM Regulation On work payment for teaching stuff , No.836, 28.07.2009. ² §8 Institutional financing is not calculated and assigned for professors, assoc. prof., assist. prof., lecturers and assistants if they work normal workload in aforementioned positions §9. Each research institution has flexibility to motivate researchers according to their performance indicators and institution's personal reimbursement policy.
Law	Law on work reimbursement of authorised persons and personnel in state and local government institutions	§2 law refers also to state founded HEIs and to state or state founded research institutions. §3 p.3 the law stipulates work payment for state institutions, except p.5.1 – if salary is paid from income from research at research institution without state budget financing; §4 p.1. Monthly salary cannot overcome Prime Minister's salary's amount. §4 p.2. The rate of salary for employed person is calculated by multiplying average monthly salary of the

No, issue	Name of the law	Content
		<p>year before last published by CSB in official statistical edition and rounded in full EUR with respective employment coefficient. Paid out salary is rounded to full Eur. P.4. Salary for non-academic stuff is based on value of position and individual competences of particular employee.</p> <p>§7 p.1. State and local government institution's position catalogue group all positions in several systematic functional families, see Annex 1.</p> <p>p.4. Families have sub-structure of levels with set maximal value for each sub-level.</p> <p>§11 p.4. Monthly salaries in research institutes cannot overcome average wage structure, the wage rate is calculated by methodology in §4 p.2., and cannot overcome amount of State Chancellery's similar positions performing comparable duties. Annex 3.</p> <p>Annex 1. P.31. research activity, laboratory works, maximum of average monthly salaries – 11; Annex 3 – max monthly salary in the group is EUR 1382.00, p.32. Project Management – max salary EUR 1917.00 monthly.</p>
CoM Reg.No.564, 21.06.2010.	Regulations on residence	§4.1.2. Application to obtain residence permission can concluded any person having Latvia's Entrance legal visa, and person is a researcher who has signed cooperation agreement with research institution, registered in the State Register of research institutions.

Notes:

1-e.g. 40 hours per week

2 – as Institutional money is used to pre-finance and co-finance competitive projects, the share allocated for personnel salaries is limited and usually is what MoES calculate as a part of assigned Institutional funding for personnel costs for research institution, e.g. in Euros for senior researcher – 587.64, researcher – 470.26, research assistant – 376.35. The technical stuff will have similar salary. Such limited share of guaranteed from Institutional funds part of researchers salaries almost cut any opportunity to set internally financed curiosity research fundamental projects, experimental testing operations to develop IP portfolio for research commercialisation and any flexibility for institutions administration.

The short legal environment analysis for researchers' market and employment procedures shows that besides high level of decentralisation and institutional autonomy there exist certain centralised limitations and language barriers. The fixed salary level being much below the EU average does not motivate visiting mobility, re-emigration or equality of domestic and foreign scientists. Several CoM Regulations stipulate maximum hourly compensation ceilings in competitive grant programmes. For example, CoM [Regulations on Operational Program "Entrepreneurship and Innovation" addition 2.1.2.1.1. activity "Competence Centres"](#), No.361 from 13.04.2010. with amendments at §25 fixes hourly rate including taxes for project managers with PhD degree – EUR 18.5, for research activity leader – EUR 14.23, for researchers and technical personnel – EUR 11.38. Such differences between researchers' salaries locally and abroad, and between Horizon2020 and EU SF or state budget based grant programmes do not motivate researchers to stay in Latvia or to return, if they are already working abroad. The second factor is the high level of bureaucracy related to the accounting system introduced locally in EU SF projects.

On the positive side, the process of equation of obtained in foreign countries academic degree or diploma is comparatively easy and fast. Also, the new post-doc support system that is being drafted by MoES (discussed at [seminar](#) on February 25, 2015) foresees competitive net salary for post-doc students (after all taxes) in the amount of EUR 2300 monthly, plus all operational and mobility funds to motivate secondments to the best EU research excellence labs. This would also be a competitive offer to retain and return excellent local young scientists.

The procedure of Transparent, Open and Merit-based recruitment usually are determined in Regulations for academic and administrative positions in each HEI individually, approved by its Senate. The main recruitment requirements in HEIs are determined by the Law on HEIs and are secured in the Regulations of all HEIs stipulating that:

- The vacancy announcement includes short job profile, skills and competences required, and eligibility criteria.
- Information on the selection process and criteria is available for the candidates.
- A minimum time period between vacancy publication and deadline for application is one month.
- Applicants have the right to receive feedback on the results of the recruitment.
- Applicants have the right to appeal against the decision.
- Evaluation panels are set up to review candidates' documents, public presentation.
- Information on the rules for the composition of selection panels (e.g. number and role of members, gender balance) is available for candidates
- The composition of the selection panel is published.

The process of career progress from young scientist just defended and obtained a PhD degree to a senior researcher leading a group, laboratory or theme is not easy. No age limits exist for election of persons in academic or scientific positions. As research society is ageing, the majority of elected people in administrative positions are over 55. It is understandable for higher level scientists to keep their income level as state pensions are comparatively low and the 2nd level pension system was almost broken during the financial crisis. Until 2015 there have been no post-doc support programs. These weaknesses were indicated by international evaluators¹⁰⁶. Young doctors (aged up to 34) represented a share of only 8.5% in 2012 and their carrier opportunities at PROs are limited.¹⁰⁷ In addition, the [Association of Latvian Young Researchers](#) mainly focuses on the needs of doctoral students, not post-docs, because its members are mainly doctoral students.

3.2.3 Access to and portability of grants

While research grants are portable to another national research institution, the current law does not regulate the portability of grants to another country.¹⁰⁸ A foreign national may come to Latvia and become a student in a doctoral study program and, when approved,

¹⁰⁶ Technopolis Summary Report, 2014, p.18-19.

¹⁰⁷ RTDI Guidelines, 2013, p.29

¹⁰⁸ Deloitte. Researchers' Report 2014. Country Profile: Latvia

receive according to CoM [Regulations on Scholarships](#) (CoM Reg. No.740 from 24.08.2004) doctoral scholarships on the same basis as local students.

Contracts on publicly-financed research activities are concluded between the funding agencies and the research institutions or higher education institutions. Therefore, national grants are also open to non-residents provided that they are employees of a contracting institution.¹⁰⁹

In reality, however, there are few signs of grant portability. Contracts are signed with the grant program administrating agency both for state budget and EU SF grants, and if a researcher is relocating because of career growth opportunities, the responsible research institution is obliged according to the signed project contract with the administering agency (as a lead partner) or with a lead partner (in case of being a minor partner) to replace the retired or leaving researcher with one corresponding in terms of quality and competencies. The public research institution's total budget is heavily dependent on the project flow income that it has generated. If a scientist participating in a project application leaves the institution he or she also breaks all employment relations and is replaced by somebody with skills and ability to perform the work. If such change happens in the process of implementation of the project, the process to formalize the replacement and to get the contract changed requires significant administrative resources and time and it would be almost impossible to transfer any part of the project budget to another institution for the sole reason that somebody moves. In underfunded PROs and in conditions of only competitive funds available (institutional money is also almost all competitive, except for PhD budget funds, see section 2.5.2), the principle "money follows the researcher" does not work in practice.

3.2.4 EURAXESS

Euraxess Latvia provides information and assistance to mobile researchers by means of a web portal (<http://www.euraxess.lv/>) and with the support of the national Euraxess Services Centre in Riga. The portal contains practical information concerning professional and daily life, as well as information on job and funding opportunities. The service centre offers free of charge up-to-date information and personal assistance for incoming, outgoing and returning to Latvia mobile researchers and their families regarding research job opportunities published by the different actors (universities, industry, research organisations, foundation, etc.); information about research fellowships and grants; information about administrative and legal issues regarding researchers mobility; practical information about cultural and family-related matters (daily life, housing, schooling, day-care, language courses, etc.).

In 2013, the number of researchers posts advertised through the EURAXESS Jobs portal (advertised in Latvian or English) per thousand researchers in the public sector was 1.8 in Latvia compared with 9.0 among the Innovation Union reference group and an EU average of 43.7.¹¹⁰

¹⁰⁹ Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹¹⁰ Deloitte. Researchers' Report 2014. Country Profile: Latvia

3.2.5 Doctoral training

The Guidelines for the Development of Science and Technology for 2009-2013¹¹¹ stated that the number of PhDs awarded annually should be increased from 230 in 2010 to at least 425 by 2013. Although this target has not been achieved (in the academic year 2013/2014 315 persons¹¹² received PhD degree) this can be considered a good average achievement relative to the other EU Member States. The number of doctoral candidates has, in fact, increased in the last couple of years, with a 7.5% average annual growth in the number of new doctoral graduates (ISCED 6) in the last five years per 1 000 inhabitants aged 25-34, stimulated by the opportunity of receiving scholarships within the context of EU structural funding¹¹³.

Although the quantitative indicators have improved, the quality of the doctoral programs has hardly increased. Most doctoral programmes in Latvia have similar problems: insufficient number of international publications of professors, insufficient knowledge of foreign languages and poor cooperation with similar programmes in Latvia and abroad.¹¹⁴

There are study directions in which the study programmes are being implemented at the same time in several universities. In a small country like Latvia this leads to the fact that in a number of universities a critical mass of scientists cannot be achieved as required for successful preparation of young scientists.¹¹⁵

In order to achieve critical mass of scientists it is necessary to develop new innovative doctoral programme structures, such as doctoral schools. In Latvia from the twenty universities offering doctoral studies doctoral schools are developed in only two larger universities – University of Latvia and Riga Technical University.¹¹⁶

The Research, Technological Development and Innovation Guidelines for 2014-2020 also foresee to continue the support for doctoral studies, by increasing the number of doctoral students in the following scientific areas: nature, life, information technologies, forestry, agriculture and engineering. In particular, the Guidelines foresee the establishment of a grant system for doctoral degree study programmes.

The system of doctoral studies is determined by the Law on Research Activity and by the Law on Higher Education Institutions. Nevertheless, the form and content of doctoral studies vary from one institution to another. Each university should licence their doctoral study programs. There might be more focus on class lectures or on individual work and reporting in seminars, workshops. Even diploma work may be as individual full report describing content of all publications and methodology according to strict format or defence of executive summary with all high impact publications as annex.

The doctoral studies are financed as block finance transferred from MoES to a university or a HEI (with set up Doctoral Council) on the basis of the number of budget students

¹¹¹ Available at:

http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/lv/policydocument/policydoc_mig_0004

¹¹² http://izm.izm.gov.lv/upload_file/lzglitiba/Augstaka_izglitiba/2014/Parskats_2013.pdf

¹¹³ Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹¹⁴ Kristapsons J. Priekšlikumi turpmākai doktora studiju programmu, grupētu pa studiju virzieniem, pilnveidei, uzlabošanai un attīstībai, konsolidācijai, slēgšanai. Rīga, 2013

¹¹⁵ Kristapsons J. Priekšlikumi turpmākai doktora studiju programmu, grupētu pa studiju virzieniem, pilnveidei, uzlabošanai un attīstībai, konsolidācijai, slēgšanai. Rīga, 2013

¹¹⁶ Kristapsons J. Priekšlikumi turpmākai doktora studiju programmu, grupētu pa studiju virzieniem, pilnveidei, uzlabošanai un attīstībai, konsolidācijai, slēgšanai. Rīga, 2013

approved in advance by MoES¹¹⁷ according to the principle that this money can be received only by institutions with accredited doctoral study programs. In [Regulation of CoM No.994 from 12.12.2006](#) in §6 it is stated that in HEIs or Colleges not having accredited doctoral study program in a particular area or theme MoES can still allocate additional targeted financing for “targeted doctoral study places for particular HEI” in large universities which execute such study programs. This in reality means establishment of a fixed by MoES quota for limited competition among doctoral students coming from “external” (regional) HEIs or Colleges. Such limited competition takes place inside the large university in a particular area among only “regional” (external) candidates for doctoral studies in the frame of the fixed by MoES “quota”. The quality requirements, procedures and whole study process in the large university remain unchanged. If admitted, such regional doctoral students benefit from state paid tuition fee transferred from MoES to the large university executing study programs. Such system promotes inequality. Firstly, a "large" university receives all state doctoral financing on behalf of regional HEI or college for each “targeted quota” extra student as agreed with MoES. To keep full control on received money and student’s research activities large universities implement formal or informal practices. For example, they set rules requiring that only a researcher who is nominated to an academic position in that particular large university can be appointed as a student’s supervisor. This means that the student’s research theme is in compliance with the large university’s (usually Riga based) research interests and that students from external research institute or regional HEI should perform research and use the infrastructure of the "large" central university for 4-5 years with little opportunity to return back to their original home organisation. In the few cases where it appears possible to keep talented young doctoral students in their home (regional or independent) research institutions, the latter nominates a second supervisor based in the regional institution and establishes a work place in the home institute keeping the research theme relevant for the regional RI or HEI. In such case all expenses for the second supervisor, work place, participation in conferences, fees for publication in recognised journals etc. are the full responsibility of the home institution. This practice according to the RTDI Guidelines (p.23) promotes a flow of talent from regional or "external" research institutions to Riga based universities, transfers planned financing for doctoral students (in the majority of cases paid from regional institutions or independent research institution’s budgets) to these large universities, and the name of the large university (because of the formal supervisor) is mentioned in the research publication. This increases the number of high impact publications and provides higher score for large universities finally resulting in larger shares of institutional money at the expense of the "external" institutions. The aforementioned practice is definitely not in line with regionally equal (polycentric) science development, provision of equal entrepreneurship, access to competence and living quality standards in regions.¹¹⁸

Besides study expenditure there exist two types of doctoral scholarships.

First ones are paid from the state budget and are approximately 100 EUR monthly. The second source comes from ESF and provides approximately 1000 EUR net monthly from one of three different programmes:

¹¹⁷ For 2014 see annex to Decree issued by MoES: http://izm.izm.gov.lv/upload_file/Izqlitiba/Augstaka_izqlitiba/2014/IzMrik_AUGSTSKOLAS_2014_PIELIKUMI_03_0114.pdf . Few HEIs doctoral block funds receive from branch ministries, not from MoES, e.g. the model for doctoral students in Latvia is still fragmented.

¹¹⁸ See RTDI Guidelines 2014-2020, p.23

- Two ESF programmes, [Attraction of Human Resources to Science](#) (activity 1.1.1.2 – 2010–2014 –35 projects were financed till the end of 2013¹¹⁹), EUR7.6m were allocated at the second call; and [Support to the implementation of doctoral programmes \(activity 1.1.1.1 - 2009 – 2015 – almost 2000 PhD students were supported till the end of 2013\)](#) contributed substantially to human resource development;
- Additional input was made by the [ERDF programme – Support to Science and Research](#) started in 2011 (activity 2.1.1.1) – 122 financed projects for 2011-2015.

The goal of ESF funded policy measures has been to maintain sustainable growth in human resources engaged in the research sector, to promote the return of Latvian researchers currently working abroad and to attract foreign researchers to work in Latvia. The aim of the programme was to attract and finance an additional 1,000 researchers (as FTE), focusing on doctoral students and young researchers with PhD degree, but data from [CSB](#)¹²⁰ shows that the total number of researchers FTE in Latvia is slightly below 4000 and has barely changed over the period 2011-2014. The block money for doctoral scholarships is linked to accredited doctoral study programs at a university or a HEI, and it doesn't follow student (see subchapter 2.5.2. of this report on institutional funding).

As a majority of the projects financed by the previous planning period calls (mostly ESF) are close to finish or finished, there is a growing trend of doctoral students interrupting their doctoral studies, delaying defence, emigrating or being forced to look for another employment. This provides negative messages to prospective students, and it increases the risk of researcher migration. Crisis management measures are needed to prevent an increase in the “brain-drain” as the best students may be among the first who will leave.¹²¹

Another serious issue is post-doctoral training which has previously not been available to new PhDs compared to western PROs. This issue was recognized and MoES plans to launch such support program in the period 2014-2020.

3.2.6 HR strategy for researchers (HRS4R) incorporating the Charter and Code

The implementation of the “European Charter for Researchers” and the “Code of Conduct for the Recruitment of Researchers” is not directly promoted at national level. Few actions or policy measures are taken from national authorities to enable the implementation of the HR Strategy for Researchers incorporating the Charter & Code. The research community is facing pressure for quality from one side and insufficient financial resources to sustain the research environment, physical infrastructure and the frequency of remuneration at the basic level on the other side.

In 2011, Riga Technical University was the first institution in Latvia to sign the “Charter & Code”. It is still today the only university having signed the “Charter & Code”.

¹¹⁹ Offer from research community was impressive. Altogether 154 project proposals were submitted – only 35 financed and a lot of excellent proposals left unfinanced. The same is also for second call

¹²⁰ <http://www.csb.gov.lv/statistikas-temas/zinatne-galvenie-raditaji-30423.html>

¹²¹ Kancs, D., Kielyte, J. 2010. "Education in the East, Emigrating to the West?," *European Review*, 18(02), 133-154.

In general, academic labour market in Latvia is not attractive. Instead, talented individuals prefer to move abroad or work in the private sector, especially in natural or engineering sciences. The reasons are the extremely low paid lecturer's work, project based employment with its instabilities in payment, difficulties for young graduates to catch up to a level when they became essential contributors and even activity leaders in EU level excellent science projects. The number of internationally competitive research leaders and visiting scientists is not sufficient to guide youngsters earlier to become science leaders themselves.

3.2.7 Education and training systems

The Latvian education system performs relatively well in relation to European quantitative benchmarks.¹²² However, there is a general challenge of improving the quality at all levels of education, increasing participation in life-long learning and improving the currently very low number of graduates in mathematics, technology, computing and science.¹²³ The current education does not provide match between labour demand and supply. Only 21% of the total number of students studied in the areas particularly important for the development of the economy of Latvia – engineering and natural sciences¹²⁴.

The education system in Latvia has been reformed several times, and any of new wave of changes immediately causes negative reaction. The prestige of teachers has essentially been reduced in society; the last reform “[money follows school children](#)” hasn't proved to increase quality. The salary level difference in rural schools and elite Riga secondary schools is almost twofold, the number of children has reduced and each year MoES is closing down several schools.¹²⁵ The negotiations between MoES and teachers' organisations are too much focused on salary level instead of teaching quality and international competitiveness. [The new payment model](#) requiring additional €30m might solve many of the problematic issues. The natural science subjects except math are not obligatory for final exams¹²⁶ and in November, 2014 in its Declaration (p.32) the new government promised to pay more attention that schoolchildren increase their skills level in maths, physics and chemistry. In 2014 only 561 secondary school students passed exams in chemistry,¹²⁷ the knowledge in maths is much below what is needed by number and quality.

Taking into account current situation there is defined priority in the Smart specialization strategy to develop modern education system which is responding to the needs of future labour market and promotes economic transformation and development of competences, creativity and entrepreneurial abilities in all levels of education necessary for the implementation of the Smart specialization strategy priorities.¹²⁸

The new 3 tier financing model suggested by the World Bank (WB) and widely discussed by HEIs professionals may catalyse improvement of governance of the whole Higher

¹²² Deloitte. Researchers' Report 2014. Country Profile: Latvia

¹²³ <http://ec.europa.eu/esf/main.jsp?catId=389&langId=en>

¹²⁴ [Guidelines for the Development of Science, Technology and Innovation for 2014-2020](#)

¹²⁵ The list of closed down schools in Latvia in 2014 is available at <http://izm.izm.gov.lv/nozares-politika/izqlitiba/vispareja-izqlitiba/aktualitates/11659.html>

¹²⁶ According to the CoM Regulations No.281 from 21.05.2013.

¹²⁷ <http://visc.gov.lv/vispizqlitiba/eksameni/statistika/2014/>

¹²⁸ [Guidelines for the Development of Science, Technology and Innovation for 2014-2020](#)

Education system.¹²⁹ The model underwent several rounds of discussions¹³⁰ and foresees a merger in one package of (1) block finance for higher education services paid to universities and HEIs on the basis of approved by MoES number of budget paid students enrolled in accredited higher education study programs with (2) institutional research infrastructure base financing. The money will be transferred to the HEI on the basis of one legal agreement setting joint target indicators for higher education and research. WB recommendations on financing for higher education suggests¹³¹ a three pillar model which foresees a combination of stable financing (basic funding – pillar 1) with performance based component using a formula with performance indicators (pillar 2), and innovation component based on three mission target agreements with MoES (pillar 3). There are no official planning documents or CoM regulations regarding the above-described model so it is not yet clear if it will be adopted or not.

Several municipalities like Ventspils and Liepaja are supporting local talent schools to improve quality and invent measures to increase teaching quality. New Vocational competence centres and large investments in their infrastructure should reshape their image in society from low education quality centres to excellent ones. The political goal is to reach balance of students 50:50 between secondary schools and vocational schools from today's ratio of 70:30. However, continuously decreasing secondary school teachers' employment and ageing of teaching personnel increases the teachers' lobby to keep the environment in secondary schools unchanged.

Regarding entrepreneurship education, there are formally existing opportunities to develop entrepreneurship support environment in schools and several municipalities are using cross-border cooperation programs to promote local entrepreneurship. Bottom-up driven entrepreneurship university models are still almost unknown in Latvia (Avotins, 2012) but we may expect changes promoting entrepreneurship in HEIs if the new WB financial recommendations will be implemented after July 2015.

3.3 ERA priority 5: Optimal circulation and access to scientific knowledge

3.3.1 e-Infrastructures and researchers electronic identity

The beginning of the e-science in Latvia can be considered the year 2005 when the European funded FP6 project “BalticGrid” was launched¹³². In 2008 work continued in the context of FP7 project “BalticGrid II”.

Latvian academic institutions have the possibility to connect to the Latvian Academic Network SigmaNet and the European academic network GEANT. Universities explore and look for opportunities to introduce also other services related to e-science, such as Cloud, High Performance Computing, Sensor Grids and others. Part of the capacity of e-science and its infrastructure in GRID development, data repositories, cloud and High Performance Computing are developed within [State Research Consortia in ICT and signal processing](#)

¹²⁹ <http://izm.izm.gov.lv/nozares-politika/izqlitiba/augstaka-izqlitiba/11984.html>

¹³⁰ <http://www.izm.gov.lv/nozares-politika/izqlitiba/augstaka-izqlitiba/11984.html>

¹³¹ WB Report on introduction of the new financing model for Higher Education in Latvia. All reports are available at http://viaa.gov.lv/lat/izqlitibas_petijumi/petijums_ai_finansesana/

¹³² http://www.rtu.lv/index2.php?option=com_content&do_pdf=1&id=60

“Iksa Centre” and two State Research Programmes at the [Institute of Mathematics and Computer Science](#) of University of Latvia and [RTU](#).

By August 31, 2015 the implementation of the ERDF funded project “Establishment of unified national importance academic network in Latvia for provision of research activities” is planned to be finished. The network will connect the main education and research centres and ensure full and effective participation of Latvian researchers in the global European and world research area, as well as scientific communication. Virtual laboratories, availability of digital libraries, online discussion and conferences, research integration in the higher education system, integrated learning solutions, interoperable and integrated administrative systems of research, academic institutions, and universities are just few of the benefits.¹³³

Project activity 2.1.1.3.2. “[Improvement of IT infrastructure and information systems for scientific activity](#)” of EU SF 2nd Operational Plan “Entrepreneurship and Innovation” implemented directly by MoES foresees:

- 1) Creation of an academic network.
- 2) Creation of main campus subnetworks and provision of access to main research institutions.
- 3) Access to main full text scientific publication databases.
- 4) Licences for key software applications commonly used for research needs.

Weak management has delayed coordination and agreement for priorities among key players and has led to postponement of the design of technical specifications and the announcement of public procurement.

Within the above mentioned project all project partners as of 2012 have access to the international scientific literature database Science Direct and citation index Scopus database.

3.3.2 Open Access to publications and data

Although Open Access policies¹³⁴ at regional or institutional level have not yet been adopted in Latvia, the Latvian scientists use opportunities to publish their articles in Open Access journals and repositories in order to achieve wider distribution and availability of

¹³³ <http://izm.izm.gov.lv/aktualitates/informacija-medijiem/11790.html>

¹³⁴ There are 4 types of Open Access:

(i) ‘Gold’ open access (open access publishing): payment of publication costs is shifted from readers (via subscriptions) to authors. These costs are usually borne by the university or research institute to which the researcher is affiliated, or by the funding agency supporting the research.

(ii) ‘Green’ open access (self-archiving): the published article or the final peer-reviewed manuscript is archived by the researcher in an online repository before, after or alongside its publication. Access to this article is often delayed (‘embargo period’) at the request of the publisher so that subscribers retain an added benefit. The green access model allows for certain variations: the length of the embargo period and the version that may be archived at different moments in time vary, e.g. depending on the agreements between publishers and authors.

(iii) Hybrid open access refers to a publishing model in which subscription-based journals allow authors to make individual articles open access on payment of an article publication fee.

(iv) Please pay particular attention to whether the further variant called ID/OA mandate (i.e. Immediate deposit/Optional Access), also called the “Liege Model” has been introduced in your country (cf., for instance <http://openaccess.eprints.org/index.php?archives/71-guid.html>)

research results. Currently there are two Open Access journals issued in Latvia that are included in the Open Access journal directory – Latvian Journal of Physics and Technical Sciences and Proceedings of the Latvian Academy of Sciences. Section B: Natural, Exact and Applied Sciences. Scientists publish papers also in institutional and sector repositories – BioMed Central, ArXiv, Cogprints etc. Scientific works are also published online for open access in the websites of Latvian scientific institutions.¹³⁵

A broad promotion of Open Access movement in Latvia has begun since 2009. It is actively organised by the library of University of Latvia. Within the International Open Access Week every year there are organized international seminars and discussions.¹³⁶ The share of Open Access publications in Latvia is 60% of total scientific publications.¹³⁷

¹³⁵ Gudakovska I. et al. Open Access initiative in the University of Latvia and Republic of Latvia

¹³⁶ Gudakovska I. et al. Open Access initiative in the University of Latvia and Republic of Latvia

¹³⁷ http://science-metrix.com/files/science-metrix/publications/d_1.8_sm_ec_dg-rtd_proportion_oa_1996-2013_v11p.pdf

4. Innovation Union

4.1 Framework conditions

The legal environment in Latvia is one of the components in the national innovation system which needs urgent government action as several studies outlined important constraints in the Latvian legal environment:

- 1) FICIL warns about frequently changing legal environment, large shadow economy and missing concrete plans for medium term perspective (even though the country switched to a three year budget planning procedure);¹³⁸
- 2) The Government¹³⁹ in 2014 has approved the [Management Group for coordination implementation of the Action Plan of the Entrepreneurship Environment Improvement](#) which in its Report in 2013 and Action Plan¹⁴⁰ for period 2014-2015 outlines key tasks such as a reduction of existing tax burden and administrative costs for entrepreneurs.¹⁴¹
- 3) OECD in its Latvia's economic assessment in 2015 stresses that "ensuring a sustainable catch-up will require boosting competition and innovation in domestic markets, encouraging formal labour force participation and tackling infrastructure bottlenecks" (see Figure 2). Lowering the tax burden on low wages would be important factor to achieve both growth and equity objectives.¹⁴² Despite good practices in Latvia in respect to improvement of administrative barriers since 1999 there is still a lot to do. In its recent report (2015) OECD evaluators are more strict, emphasizing the need to make the tax system more progressive and employment friendly by reducing high labour tax burden and cut red tape. The administrative burden in Latvia is considered above OECD average for start-up entrepreneurs and corporations and existing regulation can hamper competition and inflow of FDI, in particular in bio-economic areas and related processing sectors (OECD, 2015, pp. 23-25). It is important that small start-ups and corporations can benefit from the conducive business environment, tax incentives and grants.

¹³⁸ FICIL – Foreign Investor Council in Latvia, Position Paper, FICIL, 2013, see in http://www.ficil.lv/hidden/HC2013%20documents/webbbbb/13%2005%2026_Tax%20and%20Macro_ENG.pdf

¹³⁹ Decree of Prime Minister No.96 from 24.03.2014., see in <http://likumi.lv/ta/id/265223-par-vadibas-grupu-uznemejdarbibas-vides-uzlabosanas-pasakumu-plana-izpildes-koordinesanai>

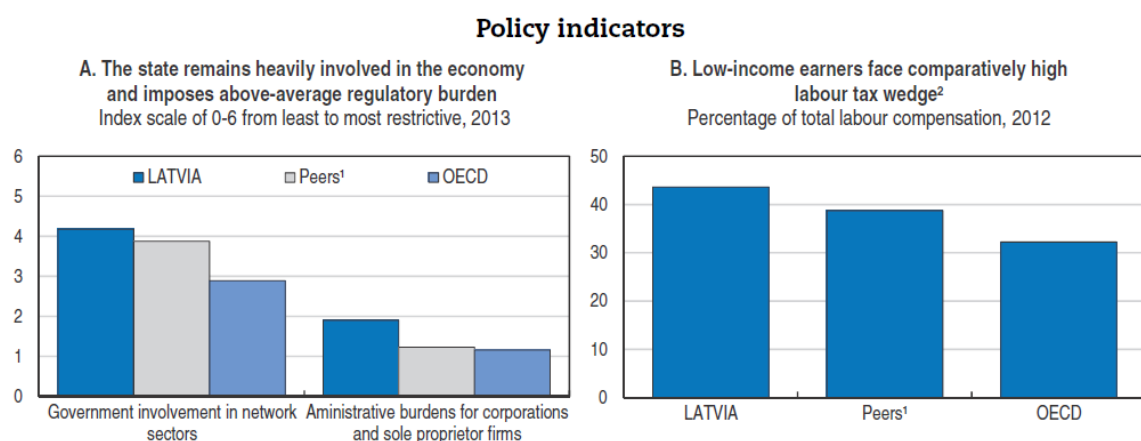
¹⁴⁰

https://www.em.gov.lv/lv/nozares_politika/nacionala_industriala_politika/uznemejdarbibas_vidē_uznemejdarbi_bas_vidēs_uzlabosana/

¹⁴¹ <http://likumi.lv/ta/id/270607-par-uznemejdarbibas-vides-uzlabosanas-pasakumu-planu-2014-2015-gadam>

¹⁴² Source: Economic Policy Reforms 2015, going for growth. Country Notes, OECD, 2015, pp.239-242. See <http://www.oecd.org/countries/latvia/going-for-growth-latvia-2015.pdf>

Figure 2 Regulatory burdens and state involvement in economy. Source: OECD, 2015



Notes: 1. Average of the Czech Republic, Estonia, the Slovak Republic and Slovenia.

2. Labour taxes include personal income tax and employee plus employer social security contributions and any payroll tax less cash transfers. Single person at 67% of average earnings without children. 2013 data for OECD average and peers.

In order to foster the development of new innovative small and medium-sized enterprises and improve the overall business environment, several support measures have been implemented in Latvia in the recent years. General business environment is part of State's plan to reduce administrative barriers for 2014-2015 (CoM Regulations No.694 from 28.11.2014). It is regularly discussed with the Foreign Investor Council in Latvia and led by LIAA.

Amendments to the Commercial Law of May 2010 significantly reduced the costs required to start a new business, envisaging that a limited liability company (LLC) may be founded with reduced equity capital (from LVL 1). Additionally, the state dues for registration of such a limited liability company were reduced.¹⁴³

On November 6, 2013, Saeima approved amendments to the Micro-enterprise Tax Law, introducing changes in the procedure for calculating the micro-enterprise tax rate. According to the amendments, a taxpayer with annual turnover below €7,000 is subject to a tax rate of 9%; however, if the annual turnover exceeds the mentioned amount, the tax rate is going to be 11% in 2015 and 2016 and 15% starting from 2017.¹⁴⁴

According to the results of "Doing business Report 2015" Latvia ranks in the 23rd place in the evaluation of ease of doing business from 189 evaluated countries. There are two larger reforms – in "Paying taxes" and in "Starting a business". Latvia made paying taxes easier for companies by simplifying the VAT return, enhancing the electronic system for filing corporate income tax returns and reducing employers' social security contribution rate. Latvia made starting a business more difficult by increasing registration fees, bank fees and notary fees.¹⁴⁵

Until 2017 fiscal incentives in three Free zones will be in force, based in seaport areas and one special economic zone in Rezekne, all aimed to attract FDI and promote new entrepreneurship. On November 6, 2013 Saeima adopted [amendments to the Law on](#)

¹⁴³ Report on economic development of Latvia. Riga, June, 2014

¹⁴⁴ Report on economic development of Latvia. Riga, June, 2014

¹⁴⁵ <http://www.doingbusiness.org/reforms/overview/economy/latvia>

[Corporate Income Tax](#), which provides that from July 1, 2014 new incentive of the corporate income tax is in force with the aim to encourage the investment of private sector in R&D, providing that certain corporate R&D costs are written off the year in which they arise in the application of value-enhancing coefficient – 3. Eligible costs are: compensation of scientific and technical personnel of enterprises, costs of the services of research institutions, services of accredited certification, testing and calibration institutions.

Latvia has recently adopted upgraded [Insolvency Law](#), which was changed in favour of enterprises. In the same time implementation of the law by insolvency administrators and several court procedures and even judge conflicts of interests at appealed court sessions have outlined personal conflicts, risk of corruption and conflicts of interests which make business environment really unattractive. From March 1, 2015 the new Law will reinforce firm protection against raider-schemes¹⁴⁶ during auctions by that reducing opportunity for owners and managers to empty firm's assets and resources before insolvency announced.¹⁴⁷

Demand side policies in the period 2007-2013 were limited. There is no innovation procurement or sector based demand side policy measures in Latvia. Among supply side policy measures one can mention [new product development support measure for micro, small and medium enterprises](#), [support to new product and technology development: registration of intellectual property rights](#), [support to new product introduction into manufacturing](#), [entrepreneurship motivation program](#). The efficiency of these measures depends on the scale of growth of innovative firms in Latvia.

In the planning period 2014-2020 the Ministry of Economy plans to design support instruments in several areas from that the first priority direction "Research, technology development and innovations" which includes the following activities¹⁴⁸: Innovation vouchers (€7m); Innovation motivation (€4.8m); Training of employees (€29.9m).

4.2 Science-based entrepreneurship

The existing technology transfer support model limits the availability of technology transfer services and there is scarcely any funding available for increasing the commercialization potential of developed intellectual property. There are also no specifically developed tools for transfer of research results by creating spin-off companies in collaboration with incubation service providers and venture investors¹⁴⁹.

Support for new innovative companies is provided by business incubators and different financial instruments. At the same time it should be noted that the developed business incubator network operates mainly in the regions and there is relatively low proportion of

¹⁴⁶ Term raider (*reider*, as in "corporate raider") had earlier been applied in the context of conflicts between large industrial corporations, by the middle of the 2000s the problem had become one largely of smaller businesses. "Raider" (*reider*) acquired the meaning of an individual or a group that makes use of trickery and fraud to acquire legal ownership of a SME, its premises, resources and property, more known in Russia. "Raids" involve painstaking legal pressure actions, dispossession of original owners for new legal situation, confrontation of the original owners by raiders, often backed by armed men, with evidence of the new set of legal circumstances and evicting them from their premises. "The most effective raider takeovers involve initiating multiple chains of legal events that are difficult to reverse. In a 'raid' pretenders take not physical assets, but the authorizations accompanying ownership of assets." See Woodruff, 2012.

¹⁴⁷ Report On National Economy, MoE, December, 2014, p.123.

¹⁴⁹ [Guidelines for the Development of Science, Technology and Innovation for 2014-2020, p.88](#)

high growth companies with export potential in the business incubators. Only in 2013 University of Latvia in cooperation with Riga Technical University launched the “Green” technology incubator with the aim to develop technology intensive business ideas and to raise the funds for their implementation in the early development phase. In Riga also operates Creative Industries Incubator, which has supported around 100 creative industry companies.¹⁵⁰

LIAA continued implementing the EU structural funds programme "Measures to Encourage Innovations and Business Start-ups" ([the Motivation Programme](#)). Within the framework of the programme, activities of several educational, training and information measures have been implemented, for instance, the training course "Become an Entrepreneur in 5 days", series of practical seminars for authors of innovative business ideas and seminars on commercialization of technologies, innovation days for students, the innovative business idea competition "Idea Cup 2014", networking seminars, mentoring programmes for new entrepreneurs, as well as TV competitions for new entrepreneurs. Specific measures have been implemented to educate students and teachers from elementary and secondary schools about innovations and commercial activities, for instance, creating students' training enterprises, arranging training visits to enterprises, etc. The implementation of the concept of DEMOLA open innovation model, launched in 2013 in Latvia, was continued in 2014. At the same time, a new activity is expected to be implemented with an aim to promote the start-up of new and innovative enterprises in their early stage, by providing the necessary consultations and knowledge to the authors of business ideas and business developers on preparation and implementation of projects, including providing support in attracting external financial sources. Total financing from the EU structural funds available within the Motivation Programme for the implementation of all activities until June 2015 constitutes €3m.¹⁵¹

The Business Incubation network (except green and creative incubators) is located outside the capital Riga and more services are provided to Ventspils University College graduates in Ventspils and [Latvia University of Agriculture](#). In general, the [Business Incubator support program](#) is aimed to generate new jobs in low growth traditional sectors in the regions, not to promote new university start-ups, spin-offs, or high growth innovative firms. The [Green Technologies Incubator](#) was established in 2013 as a result of cooperation between University of Latvia and RTU and is financed from the Norway State Financial Facility. The initial idea was to create two major Technology Transfer Centres as establishments of higher level and under them operate several Technology Transfer Contact Points. The [Technology Transfer scheme](#) helped only to create several lower level Technology Transfer Contact Points which lack financing to support feasibility studies and development of new innovations born in universities and to attract with technological offers private enterprises interested to obtain licenses. Business angels and VCF were more interested to assess new technological ideas from universities and research and technological institutions but unfortunately new innovative ideas with high growth projection and patenting capacity in Latvia are low.¹⁵²

¹⁵⁰ [Guidelines for the Development of Science, Technology and Innovation for 2014-2020](#)

¹⁵¹ Report on economic development of Latvia. Riga, June, 2014

¹⁵² See <http://www.commercializationreactor.com/#!31032015/c1i60>; <https://riga.techhub.com/>; <http://www.icfm.lv/en/news>; <http://www.lvca.lv/en/> and <http://www.latban.lv/en/events/>

A bottom-up initiative, supported and implemented by LIAA – Commercialization Reactor – selects and brings to Latvia new technological ideas with high growth potential from former CIS, additionally providing training, mentors and access to risk capitalists in Latvia who are able to provide initial investment. More than 30 new firms with investments over €2.8m started businesses thanks to this unique scheme.¹⁵³ A significant weakness of the National Innovation System is the absence of direct support to Science Parks or Business Accelerators. Initiatives such as [Techhub](#) and the [Ventspils High Technology Park](#) receiving funding from [Ventspils City Council](#) are rather an exception.

[Micro, small and medium-sized enterprises support for new product development](#), [Entering in new external markets support program](#), [Support to investments in manufacturing facilities or their reconstruction](#), provide support to young companies. The difficulty is that new enterprises lack collateral or available free financial resources to pre-finance projects which were established on reimbursement model after content and financial reports are approved. [Support program to start entrepreneurship or self-employment](#) was implemented by Latvian Mortgage and Land Bank until 2012.

New firms may benefit from a [loan guarantee scheme](#), aimed to provide access to loans without collateral, [mezzanine loan scheme](#), [seed and expansion risk capital](#), [microloan scheme](#). After few failures and attempts the Latvian Business Angel network [LATBAN](#) was finally established.¹⁵⁴ LATBAN, Latvian Risk Capital Association, Techhub, LIAA, Commercialization Reactor, [Seed Forum Riga](#) organise a number of investor forums, events where new nascent or new business idea holders can present their idea to risk capitalists. The small number of young researchers and engineers with commercial focus is one of the reasons for low deal flow.

4.3 Knowledge markets

The system aimed to promote commercialisation of created in Latvia new intellectual property (new knowledge or technologies) is fragmented with too many players with limited resources.

Several incentives are implemented with the aim to provide support for commercialization of inventions. LIAA and the Ministry of Economics already for eight years organize the competition “Export and Innovation Award”. The Patent Office has begun to implement a number of new initiatives. Co-operating on regular bases with Latvian higher education institutions, students and teachers, the Patent Office organizes seminars and lectures on industrial property protection issues. In collaboration with the technology transfer and business competence centers it participates in the informative events for companies about support of innovations in Latvia, and also takes part in international exhibitions in Riga to provide the necessary information for entrepreneurs–manufacturers on the enforcement of intellectual property rights protection aspects of the EU and Latvian legislation. The Patent Office in cooperation with the Latvian Academy of Sciences also presents an award for outstanding inventions.

Although there are regularly organized support programmes for promotion of invention and innovation for companies, their involvement is relatively small. In addition, the time period from the project development, submission, and acceptance until its execution is

¹⁵³ <http://www.lvca.lv/en/komercializacijas-reaktors-4-un-5-oktobri/>

¹⁵⁴ <http://www.lga.lv/index.php?id=165>

relatively long (from 6 to 12 months) and taking into account market demand changes and technological fluctuations, many projects are stopped. Large number of the projects is not accepted due to various formal (administrative) requirements.

Arguably, the main problem in Latvia is IPR policy inside universities and large research institutions. Formally, universities according to employment contract own all new IPR designed inside their premises and using their research infrastructure. In the same time they do not guarantee that the author will receive fixed and comparable with western practices individual income if the invention is commercialised. The competences to licence technologies in local TTCPs are low, universities lack funds to invest in IPR portfolio, patenting fees and patent maintenance. The main instruments in research institutions to promote commercialisation of IPR is the TTCP scheme, and in enterprises – activity 2.1.2.2.3. – [“Design of new products and technologies – support to industrial IPR patenting”](#).¹⁵⁵

The Intellectual Property Council was established in 2006 according to Regulations of CoM¹⁵⁶ approved in 2006 with amendments in 2007, 2009 and 2010. It represents 9 ministries at state secretary level and is chaired by the Minister of Justice. It meets twice a year. The main focus of Council is IP protection, communication and training issues. It has almost no activities related to knowledge transfer promotion and commercialisation. Nevertheless several hundred individuals each year are trained on different topics of IPR in collaboration with International organisations, on project bases or in Motivation program by LIAA.¹⁵⁷

MoJ has designed the new Intellectual Property Guidelines for 2014-2020, replacing the previous planning document for 2008-2012.¹⁵⁸ The new Guidelines foresee minor changes in the policy goals including adding new goal – effective prevention and combating of piracy on the Internet.

4.4 Knowledge transfer and open innovation

With the aim to promote cooperation between academia and industry in the recent years several incentives have been continued or reintroduced – *competence centres, technology transfer contact points, cluster initiatives, market oriented research projects, business incubators, new product and technology development program, BIRTRI initiative, the Motivation program*. However, they have been in place for about 4-5 years and it requires more longer time to introduce new cooperation culture and change the mind-set of involved in collaborative research and innovative active people.

1. Measures to support R&D cooperation projects between public / academic / none profit sector research institutions and enterprises. Lack of cooperation between science, academia and industry is mentioned as one of the main weaknesses in the Latvian innovation system¹⁵⁹. Poorly developed cooperation between scientific institutions and industry substantially restricts adaptation and implementation of new technologies and innovative solutions.

¹⁵⁵ CoM Regulations No.834 from 07.10.2008, <http://likumi.lv/doc.php?id=183245>

¹⁵⁶ Regulations of CoM, No.18 from January 3, 2006, see: <http://likumi.lv/doc.php?id=125862>

¹⁵⁷ Informative report on the implementation of the “IPR protection and provision Guidelines for 2008-2012” in 2011 and 2012. 26.04.2013, 15.p. Available at <http://polsis.mk.gov.lv/view.do?id=2780>

¹⁵⁸ <http://polsis.mk.gov.lv/view.do?id=2780>

¹⁵⁹ Guidelines for the Development of Science, Technology and Innovation for 2014-2020, p.19

The main activity to create better environment for generating commercial return and foster long-term cooperation between scientists and industry is the state support program *Competence Centres*. In the programming period 2007-2013 until April 30, 2014 within the activity "Competence Centres" 6 contracts have been concluded with NGOs representing Competence centres as established legal entities for the total contract sum of €53.17m. Within the programme [Competence Centres](#), support is provided for individual and collaborative joint industrial research projects between scientists and enterprises in conducting larger-scale industrial research and development of new products and technologies. Competence centres are established in six sectors important to the national economy of Latvia and they are as follows: the pharmaceutical and chemical industry, information and communication technologies, the forestry sector, manufacturing of electric and optical equipment, environment, bioenergetics and biotechnology, as well as transport and engineering. The programme started in 2010, had almost a year break and after re-approval by Latvia's government¹⁶⁰ was restarted in October 2012, and will be implemented until June 2015 with the opportunity to prolong ongoing projects until December 31st, 2015¹⁶¹ with total public funding of €53.17m, plus additional co-funding of at least €19m expected to be attracted from the private sector. 197 production research and new product and technology development projects are implemented in the six competence centres, out of which 42 projects have been completed by June 1, 2014. A total of 140 enterprises and 15 scientific institutions are involved in the competence centres, while over 323 researchers are involved in the conduct of research.¹⁶²

To support facilitation of the cooperation between science and business, the Ministry of Education and Science financially supports implementation of *market oriented research projects (MORP)*. Within the framework of market-oriented projects scientists and manufacturers cooperate to develop new products and technologies. In this way, scientists do research in close collaboration with manufacturers, receiving state budget funds for scientific work, while manufacturers get new competitive products. On the basis of the "Law on State Budget for 2013" applications for market-oriented research projects were not accepted in the year 2013¹⁶³. In the year 2014 financing of the program was reduced by €160,658 with the aim to ensure the payment of membership fee in the European Research Infrastructure Consortium and participation of Latvian researchers in the 7th stage of European Social Survey in 2014¹⁶⁴. In 2013-2014 MoES gradually replaced MORP program financed purely from the state budget with EU SF program 2.1.1.1.¹⁶⁵ ("Support for Science and Research") third call¹⁶⁶ aimed to support research and industry collaboration and commercialisation of research outputs (mainly licensing) in five priority science areas: energy and environment; innovative materials and ICT and signal processing and nano-technologies; national identity; public health, sustainable usage of local resources.

¹⁶⁰ Operational Program Entrepreneurship and Innovation, subprogram 2.1.2.1.1. Competence Centres, CoM Regulations No.361 from April 13, 2010 with amendments made at 2012, No.702 and 2014, No.639, <http://likumi.lv/doc.php?id=209078>

¹⁶¹ See Amendments in Regulations of CoM <http://likumi.lv/doc.php?id=269855>

¹⁶² Ministry of Economics. Report "Economic Development of Latvia". Riga, June, 2014, https://www.em.gov.lv/files/tautsaimniecibas_attistiba/2014_jun_eng.pdf

¹⁶³ <http://izm.izm.gov.lv/nozares-politika/zinatne/TOP.html>

¹⁶⁴ <http://likumi.lv/doc.php?id=269832>

¹⁶⁵

http://esfondi.izm.gov.lv/projektu_iesniedzjiem/konkursi/2_1_1_1_aktivitates_tresa_projektu_iesniegumu_atases_karta

¹⁶⁶ CoM Regulations No.14 from January 13th, 2013

The available ERDF financing for this program was €18m, minimal project size €42,700, maximal amount - €569,000. By June 1, 2014, 695 internationally recognized scientific papers were published and 125 international patent applications have been submitted.¹⁶⁷

Implementation of the programs “*New product and technology development*” and “*New product and technology introduction into production*” was continued in 2013 and 2014. The aim of these activities is to support development of new products and technology and to support introduction of successfully developed new products (including goods and services) or technology into production. The majority of projects were implemented solely by firms with only few cases of collaborative research with PROs.

The assessment of planning period 2007-2013 activities showed that the aimed range at the beginning of the period to foster science – industry linkages was much wider. Some of the planned policy measures like the Riga Science and Technology Park project, were cancelled.¹⁶⁸ From the intended two-tier *TTCP scheme*¹⁶⁹ only the “lower tier” was implemented, cutting off international competence building and grants for IPR portfolio building. NIS evaluation in 2007 performed by international independent Inno Group experts forecasted much higher number of average projects than were implemented in reality in programs of “New product and technology development” (1065 planned in 2007 for financing amount €112.7m respectively versus 224 implemented for total funding €71.7m and 107 completed for €32.9m in 2014¹⁷⁰) and “Competence centres” (393 versus 197 implemented or ongoing),¹⁷¹ which indicated overestimation of science demand for existing industry base in Latvia. The conclusion of Inno Group was that facilitation of innovation linkages needed to get more political support and more ESF resources in the period 2007-2013. In 2014 LIAA continued to administrate approved applications in support program “Support to new product and technology development introduction into manufacturing”. From 116 mainly medium size firm projects with total financing of €37.7m on December 1st, 112 were finished (€35.3m) with average amount of support of €0.37m per one project. Within sub-activity “Design of new products and technologies” – only 3 contracts were signed in 2014 with total value of €0.06m.¹⁷²

2. Measures for supporting cooperation and knowledge transfer between public and private sector. Over the past ten years there is growing political focus on fostering active and efficient knowledge transfer channels from public research institutions to

¹⁶⁷ Report on Economic Development of Latvia, June, 2014, p.137

¹⁶⁸ Amendments to Operational Program, Activity 2.1.2.3.1. Riga Science and Technology Park Development, 2007, p.18

¹⁶⁹ The original Operational Program foresees two level activities: 2.1.2.1.2. Technology transfers contact points and 2.1.2.1.3. Technology transfer centres (see Amendments to Operational Plan, 2007, p.15. http://www.esfondi.lv/upload/04-kohezijas_politikas_nakotne/dpp/FMProgr_241007.pdf). The lower level program was implemented as existing TTCP program with aim to “facilitate cooperation between scientists and commercial firms and protect and develop of intellectual property”, but the upper level subprogram aimed to create TTC has goal to license in international market research outputs of universities and research institutes. As upper level subprogram was cancelled, TTCPs lacked financing for research ideas commercialisation, additional research and testing, design works and prototyping, market research and patenting, new patent purchase, as well as assessment of value of technology and creation of IPR portfolio offered to customer. The OP planned to carry out both subprograms €3.55m each, maximal Intended amount to support one TTC was €210'000 LVL/year, to one IP development project, e.g. max 2 centres in Latvia.

¹⁷⁰ MoE, Report on National Economy, 2014 Riga, June, 2014, p.137

¹⁷¹ The Latvian National Innovation System – assessment of competitiveness and opportunities, Expert evaluation report by Inno Scandinavia AB, Stockholm, 2007, 40 p.

¹⁷² Report on National Economy, MoE, 2014, December, p.131

private enterprises. Within the programme “*Technology Transfer Contact Points*” (launched on 26.02.2008) seven TTOs were established in the main universities. According to the latest NRP report from April 29, 2014, 8 Technology Transfer Contact Points in 2013 prepared 67 research output commercialisation offers, submitted 55 patent applications (incl. 5 international patent applications) and 2 other industrial property design or prototype applications, concluded cooperation agreements between academia and industry on contract research, research based consultancies or IP rights or sales. However, the existing technology transfer support model restricts the availability of technology and service transfer. It provides only limited support to universities: no financing is available for technical and economic feasibility studies of commercialization of research results created by scientists’ intellectual property. Also, no tools have been developed for the investment of IP in new innovative spin-off companies in collaboration with providers of incubation services and venture investors¹⁷³. Because the Business Incubation support program was focused to new job creation in regions with low growth firms, and regional HEIs have low science capacity, incubation cannot be effective as important knowledge transfer channel to new firms, except for Ventspils and Jelgava cities.¹⁷⁴

The implementation of the “*Cluster Programme*” co-funded by the EU funds and administered by LIAA was continued in 2014 to promote the collaboration between so far unconnected enterprises, research, educational and other institutions, to improve the competitiveness of enterprises, boost export volumes, and to promote innovation and new products. The programme supports 11 cluster projects which involve at least 300 enterprises, more than 20 educational and research institutions, as well as several non-governmental organisations and local governments. The total public financing until 2015 is €4.8m. Maximum €0.4m can be granted to one cluster¹⁷⁵. The most important clusters in Latvia are the Forest and wood cluster, the Agro-food cluster, as well as the Mechanical engineering and metal cluster.

From the 11 supported, 8 clusters¹⁷⁶ represent respective national associations which continue the tradition that industrial associations are drivers also of cluster development. The positive side of clustering is better knowledge of member and sector needs and better lobbying of cluster interests. The negative side is that cluster development strategies are influenced and limited by association strategies in general or determined by only few most active larger members. Clusters linked to industrial associations usually exclude new rapidly emerging technological segments with future growth potential.

In order to promote the development of technology intensive products and services with the support of the Norwegian Financial Instrument (90% of financing, EUR11.2m) and state budget (10%, €1.2m) within the frame of the program “Green Industry Innovation” the *Green Technology Incubator*¹⁷⁷ was launched in July, 2014 in Riga. The aim of the Incubator is to help green innovation ideas to enter the market, and also to promote

¹⁷³ Guidelines for the Development of Science, Technology and Innovation for 2014-2020, p.88

¹⁷⁴ International science evaluation provided only two regional research centres among top 15 as local excellence centres – in Ventspils and Daugavpils, but from supported 9 BIs in 20 towns and cities only Ventspils and Jelgava demonstrate established commercial relations with Ventspils University College and Latvia University of Agriculture research structures. See www.vatp.lv, VIRAC Annual reports for 2011, 2012, http://virac.venta.lv/index.php?option=com_content&task=view&id=90&Itemid=42, <http://www.llu.lv/aktualitates?op=raksts&id=2242>

¹⁷⁵ Ministry of Economics. Report “Economic Development of Latvia”. Riga, June, 2014

¹⁷⁶ <http://www.liaa.gov.lv/lv/ar-11-klasteru-starpniecibu-veicinas-latvijas-ekonomikas-izravienu>

¹⁷⁷ <http://www.giic.lv/atbalsts>

knowledge flows and co-operation between the private and academic sectors as well as the exchange of experience and competence in the area of green technology between Latvia and Norway¹⁷⁸. The incubator is a joint project of Riga Technical University, the University of Latvia and the Norwegian Industrial Development Corporation SIVA. The Program “Green Industry Innovation” also supported 5 project applications from 13 submitted in the first stage with total required funding €2.4m.¹⁷⁹

Leading scientists from major universities of Latvia and fifty innovative entrepreneurs in 2012 have teamed up and founded a Technology transfer centre for innovative products – Baltic Innovative Research and Technology Infrastructure (*BIRTI*). The objective of the BIRTI is to create and improve the environment and infrastructure for developing human resources to innovation-driven scientific research, technology transfer and innovative business as well as to ensure coordinated higher education, research, development and innovation resource progression in the Baltic countries, their integration into the common European Research Area and Higher Education Area¹⁸⁰. This bottom-up initiative joining together Universities, research institutes and private firms foresees consolidation of resources and collaboration of PROs with private research and commercial entities in three areas: BioPharmAlliance, NanoTechEnergy and BaltSmartTech. The further development of infrastructure for fundamental, applied, experimental RTD and open innovation driven by BIRTI might be integrated in state research consolidation reforms based on international performance evaluation.

3. Framework conditions to facilitate and reward academics engaged in cooperation with industry and industrial clients. The knowledge transfer between academic and industry sectors is catalysed also by non-financial measures supported by MoE and MoES, e.g. introducing performance based research institution funding model (higher score at evaluation is given to applied science, increased income from contract, collaborative or sponsored research projects with industry). This model is applied at Institutional research funds allocation, in almost all EU SF programs targeted to research institutions and this model has extremely high priority in new research reforms.

Investment and development Agency of Latvia (LIAA) continued implementing the EU structural funds programme “Measures to Encourage Innovations and Business Start-ups” (*the Motivation Programme*). Total budget for the planning period 2007-2013 (implementation until June, 2015) will be €2.9m¹⁸¹. Within the framework of the Motivation Programme, several training and information measures are implemented, for instance, series of practical seminars for authors of innovative business ideas and seminars on commercialization of technologies, innovation days for students, the innovative business idea competition Idea Cup 2014, networking seminars, mentoring programmes for new entrepreneurs, as well as TV competitions for new entrepreneurs. In 2014, the Motivation Program expect to involve at least 7700 persons (in 2013: 6751), including students, researchers, inventors.

DEMOLA project in Latvia was launched in 2013 by Latvian IT Cluster with the support of Ministry of Economics and Investment and Development Agency of Latvia as a part of the Motivation Program. DEMOLA is an innovation platform with Finnish roots, supporting

¹⁷⁸ <http://eeagrants.org/News/2014/Green-Technology-Incubator-launched-in-Riga-Latvia>

¹⁷⁹ Ministry of Economics. Report “Economic Development of Latvia”. Riga, June, 2014, p.139

¹⁸⁰ <http://www.birti.eu/en/about-birti>

¹⁸¹ Commercial competitiveness and innovation promotion program for 2007-2013 (Komerccdarbības konkurētspējas un inovācijas veicināšanas programma 2007. – 2013.gadam)

cooperation of students, universities and companies. DEMOLA Latvia has set cooperation with Latvian Electrical Engineering and Electronics Industry Association, Association of Mechanical Engineering and Metalworking Industries of Latvia, Association of Latvian Travel Agents and Operators, and major universities of Latvia. In 2014 DEMOLA plans to implement 12 projects.¹⁸²

4. Measures for supporting open innovation and the effective two-way diffusion of knowledge between academia and the private sector and within private sector. Open innovation philosophy is new and it conflicts with dominating approaches in business management and research administration methods and habits partly arising from former Soviet centralised concepts. Nevertheless, the overall trend is to provide wide access to full text scientific publication databases¹⁸³, motivate researchers to publish their results in publicly accessible editions increasing intensity up to 80% instead of 70% of eligible costs in projects of Competence Centres program if all published outputs have open access.

As the measures to support open innovations and optimal circulation of knowledge between both academia and the private sector and within private sector two Estonia-Latvia joint projects should be mentioned – [Protolab Network](#) aimed to create and strengthen prototyping network with specialisation and labour division in 3 strong cross-border Skills Centres and Prototyping laboratories (Product Development, Training and Testing Centres in Ventspils, Ogre and Tartu for analysis, knowledge transfer and consulting, raising the competence of entrepreneurs, staff and students of vocational & higher education institutions in the field of product development), and [Skills centre](#), creating lifelong learning training programmes for manufacturing industry and engineering service providers in CAD / CAM, mechatronics, rapid prototyping and reverse engineering areas. As a result, the Living Lab concept was elaborated and such open access lab was established in Tartu Science Park, but not in Latvia.

5. The new planning period 2014-2020 activities for technology transfer basically will continue the activities from previous period. The following programmes are planned¹⁸⁴:

- competence centres – funding of €72.3m;
- technology transfer – funding of €24.5m;
- cluster programme – funding of €6.2m;
- innovation vouchers – funding of €7.0m;
- technology accelerators – funding of €30.0m,
- Motivation program – funding of €4.8m,
- Knowledge transfer to farmers and forest owners €17.1m (ELFLA)¹⁸⁵
- Collaboration between research and agriculture and forestry sectors €2.2m (ELFLA).

¹⁸² <http://www.liaa.gov.lv/lv/par-liaa/liaa-zinas/ziema-2014/atklata-inovaciju-platforma-demola-latvia>

¹⁸³ Financing comes from activity 2.1.1.3.1. through MoES and will be covered further from Institutional financing from state budget, see:

http://sf.viaa.gov.lv/lat/zinatne/zinatnes_apakshsad/?tl_id=13941&tls_id=11469

¹⁸⁴ https://www.em.gov.lv/lv/es_fondi/planotais_atbalsts_2014_2020/

¹⁸⁵ NRTD Guidelines. Implementation. Informative report, 21.10.2014, p.27

In 2014, improvement of the technology transfer system will be implemented during the EU programming period for 2014-2020. The formation of a two-level transfer system is envisaged with the development of 1-2 technology transfer centres and strengthening of the already developed eight technology transfer contact points. These technology transfer centres will concentrate technology transfer efforts and expanded technology transfer services for the assessment of the technological feasibility of the research results, protection of intellectual property, development and implementation of the commercialization strategy (“proof of concept” fund), as well as providing support for the research, which aims to create commercially viable technological problem-solutions and prototypes at global level.¹⁸⁶The lower level technology transfer contact points will serve as the industrial liaison offices, supporting industry in its need to find the optimal technological solutions and obtain services from academic community, and vice versa, to support researchers in their activities to select, develop and identify commercial potential of science outputs, keep applied focus of new technologies and help to channel and licence IPR. This would be significant difference from the one level technology transfer system established in the period 2007-2013, limited at the lower level with 8 technology transfer contact points in the universities and therefore inefficient. Additional support is envisaged within the framework of the commercialization foundation for the development of technological offers to increase the readiness thereof and to improve the attraction of licentiates/ investors.¹⁸⁷

A feasibility study to establish a new Business Accelerator was performed within cross-border ESTLAT program’s SibNet project¹⁸⁸ outlining that there is room for one such efficient Business Accelerator in each of the Baltic states.¹⁸⁹ There exists a definite risk of low performance if several or poor business models would be supported.

Several evaluations¹⁹⁰ have concluded that business-science collaboration has only formal but not real substance, e.g. focused to meet selection criteria of EU SF programs. The real financial transfers from industry are poor and limited; both sides try to keep control on obtained infrastructure or human resources instead of contracting or performing joint research based on pre-agreed IPR. The government has elaborated several overlapping strategies how to increase business demand for science and knowledge transfer for low and medium technology enterprise base, but without targeted structural changes aimed at fostering knowledge intensive (high growth) new innovative firms, technological companies of scale¹⁹¹ and targeted technological development¹⁹² including increase of technological absorption readiness¹⁹³, business-science collaboration may keep its formal character.

¹⁸⁶ [Guidelines for the Development of Science, Technology and Innovation for 2014-2020, p.47](#)

¹⁸⁷ Ministry of Economics. Report “Economic Development of Latvia”. Riga, June, 2014

¹⁸⁸ <http://www.estlat.eu/supported-projects/>

¹⁸⁹ <http://www.sibnetwork.eu/?id=48> and

<http://www.teaduspark.ee/UserFiles/Projektid/SibNet%20veeb/Report%20-%20Recommendations%20for%20strategy%20of%20'Gazelle'%20type%20companies.PDF>

¹⁹⁰ Source: RIS Latvia report, see http://www.cnel.gov.pt/document/latvian_innovation_system.pdf, ESTER reports, see <ftp://ftp.cordis.europa.eu/pub/paxis/docs/ester.pdf>, <http://www-3.unipv.it/ester/file%20ESTER%20da%20Laboranti/Ester%20Laboranti/Project%20Download/3%20Third%20meeting%20presentations/Start-up%20Access%20to%20Finance%20in%20Latvia.pdf>, http://ec.europa.eu/invest-in-research/pdf/download_en/latvia.pdf, SME innovation need analysis, LIAA, 2007 report, Research Guidelines 2014-2020.

¹⁹¹ The entrepreneurship development policies distinguish three important target groups: new start-ups and spin-offs; mature exporters, SMEs, growth (with annual sales growth of €1m plus over 3 years) and high-growth companies (with 3-4 consecutive years of 20% or more growth), large companies and companies of

Integration into the European research area offers growing opportunities of knowledge and technology transfer, diffusion and spillovers for both scientific institutes and SMEs. A good example how to create such linkages between EU large scale research infrastructure objects and distributed local nodes providing access, knowledge and services to local clients is the Baltic ScienceLink project with a number of studies outlining that Latvia again is lagging behind CEEC countries in long-term planning of creating presence and membership in mega-research clusters and EU significance large scale research facilities¹⁹⁴, thus reaching higher scientific excellence and keeping brain drain in control.

Quantitative indicators related to Knowledge Transfer

In 2009 440 doctorate holders were employed in business enterprise sector that account for 13% of all doctorate holders in that year. The majority (1779) or 52% were employed in the higher education sector, 797 or 23% in public sector and 67 or 2% in other sectors. 11% were unemployed.¹⁹⁵

The number of applications for inventions in 2013 is 233, that is, 28 more than in the previous year¹⁹⁶. NPO applications are 1456, PCT – 208, EPO applications – 122 in Latvia in the period 2000-2010.¹⁹⁷

4.5 Innovation framework for SMEs

The legal environment, policy support measures to spin-offs, start-ups and creation of motivation at early stage of entrepreneurship (Motivation program) and business incubation scheme were already discussed in chapters 4.1, 4.2 and 4.4. The support to SMEs policy measures include activities to improve legal environment to promote micro-enterprises, provide financing for SME growth, mainly based on Altum administrated support to self-employed persons and entrepreneurship beginners, support program for

scale – portfolio companies in the €15-20m range which receive support for fast growth to reach €100m scale (for Latvia's circumstances it could be from €2-5m to €20-50m, respectively. The increasing presence of mature technological firms with the critical size and boosting innovations in traditional food and drink sectors are the main factors for Scotland's development. The main barriers for fast growth of high-tech firms in Scotland are "a lack of strong ambitions leadership and management ambition, or weak management capabilities or Scottish ownership rather than access to finances or university-linkages". This gives strong insight also in weaknesses of the Latvia's NIS and R&T&D demand side, requiring further analysis. See Reid A. A smart, sustainable nation? A review of Scottish research and innovation policy in the context of the smart specialisation agenda. Technopolis, August, 2012, 56 p. See about companies of scale support measures at p.33-34.

¹⁹² Examples would be well proved measures like Knowledge Transfer Partnership and MAS schemes in UK, Innovation assistants in Lower Austria, Industrial Doctors in Denmark etc.

¹⁹³ Watkins A. Agapitova N., World Bank, 2004

¹⁹⁴ The recent literature describes large scale research infrastructure as those facilities "with many or all of the following features: large research capacity, trans-national relevance, requiring sizeable investment and, generally, having high operating costs". They usually are unique or rare, have considerable impact on science and research at triple the global, EU and national level (e-IRG White Paper, 2009, Brussels, 53 p.). e-VLBI radiotelescopes in astronomy definitely belong to this group as distributed facility network model; sometimes defined also as big labs (Heuer, 2013), big science (Simmonds, 2013) or large scale research facilities (Technopolis, 2011). As a rule in majority of countries maintenance and operation costs of such objects are covered from special targeted large scale research infrastructure (base) financing which is missing in Latvia.

¹⁹⁵ http://data.csb.gov.lv/pxweb/lv/zin/zin_zin/?tablelist=true&rxid=cdbc978c-22b0-416a-aacc-aa650d3e2ce0

¹⁹⁶ <http://www.lrpv.gov.lv/lv/patentu-valde/statistika/izgudrojumu-statistika>

¹⁹⁷ KU Leuven, Bocconi University, „Patents and Licensing study”for DG RTD – data release Summer 2014.

competitiveness of commercial entities, micro-loans, SME expansion loans, agriculture working capital program and Support program to purchase agricultural land.¹⁹⁸ Latvian Guarantee Agency implements the ESF based 2.2.1.3. Program “Guarantees to increase competitiveness of commercial entities”, issues loan guarantees, offers short-term export loan guarantees, and supports mezzanine loans. In addition, there are expansion capital and seed capital programs and funds (chapter 4.6). The total support to SMEs issued by LGA in 2014 was aprox. €50m, which is still below the companies’ needs to continue capital investments aimed to increase productivity and replace out-of-dated equipment.¹⁹⁹ Since September 11, 2014 a new consortium “Development Financial Institution” was established according to the Law On Development Financial Institution.²⁰⁰ The consolidation of Altum, LGA and Rural Development Fund will turn into a full merger at the second stage of the reform, leading to better service, higher efficiency and continuity. The new umbrella organisation will provide financial instruments and grants for SMEs and start-ups, micro-loans, risk capital and export support financial measures, financial programs to support dwelling construction, public infrastructure development, environmental protection, development of business infrastructure, R&D&I development, agribusiness, food processing, rural, fishery and forestry development, employment of social inclusive groups and other social support programs, promotion of cooperation and to support disadvantageous regions and as a co-financing to implement programs and projects of the International Financial Institutions. The new entity “Development Financial Institution ALTUM” was established on April 15, 2015, taking over to all aid programs earlier administered by Altum, LGA and Rural Development Fund.²⁰¹

LIAA and Latvian Technology Centre provide Access to EU Enterprise Europe Network services (EEN). The main goal of EEN is to promote internationalisation and competitiveness of SMEs by EEN support such as technology transfer services, practical knowledge about export of goods, tariffs, tax system, transport, transit and customs procedures, as well as EU legal system in more than 50 markets exploiting 600 partner organisations with 4000 professionals. The EU data base of technology offers or deals serve as market information source and source of new technological solutions.²⁰²

4.6 Venture capital markets

The first generation of Latvian public venture capital programmes was launched in 2005 and so far five programmes have either been launched or are being planned. However, the programmes have failed to address the demand side. The reported evidence suggests there are not enough good projects to invest in, while at the same time Latvian entrepreneurs look for venture capital outside Latvia.²⁰³

Venture capital state support programmes in Latvia are operated by five venture capital funds – Imprimature Capital, BaltCap, Expansion Capital Fund, FlyCap Investment Fund I

¹⁹⁸ Ministry of Economics. Report “Economic Development of Latvia”. Riga, January, 2015, pp.128-133.

¹⁹⁹ See Chapter 2.1. and Report on Economic Development of Latvia, December, 2014, p.21-24.

²⁰⁰ In force since March 1, 2015, see <http://likumi.lv/doc.php?id=270323>

²⁰¹ http://www.fm.gov.lv/lv/aktualitates/nozares_zinas/altum/50474-izveidota-vienota-attistibas-finansu-institucija

²⁰² een.ec.europa.eu

²⁰³ Avots K. Et al. Public venture capital in Latvia. – 2013. Available at http://www.biceps.org/assets/docs/bje/bje2013_no1/Policy_paper_1

and ZGI-3²⁰⁴. **Imprimature Capital** manages seed and start-up capital. **ZGI-3** plans to diversify its portfolio by investing about 10% of fund's resources in enterprises at seed capital stage, 20% at start-up capital stage, and the remaining resources at the growth capital stage. The **FlyCap Investment Fund I** plans to invest 20-30% of funds resources in new enterprises that have already developed a business model and have verified viability of a product, by attracting first customers. **Expansion Capital Fund** and **BaltCap** are focused on enterprises at growth stage.

On September 26, 2012, a contract on establishment of the **Baltic Innovation Fund (BIF)** was signed between the Baltic States and the European Union. The available BIF funding might amount to up to €200m, €100m out of which are expected to be public resources, while the remaining €100m are planned to be attracted from private investors. BIF will promote availability of funding to small and medium sized enterprises in the Baltic States, willing to develop operation at the Baltic and international level, attracting risk capital investments for one company in the amount of up to €15m, thus creating new jobs and promoting formation of knowledge-based economy in the Baltic States. Furthermore, BIF will promote development of the risk capital sector and attractiveness of the Baltic State market for investors. Latvia will provide co-financing in the amount of €20m necessary for establishment of the BIF from the resources available in the LGA. By the end of December 2013, three funds have been selected within the framework of the BIF. Currently, these funds (BaltCap Private Equity Fund II, BPM Mezzanine Fund and Livonia Partners Fund) deal with attracting private investors to be able to start investing in enterprises from 2014.²⁰⁵

In April, 2014 the association "Latvian Business Angel Network" was founded with a goal to widen and develop the network of business angels in Latvia, as well as to support new, promising projects. Currently there are 23 investors working with "Latvian Business Angel Network".²⁰⁶

According to an EVCA study²⁰⁷ Latvian tax is generally low; taxation regime for VC and/or business angels in combination with some fiscal incentives provides an attractive investment environment. At a fund level Capital gains Tax is 15%, Withholding Tax is also 15%.

4.7 Innovative public procurement

Innovative public procurement as demand-side policy to encourage creation of innovations in Latvia was never used. According to the results of the [Global Competitiveness Report 2014-2015](#) government procurement of advanced tech products in Latvia with the evaluation of 3.2 points takes the 92nd place in the total evaluation of 144 countries.

There is no national target for public procurement of innovative goods and services. Report "[Innovation system review and research assessment exercise](#)" carried out by Technopolis in 2014 contains recommendations to use the "innovative procurement" as an instrument to "encourage the development of specific innovations in the delivery of public services, which

²⁰⁴ <http://www.lga.lv/index.php?id=77>

²⁰⁵ Ministry of Economics. Report "Economic Development of Latvia". Riga, June, 2014

²⁰⁶ <http://www.vatp.lv/en/association-latvian-business-angel-network-announcing-first-meeting-new-entrepreneurs>

²⁰⁷ http://www.evca.eu/uploadedFiles/Benchmark2012.pdf?dm_i=1GLS,1K23D,827W8K,5C4G8,1

in turn create advantages for the companies that develop them in seeking other national and international markets. State or semi-state organisations such as electricity companies, ministries and other large buyers can set higher standards for quality and performance, to which their domestic suppliers can respond. Encouraging the use of ISO 9000 and 14 000 standards for quality and sustainability is another way to make the domestic environment more demanding – in addition to encouraging companies to obtain certification that serves them well in international markets.”

5. Performance of the National Research and Innovation System

5.1 Performance of the National Research and Innovation system

The key question in this chapter is how Latvia can break away from its low performing economic model and move towards a dynamic restructured model with national and regional specialisation, efficient labour division, and balanced demand and supply activities in the period 2014-2020.

Latvia is among the EU countries having the lowest level of innovation performance. The [Innovation Union Scoreboard 2014](#) shows that the Summary Innovation Index has decreased for Latvia from 0.234 in 2012 to 0.221 in 2013. Since 2010 the country is listed among the poorest performing innovators with its innovation performance strongly below the EU-27 average of 0.554 in 2013.²⁰⁸

Research and innovation inputs (financing and people)

Latvia **performs below the average of the EU** for most indicators, particularly for non-EU doctorate students (Latvia – 0.2%, EU-27 – 24.2%), R&D expenditures in the business sector (Latvia – 0.15% of GDP, EU-27 – 1.31 % of GDP), public-private scientific co-publications (Latvia – 1.5 per million population, EU-27 – 7.3 per million population).²⁰⁹

Relative strengths are in Youth with upper secondary level education (Latvia – 84.4, EU-27 – 80.2) and in Population with completed tertiary education (Latvia – 37.0, EU-27 – 35.8). **A high growth** is observed for Community trademarks (growth in Latvia: 27.1%, growth in EU-27 – 6.9%), New doctorate graduates (growth in Latvia – 18.8%, growth in EU-27 – 2.8%), Population with completed tertiary education (growth in Latvia – 10.4%, growth in EU-27 – 3.6%) and Community designs (growth in Latvia – 8.9%, growth in EU-27 – 1.6%). **A large decline in growth** is observed for non-R&D innovation expenditures (Latvia – 15.8%, EU-27 – 4.7%).²¹⁰

²⁰⁸ Innovation Union Scoreboard 2014

²⁰⁹ Innovation Union Scoreboard 2014

²¹⁰ Innovation Union Scoreboard 2014

Table 8: Assessment of the Performance of the National Research and Innovation System.

1. ENABLERS	Year	LV	EU
Human resources			
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	2011	1.00	1.70
Percentage population aged 30-34 having completed tertiary education	2012	37.00	35.80
Open, excellent and attractive research systems			
International scientific co-publications per million population	2012	195.62	343.15
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	2009	3.03	10.95
Finance and support			
R&D expenditure in the public sector as % of GDP	2012	0.51	0.75
Venture capital (early stage, expansion and replacement) as % of GDP	2012	N/A	0.08
2. FIRM ACTIVITIES			
R&D expenditure in the business sector as % of GDP	2012	0.15	1.31
Linkages and entrepreneurship			
Public-private co-publications per million population	2011	2.23	52.84
Intellectual assets			
PCT patent applications per billion GDP (in PPS€)	2010	0.49	3.92
PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	2010	0.13	0.85
3. OUTPUTS			
Economic effects			
Contribution of medium and high-tech product exports to trade balance	2012	-4.89	1.27
Knowledge-intensive services exports as % total service exports	2011	32.81	45.26
License and patent revenues from abroad as % of GDP	2012	0.03	0.59

Source: European Commission, IUS Database (2014).

Research expenditure is low in all sectors: HEIs, government and business, both by amount and share. Researchers at universities and HEIs perform behind EU-15, but the number of researchers in the business enterprise sector is especially low. Latvia also suffers from a significant outflow of graduates and researchers to other countries, many scientists preferring to pursue their careers abroad. In addition, the country is failing to attract significant numbers of foreign nationals in the field of R&I and the already low number of foreign doctoral students is falling even further.²¹¹

Most of the researchers (FTE) with PhD degree at age below 60 in Latvia (~1200 FTE) are placed at the registered approx. 90 research institutions (in 2014 – around 150, respectively) reflecting fragmentation of human resources. Research groups in such institutions are small by number and researchers continue working on the same themes and scientific directions since Soviet times. Structural units of large universities as divisions under Departments (faculties) were registered as research institutes in many cases. So far the "strategy" of HEIs was to create large number of small registered research institutions at large universities in the state register, as this approach helped to increase institutional

²¹¹ Research and Innovation Performance in the EU. Innovation Union Progress at country level. 2014

(base infrastructure) financing for particular university in total in the short term. Such small research groups or laboratories have difficulty in competing for grants at international and national level getting collaborative research with industry or contracted research. At HEIs leading appointed researchers are often nominated in parallel also as lecturers (e.g. getting double academic positions, as a lecturer assistant, lecturer, assistant, associated or full professor and/or as a research assistant, researcher or senior researcher), which requires balancing research plans with semester time-cycles and sometimes the financing for teaching is drawn from the science project finances.²¹² The most active and capable senior researchers are extremely overloaded and should be selective in taking up new projects. At the same time, industry requires input at strict terms, with definite solution and ready-made prototype which is difficult to accomplish for small research groups. Not surprisingly, research groups prefer calls with lower predicted competition, simple and short application terms requiring limited technical preparatory work and small consortia, as they have limited human resources. Small research teams prefer investing their resources in the design of the project proposals for available competitive funds with higher likelihood to get approved: state budget grants, ESF grants, EU programs. As a result HEIs capacity to attract research funding is limited, especially from industry.

Individual researchers have little motivation for commercialisation as HEIs own all IP produced at its premises. General HEI's IPR policy gives all rights for commercialisation of IPR generated by their employees to the HEI without clear guarantees of rewards to the researcher. If HEIs do not use their rights to commercialise IP, researchers, even in a case of genuine interest, have neither the resources available nor the skills to get commercial return from their IP.²¹³ The career system supports career performance indicators like teaching hours, number of scientific and cited papers in high impact journals, organisational responsibilities, advanced project activities, but the ability to involve industry is usually missing as a performance indicator.

The majority of available EU and national level grants and private sector money are tailored for applied research. But just setting industrial focus as a goal does not automatically lead to essential increase of attracted private financing. In its policy Latvia needs to distinguish between teaching funding and funding aimed at reaching and reinforcing international science excellence of a few selected research institutes and performing applied R&D&I, placed as close as possible to local SMEs. Research policies should be tailored to exploit better international research networks, exploiting clusters, competence centres, industrial associations and regional ecosystems.

²¹² Government transfers only 85% of total needed study tuition fee for state paid (e.g. budget) students for all higher education study programs.²¹² This operational model requires saving of 15% of HEI's education budget. Quite often and at small HEI's administration require academics to supervise praxis, course and diploma works for free which substantially reduces time for research.

²¹³ The national university – UoL has IPR policy stating that individual employees are rewarded in amount of 50% of income generated from commercialisation of IP after paying all occurred costs within commercialisation process if Commercialisation Agreement with UoL or funding program regulations do not foresee different distribution model. E.g. UoL administration keep major control and individual depend on its proposal and negotiations in this high risk business. See:

http://www.lu.lv/fileadmin/user_upload/lu_portal/par/strukturvienibas-un-infrastruktura/departamenti/attistibas-un-planosanas/inovaciju-centrs/rupnieciska_ipasuma_noteikumi.pdf

Research and technological output

Latvia contributes an extremely low number of publications to international high impact peer-reviewed academic journals²¹⁴, and, like other CEE countries, it also produces low level of applications to the European Patent Office. According to both these indicators, Latvia reaches only around 25% of the EU average.

In 2012 Latvia produced 6.30 publications per 10,000 inhabitants, well below the EU-28 average (13.8). In 2012 Latvia had about 213.2 international scientific co-publications per million population (324.3 in Lithuania, 864.0 in Estonia, 1489.8 in Finland). In the period 2002-2012, 5.98% of the Latvian scientific publications were in the top 10% most cited publications worldwide in comparison with 11% of top scientific publications produced in the EU-28 (Science Metrix, 2014).²¹⁵ The share of public-private co-publications in Latvia is 0.8% in the period 2008-2013 against 2.8% for the EU-28.²¹⁶

Bibliometric data is only one indicator of a country's knowledge performance. Scientific citations may have high scientific impact but it has little economic or societal relevance and value outside the scientific community. The national innovation system is severely affected by low scientific performance (the share of scientific publications in the top 10 % of the most cited is 3 %) and low licence and patent revenues. Moreover, the country needs to enhance the quality of the higher education system and to address the need to attune Latvian research better to the needs of local industry, while reinforcing the capacity of the latter to develop R&I activities. Public-private scientific cooperation is very low and investment in R&I by foreign affiliates in support of specialisation in knowledge-intensive and innovation-driven sectors has been declining. The results produced by the technology transfer contact points operating in eight universities or HEIs remain modest, although recent actions, such as the development of a Smart Specialisation Strategy and recent changes to the legal framework transferring IPR ownership to PROs or HEIs, if followed by guaranteeing individual rewards to researchers, could improve their impact and increase the current low-level commercialisation of research results.²¹⁷

Technological performance (patenting, licensing contracts, royalty income) is also not very impressive compared to EU-15, although spin-offs potentially would have growing trend for Latvia's economy. The policy measures supporting high growth high tech start-ups should be balanced also with support measures to increase R&D&I intensity at small traditional sector companies, catalysing their growth to internationally competitive medium – large size firms with critical mass to keep continuous R&D investments.

Business innovation performance and trends

The demand for external knowledge and competence in Latvia is low. The competitiveness of the national economy is based on cheap labour force and processing of natural

²¹⁴ Impact factor for scientific journal, please see http://en.wikipedia.org/wiki/Impact_factor

²¹⁵ These publications data are based on Elsevier's Scopus database

²¹⁶ These publication data are based on Elsevier's Scopus database. ScienceMetrix, Analysis and Regular Update of Bibliometric Indicators, study conducted for DG RTD. They represent an update of the data displayed in the table above. See also http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=other-studies

²¹⁷ Research and Innovation Performance in the EU. Innovation Union Progress at country level. 2014

resources, hence the dominance in the country's export structure of low or medium technology segments (more than 82% of total processing industries).²¹⁸

Productivity remains substantially low and the share of manufacturing industry sectors lags behind EU average.²¹⁹ The real needs of local companies neither require frontier research outputs, nor up-to-date advanced knowledge or competence.²²⁰ Low innovation capacity both in terms of low technology absorption capacity and investment readiness is limited to simple prototyping, testing, incremental innovation (small step technical experimental development or upgrade of production machinery) and introducing business processes in compliance with requirements of environmental, quality, health, safety, consumer protection, environmental and market standards.²²¹

The new technology acquisition in Latvia now takes place²²² in the form of a) investments in machinery and equipment (Latvia 63%; Lithuania 60%, Estonia 58%), b) licensing/turnkey operation (10% of the firms on average). Just a negligible percentage of firms in Latvia (<1%) rely on external sources (universities, business associations).

Based on the average innovation performance Latvia, together with Bulgaria and Romania, is classified as a “modest innovator” in the Innovation Union Scoreboard 2014 with innovation performance below the EU average. Neighbouring country Lithuania is evaluated as “moderate innovator” and Estonia as “innovation follower”. However, among the modest innovators, Latvia has reached the highest innovation progress. In terms of EU member states’ innovation growth performance Latvia has taken the third place with 3.5% average annual growth rate over an eight year period (2006-2013). Notwithstanding these achievements, Latvia is still in the last but one place in the assessment of EU Member States’ innovation performance. Compared to Estonia and Lithuania, Latvia has shown much weaker performance almost in all dimensions (Table 9).

The ministries in Latvia are reluctant to attract external experts to perform ex-post evaluation, identify the needs of SMEs and design well targeted policy measures of financial and fiscal incentives to meet challenges of market failures regarding innovation capacity²²³. International benchmarking and comparison with performance in other EU

²¹⁸ National Industrial Policy Guidelines for 2014-2020 (Approved by CoM Decree No.282, at June 28, 2013). http://polsis.mk.gov.lv/view.do?id=4391_pp6-11

²¹⁹ National RTDI Guidelines for 2014-2020 (Approved by CoM Decree No.685, at December 28, 2013). http://polsis.mk.gov.lv/view.do?id=4391_p.17

²²⁰ Watkins A., Agapitova N. Creating a 21st Century National Innovation System for a 21st Century Latvian Economy. World Bank Policy Research Working Paper 3457, November 2004, 95 p.

²²¹ Innovation Survey, CSB, 2014, <http://www.csb.gov.lv/statistikas-temas/metodologija/inovacijas-uznemumos-38226.html>

²²² Correa Paulo. Technology Adoption and the Investment Climate: Enabling the Private Sector to Acquire and Use Modern Technologies. Presentation at WB Knowledge Economy Forum VI, Cambridge, England, April 17-19, 2007. See http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/EXTECAREGTOPKNOECO/0_contentMDK:21291054~pagePK:34004173~piPK:34003707~theSitePK:677607_00.html

²²³ RIS Latvia „Report On finance supply analysis, 2003, 127 p. In a period of crisis it was hard for government to predict the total loss of tax revenue as well as number of applying companies, also stability and predictable tax system was a strong argument. There are few uncertain factors during implementation of fiscal schemes, complete control of overall costs (budget) during take-up stage is impossible. In a case of direct R&D grant schemes it is possible to define a ceiling for each individual firm or institution applying and strictly to control situation over spent funds. Implementation of an effective fiscal incentive requires that the various government bodies co-operate and work together very effectively. The typical failure is to design a scheme fitting the needs of tax authorities, or having unclear R&D definitions, or not precisely matching

member countries is not so far a common practice. Broad and vaguely defined schemes have lowered performance and effectiveness. Public administering agencies lack professional knowledge in technologies and research. They try to design schemes with simple criteria for content and performance evaluation and administration, but impose a lot of bureaucratic criteria. The intended concentration of administrative functions of EU SF in the hands of CFCA under MoF may increase the risk that professional and goal oriented approach towards EU goals and indicators would decrease and bureaucracy would increase.²²⁴

Table 9: Performance of Latvia, Bulgaria, Romania, Lithuania and Estonia in innovation dimensions.

Innovation dimension	Place of LV	Place of BG	Place of RO	Place of LT	Place of EE
Human resources	19	24	23	6	16
Research systems	28	25	27	22	16
Finance and support	18	28	26	11	1
Firm investments	28	26	27	12	5
Linkages & entrepreneurship	25	27	28	22	12
Intellectual assets	23	22	28	24	8
Innovators	27	28	24	25	14
Economic effects	26	27	20	28	22

Source: Innovation Union Scoreboard 2014

The innovation strategy's demand side measures according to National Industrial Guidelines²²⁵ should include promotion of firm's technological absorption readiness²²⁶ and external technology acquisition. The FDI and export promotion policies should meet these challenges. Entry into export markets gives firms a steep productivity boost, e.g. learning from overseas customers, exposure to new ideas, technologies, upgrades. Trade and inward investment can give rise to beneficial knowledge spill-overs.

5.2 Structural challenges of the national R&I system

The national R&I system in Latvia faces a number of **weaknesses**²²⁷:

- there is a decreasing number of highly qualified scientists and engineers caused by aging of researchers base, uncompetitive wages, lack of competitive support instruments; low number of PhD graduates and brain drain; limited and underdeveloped international exchange and cooperation of researchers;
- the fragmented scientific and research infrastructure is underdeveloped and the limited R&I resources (human and financial) available are spread too thinly to be

company's needs, many productive companies will not use such scheme. So far Latvia's government because of aforementioned reasons was very much in favour of direct grant (financial) schemes.

²²⁴ <http://likumi.lv/doc.php?id=267471>

²²⁵ National Industrial Policy Guidelines 2014-2020, p.26. Such recommendation was argued already by Watkins A., 2004

²²⁶ Absorptive capacity is capacity to acquire, understand, develop and exchange knowledge and technology from external sources (competitors, collaborators, customers, public research base)

²²⁷ Guidelines for the Development of Science, Technology and Innovation for 2014-2020

efficient; even in this situation there is too much focus on mature research institutions leaving aside foresight and other methods to identify emerging future technological sectors ahead of competitors;

- low level of investment in R&D: long-term underfunding of the sector, small scale financial instruments, a low share of private investment in research;
- poor cooperation between business and academics: research objectives are not oriented towards the needs of industry; small amount of applied research; low mobility of researchers between the public and private sectors; lack of instruments to foster attraction of researchers in the private sector; lack of skills and the ability to manage and commercialise created knowledge including promotion and marketing of products; underdeveloped infrastructure of technology absorption and transfer, low demand of R&D by firms, and absence of knowledge intensive industrial clusters of scale;
- limited capacity to design, implement and coordinate R&I system and policy: inefficient and fragmented management of R&I system, a lack of cooperation and coordination between research institutions, higher education and industry; Latvia has a complicated decision-making process for such a small country and the effectiveness of policy measures has been undermined by a lack of systematic evaluations;
- monocentric development as all policies are Riga based and lobbied by players in Riga. The innovation level disproportions between the capital and regional centres are growing, there should be clear regional innovation measures with regional HEIs as driving forces with strong contribution in external technology transfer and adoption, as well as regional and rural entrepreneurship promotion measures implemented.

Opportunities to be addressed to increase the level of performance of the national innovation system are marked in the *Guidelines for the Development of Science, Technology and Innovation for 2014-2020*:

- preparation of human resources to be able to use future market opportunities;
- attraction of qualified high-level recognised mid-age scientists from abroad;
- consolidation of specialisation areas of science in response to industry demand;
- promotion of R&D excellence in areas where Latvia already has asset base and achievements, including traditional industries;
- attraction of foreign investment in the areas where R&D expertise is faced with underdeveloped industry and promote exports thus catalysing technology diffusion and spillovers with increasing role of domestic industrially focused academics;
- participation in the scientific programs of European Union;
- the economy of Latvia has considerable potential²²⁸ for development towards higher added value, high productivity and innovation in certain sectors (e.g. forestry and woodworking, food processing); relatively specialized economy allows to search for related diversification opportunities, to develop new products and scientific

²²⁸ See National Industrial Policy Guidelines 2014-2020, p.42, Annex 1

areas of specialization according to market demand. This might be achieved by introducing incremental innovations, supporting mature innovative exporters and new high growth start-ups, creating industrial infrastructure and facilities for traditional sector firms based in regions.

Table 10: Summary of existing challenges and policy measures of NIS in 2014-2020.

Challenge	Policy measures/actions addressing the challenge	Assessment in terms of appropriateness, efficiency and effectiveness
1. Existing industry has low demand for innovation	1.1. RIS3 policy 1.2. Loan Guarantees for new SMEs 1.3. Mezzanine financing Leverage fund for business angel investment Risk capital for high growth firms 1.4. Entrepreneurial motivation program 1.5. New product and technology design 1.6. Support to new product entering into market 1.6. High value added investments 1.7. Support to investments in manufacturing estates 1.8. Fiscal incentive for R&D 1.9. Innovation vouchers 1.10. Support to firm's personnel training 1.11. Support to highly skilled personnel attraction 1.12. Microloans for start-ups	<ul style="list-style-type: none"> - specific priority sectors determined, wide discussion continues how to use RIS3 frame to reinforce all new R&D&I development policy measures - €15.0m, for new innovative SMEs in RIS3 priority sectors - €10.4m, need evaluation - €15m planned for co-financing, risk determines new business idea flow - €45.0m, includes expansion capital - €4.8m, pre-incubation and new idea generation activities; - €77.3m, program to support individual firms, will be integrated in competence centre program, positive - better evaluation, negative – step back from intended promotion of the collaborative research involving academia and several firms in one R&D project; - €50.0m, intensity much lower, risk that funds might not be absorbed - high role in promotion of manufacturing and regional development, question about global strategy and ambitions of firms - needs evaluation after 1st year - there is a risk that SMEs may not know what they need, rarely voucher programs are evaluated as efficient - €24.9m, performance of this measure depend on firms' growth performance - €6.7m, comparatively small money, impact depend on economic return - €21.0m, important as society have no savings, guarantees should be in place to avoid barrier of collateral
2. Education system does not provide sufficient supply of university	2.1. Evaluation and consolidation of HE system	- was done by joint local and international expert team, ranked all study programs according to their

Challenge	Policy measures/actions addressing the challenge	Assessment in terms of appropriateness, efficiency and effectiveness
graduates in natural and engineering sciences	2.2. Smart specialization 2.3. Keeping / increasing student number for whom studies are paid from state budget (block money)	quality and demand - in a limited extent introduced by stopping licenses to few study programs - focus also to the export of education services (attraction of external talents)
3. Poor research capacity, technological development and innovation	3.1. Development of research infrastructure 3.2. Increased institutional funds 3.3. Doctoral student scholarships 3.4. Support to post-docs 3.5. Consolidation of research institutes 3.6. Support to research groups 3.7. Innovation grants for students 3.8. Support to new international projects 3.9. Participation into international research programs	- €97.9m, in RIS3 priority sectors - 2014-2017 - €99.16m, very positive trend, should reach EU average level, special target program need to be set for large scale research facility maintenance and development - €64,0m; an opportunity to retain, return and attract high quality new PhDs - €9m (2015), €15.25m later, large reform should end with ~20-30 HEIs and 30-40 PROs, each with 20 FTE researchers and focus to excellence - new program, support to young senior researchers, increase of R&D capacity at PROs - €34m, new program - €27.7m, very important and productive program - €6.4m, integrated within previous measure
4. Weak academic – industry collaboration	4.1. Technology transfer program 4.2. Industrial clusters 4.3. Competence centres 4.4. State Research Programs 4.5. University research grants 4.6. Applied research grants	- €24.5m, two-tier program, first one focused on local HEIs and PROs, the other is centralised for commercialisation at international markets - €6.2m, need more focus to economic return and link with RIS3 priority sectors - program should be more focused on collaborative research instead of individual industrial research in-house in firms - medium term program, relevant - has stopped when crisis started, would focus to fundamental research excellence or regional research support - €76.1m, is replacing market

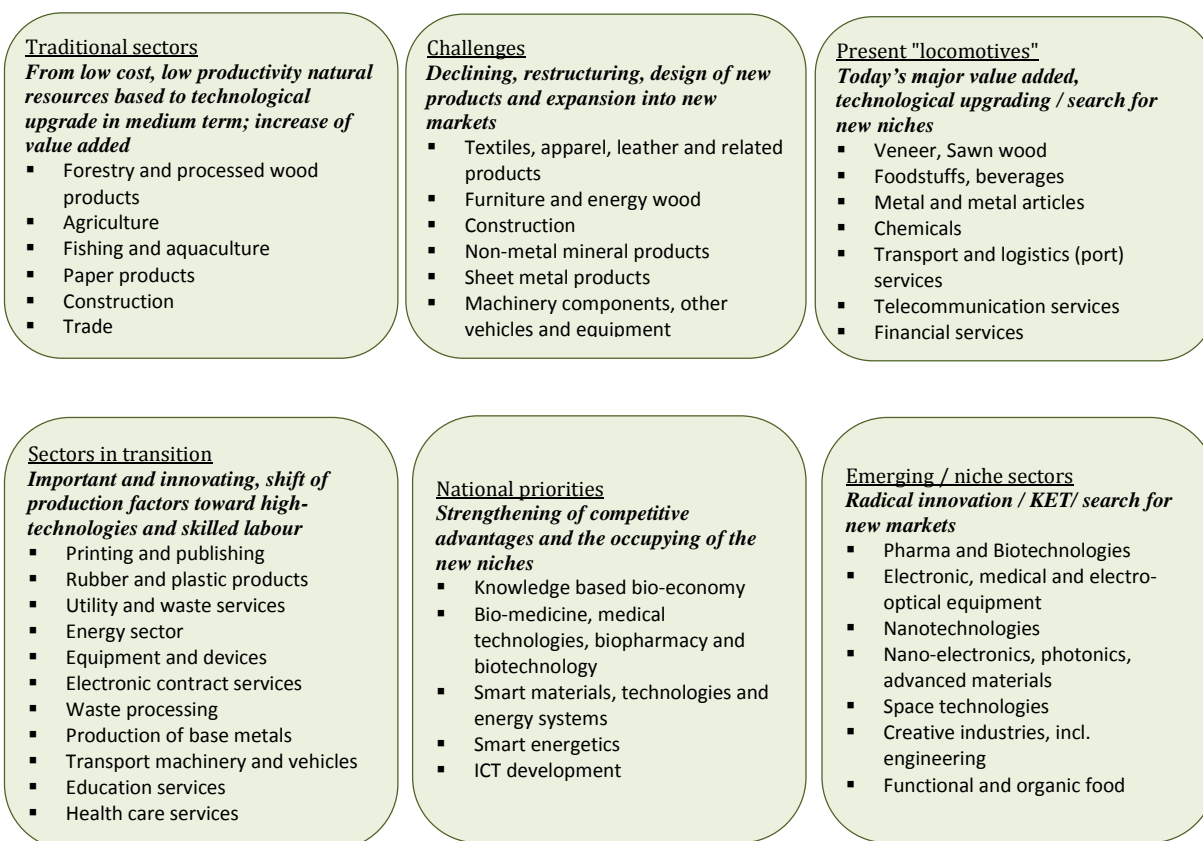
Challenge	Policy measures/actions addressing the challenge	Assessment in terms of appropriateness, efficiency and effectiveness
		oriented research program, supports collaborative industry – academia research projects
5. Monocentric development model	5.1. Industrial premises in regions 5.2. Entrepreneurship promotion in regions 5.3. Regional Colleges and HEIs - research 5.4. Regional Business Incubators 5.5. Business accelerators	- €24.8m, very important for rural innovations - fragmented and weak measures - purposeful support to strengthen research in regional HEIs according to RIS3 is missing - €27.9m. aimed to support start-ups, only few BI focus on knowledge intensive sectors, usually BI stop operation when grants ends, green incubator and creative industry BI should be evaluated - €20.0m, new program

Source: Operational program for ESF for period 2014-2020, <http://esfondi.lv/page.php?id=1149>

5.3 Meeting structural challenges

The structural challenges of the national economy are important also for RTDI policy. To cover this we need to assess the sectorial, technological or supply- and demand-side focus of Latvian R&I policy and measures stimulating private sector R&D&I investments, supporting projects involving closer to market industrial collaborative partners with market demand focus.

Figure 3 Map of the current strengths of Latvian economy, based on methodology from Paliokaite, 2012 and using data from RIS3 Informative Report and its Annexes




The R&D&I Guidelines also integrate the Smart Specialisation Strategy in part. The primary goal set in the strategy is to transform the economy towards higher-value added products and technology-based growth. The RIS3 sector analysis report in combination with a methodology worked out to analyse performance of Lithuanian economy (Paliokaite, 2012) helps to map all sectors relevant for national economy in Latvia. Present competitive advantage of Latvia was analysed using such criteria as growth, jobs, existing and potential increase of export value added, keeping current export volume constant in existing product groups. The methodology assumes that a shift of existing product groups to more value added products is possible using current production factors (capital and partially knowledge).²²⁹ The analysis showed that (Figure 3 and Table 11) sectors selected as "natural priorities" and "rising / niche sectors" constitute areas for potential concentration of innovators. Most firms are relatively small in terms of employment and value added. Large and traditional sectors with high export performance are "current locomotives" and "sectors in transition".

²²⁹ See RIS3 Informative Report, 2014 with all annexes

Table 11: Characteristics of demand side by innovation readiness.

Sectors/ priority	Technology consumers – existing firms’ base	Potential innovators	Emerging / new innovators	Mature innovators
1. Change of manufacturing and export structure in traditional low and medium-technology sectors, priority “knowledge intensive bio-economy”	Low cost labour, low technological development, low productivity manufacturing companies and services providers (including public sector) that lack modern technological and managerial capacity	Generally medium and large manufacturing companies or service providers in the traditional sectors facing loss of competitiveness, knowledge absorption is absent	Generally few young and small companies, export orientated, fast growing (incl. university spin-offs), e.g. gazelles, low critical mass to attract required growth investment	Few ones exist, medium-tech, generally R&D based large firms, long time in the market, export orientated, well developed networks, expanding outwards
2. Growth in sectors with opportunities to produce (provide) products (service) with high value added priority “biomedicine, medical technologies, biopharmacy and biotechnology” and “smart materials, technologies and energy systems”	Dominance of B2B firms, in-house innovations, weak collaboration with research Modernisation and strengthening of technology efficiency and absorptive capacities (including the human resources)	Diversification of products and increase in technology absorption readiness, innovation based strategy and business models	Acceleration of innovative activities, including spin-off creation, attraction of risk capital and other financial resources (incl.FDI) to reach critical mass of company size, promotion of supportive environment, innovation culture and open public R&D infrastructure	Moving to higher impact innovations and absorption of external new knowledge, large scale R&D projects, new international markets, spin-outs, outflow of young industrially focused academics, talent availability, export promotion
3. Sectors with high horizontal impact and related policy interventions, priority “smart energetics” and ICT development	Ensuring availability of high quality specialists (including upgrading of higher education programmes), creation of advanced ICT infrastructure and information society, energy efficiency measures.	Clustering and networking promotion, competence centres, internalisation of industrial associations, LCCI, pro-active knowledge partnership activities in regions and rural areas.	Support for experimentation and foresight, FDI attraction policies to promote diffusion and spillovers, regional knowledge centre policy based on regional HEIs	Favourable framework conditions (entrepreneurship policies, flexible labour market, tax policy, R&I regulations, talent growth, retention and attraction policies, standardisation, innovative procurement)
4. Needs that the specific policy mix should focus on	Demand side incentives, capacity and quality development, focus on high value added in traditional industries, creation of rural industrial sites and facilities with clear	Creation of testing, prototyping, design and pilot production infrastructure and services, based on PPP and open innovation approach, diversification of products,	Start-up acceleration, R&D&I infrastructure, strategy services, quality system and incremental innovation (lean manufacturing advice based) advice and	Integration into global supply chains, large joint R&D projects, export support, promotion of technology diffusion, human capital supply

Sectors/ priority	Technology consumers – existing firms' base	Potential innovators	Emerging / new innovators	Mature innovators
	innovation focus	technology, partnership linkages, promotion of local champions	mentoring, focus to promote growth of innovative companies of scale (from small to medium)	
The competence stairway 				

Note: The table was created adopting the methodological approach of A. Paliokaite, Presentation at RIO methodological seminar in Brussels at March 3, 2015 combined with methodology used to analyse export readiness and export needs of Latvian firms (Elerts, 2008).

We may conclude that there should be a better balance of support among potential, emerging, existing and mature companies. The planned support measures should be made more attractive and in a more available format for new and small innovative entrepreneurs.

Promoting innovations in traditional sectors. Such sectors as transit services and logistics, forestry, agribusiness, woodworking and food and drink sector are the most important manufacturing and service sectors in Latvia and show good shape in export and sales growth, but still innovation penetration is lower than needed considering the strategic importance of these sectors. The support policies might be structured with a focus on two directions: 1) to diversify product range to more knowledge intensive and higher value added goods (like energy wood, deep organic processing, new 3D mechanic structures of wood products etc.) and 2) to restructure the supply side by increasing the requirement for better innovation efficiency, even inviting external private support experts and involving them in programming.

The emerging global leaders. Green, smart and renewable energy technology sector is rapidly developing in Latvia. This has been achieved due to external technologies adapted in Latvia and is now more and more supported by local developments. Renewable energy sources accounted for 36.3% of total primary energy supply in 2012, demonstrating one of the highest shares in the EU.

For two decades pharmaceuticals, health services and biotechnologies are named as emerging frontier industry sectors. Nano-, photonics and space technologies require ambitious target setting by the Latvian Government, supported by a policy aimed to concentrate government resources into few Latvian centres of excellence. The goal would be to provide incremental public funding on competitive basis to research areas where local scientific centres have comparative advantages in areas that can contribute to the country's long term economic development.²³⁰ The essence is to give to best performing scientists sufficient funding for sufficiently long period (for example five years) so that they can undertake medium term research projects. On institutional level outstanding research centres (or international level research groups) should receive 5-7 year funding at an annual level of €1-3m depending on its capacity. The essential difference between this approach and the current one is that RIS3 prioritisation based on the provision of EU SF financing are still based on separate competitive programs weakly linked each with other.

²³⁰ See Recommendation 2 in Watkins, 2004 or the more recent RIS3 Strategy.

The competence centre (CC) model continuation also for the period 2015-2020 would be the right answer to provide support measures to SMEs on a collaborative basis with PRO to boost new product ideas into competitive and demanded export products. The CC model would further support firms demand side for new knowledge and technologies, while industrial clusters based on RIS3 specialisation would help to create training, informative and exchange platforms for cluster participants.

Entrepreneurship policies: gazelles and companies of scale. Entrepreneurship and business performance of local firms are viewed as a weakness of Latvia's economy and innovation system. Entrepreneurship support system in Latvia has been developed within the last 15 years and today is a combination of various non-financial and financial support measures. The MoE plans to reinforce further business development support in the period 2015-2020. Financial and skill-development support to start-ups, high growth innovative firms and spin-offs exists and its effectiveness and efficiency, as well as outcomes and impact, depend on the quality of policy evaluation and the political will to identify best feedback actions and to create conducive environment and motivation for multilevel partnerships.

High growth entrepreneurship²³¹ depends more on concentration of talent in Riga and selected regional growth centres, the number of industrially thinking researchers with high ambition, internationalisation, carrier motivation and entrepreneurial behaviour in research institutions (Kulikovskis, 2012).

Companies of scale²³² or medium size mature innovative companies. Demand side promotion policy measures are required to create a base of strong innovative companies in RIS3 sectors investing in R&D more than 2-4% annually and becoming demanding partners to local academic institutions.

Business incubation. The isolated and poorly coordinated initiatives of the Latvian pre-incubation system may confuse direct target groups (young entrepreneurs, employees in industry) and may discourage them to engage in entrepreneurship. The existing Pre-BIs initiatives demonstrate too big focus on academia, as a result having weak long term outputs and links to BIs, thus the real challenge for the incubation system is the will and ability to put together inventors, entrepreneurs and investors. A program for the next 5 years "Innovation culture and Entrepreneurship motivation" should encourage better performance for the whole business incubation system in Latvia.

Rural and regional entrepreneurship. The current national innovation system poorly integrates the needs of regions and their growth centres, but almost entirely excludes rural areas. Innovation policy lacks specific actions linking knowledge with innovative private sector in rural and peripheral areas.

General conclusions. Over the last few years, Latvia's performance in research and innovation has not improved significantly. Several measures that were implemented to improve the quality of the system and to strengthen the links between the research and industry sectors have not proved their effectiveness since overall R&I performance is not showing any significant improvements. The main areas targeted by the measures included governance of the R&I system, modernisation of the scientific infrastructure and an improvement in human resources by attracting foreign academics, and industry's capacity to innovate, by developing better links between research and industry.

²³¹ High growth firms are ones able to demonstrate growth over 20% for 4 last years

²³² In Latvia's circumstances definition would be firms with annual sales over €10-20m and investing in R&D over 1% annually

As mentioned by one of the Country Specific Recommendations, Latvia needs to consolidate further and modernise its research base in order to reach critical size and to improve the capacity and quality of the R&I system. The introduction of the three pillar financing model for HEIs based on combination of stable block funding with research and innovation performance based component using a formula with performance indicators could prove beneficial. Fewer but larger research organisations would be more able to reach critical mass of human capital, research infrastructure and available financing to behave as entrepreneurial and open for innovation organisations in RIS3 priority technological sectors. Internationalisation is also a priority in all levels and aspects of the R&I system. Moreover, Latvia would benefit from the introduction of better governance system (making innovation a horizontal priority across different national and regional policies), peer – reviewing procedures and monitoring system.²³³

Finally, efficient innovation policy-making should start at the top – at Parliament level – with National Foresight Innovation Commission determining main medium and long term political priorities for the government. A strong will is needed to move from process driven approach (i.e. too much pressure to spend EU SF resources and report on their spending, showing that also non-eligible expenses are in line with EU requirements instead of reaching long-term targets, driving structural reforms towards growth and knowledge based economy) to focus on economic competitiveness and structural changes, introducing a more independent peer-review system for design, administration and evaluation of EU SF support measures. [Latvia's Research and Innovation Strategic Council](#) chaired by Prime Minister should carefully assess the need of any state budget spending against the needs and priorities of national research, technology development and innovation programs to keep the limited available resources concentrated for reaching key targets and performance indicators.

²³³ Research and Innovation Performance in the EU. Innovation Union Progress at country level. 2014

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Annex 2 - Abbreviations

BERD	Business Expenditures for Research and Development
BIF	Baltic Innovation Fund
BIRTI	Baltic Innovative Research and Technology Infrastructure
BSR	Baltic Sea region
CEE	Central and Eastern Europe
CFCA	Central Finance and Contracting Agency
CoM	Cabinet of Ministers of the Republic of Latvia
COST	European Cooperation in Science and Technology
CSB	Central Statistical Bureau of Latvia
EC	European Commission
ECL	Employers' Confederation of Latvia
EEN	Enterprise Europe Network
EPO	European Patent Office
ERA	European Research Area
ERA-NET	European Research Area Network
ERDF	European Regional Development Fund
ESA	European Space Agency
ESF	European Social Fund
EU	European Union
EU-28	European Union including 28 Member States
FDI	Foreign direct investment
FP	European Framework Programme for Research and Technology Development
FP7	7th Framework Programme
FTE	Full-time equivalent
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
HEI	Higher education institutions
HES	Higher education sector
ICT	Information and communications technology
LIAA	Investment and Development Agency of Latvia
IMF	International Monetary Fund
IP	Intellectual Property
IPR	Intellectual Property Rights
ISCED	International Standard Classification of Education
IUS	Innovation Union Scoreboard
LAS	Latvian Academy of Sciences
LCCI	Latvian Chamber of Commerce and Industry
LCS	Latvian Council of Science
LGA	Latvian Guarantee Agency
LIZDA	Latvian Trade Union of Education and Science Employees
LLC	Limited liability company
MNC	Multinational corporation
MoA	Ministry of Agriculture
MoE	Ministry of Economics
MoES	Ministry of Education and Science
MoH	Ministry of Health
MoJ	Ministry of Justice
MoEPRD	Ministry of Environmental Protection and Regional development
MORP	Market oriented research projects
NASI	National Association of Scientific Institutions
NCP	National Contact Point
NDP	National Development Fund
NGO	Non-governmental organization

NIS	National Innovation System
NRP	National Reform Programme
NUTS	Nomenclature of territorial units for statistics
OECD	Organisation for Economic Co-operation and Development
PCT	<i>Patent</i> Cooperation Treaty
PhD	Doctor of Philosophy
PPS	Purchasing power standards
PRO	Public Research Organisations
RC	Latvian Rectors' Council
R&D	Research and development
RDI	Research, development, innovation
RI	Research Infrastructures
RIS	Regional Innovation System
RTDI	Research, Technological Development and Innovation
SF	Structural Funds
SEDA	State Education Development Agency
SME	Small and medium-sized enterprise
STI	Science, technology, innovation
TTCP	Technology Transfer Contact Point
VAT	Value Added Tax

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