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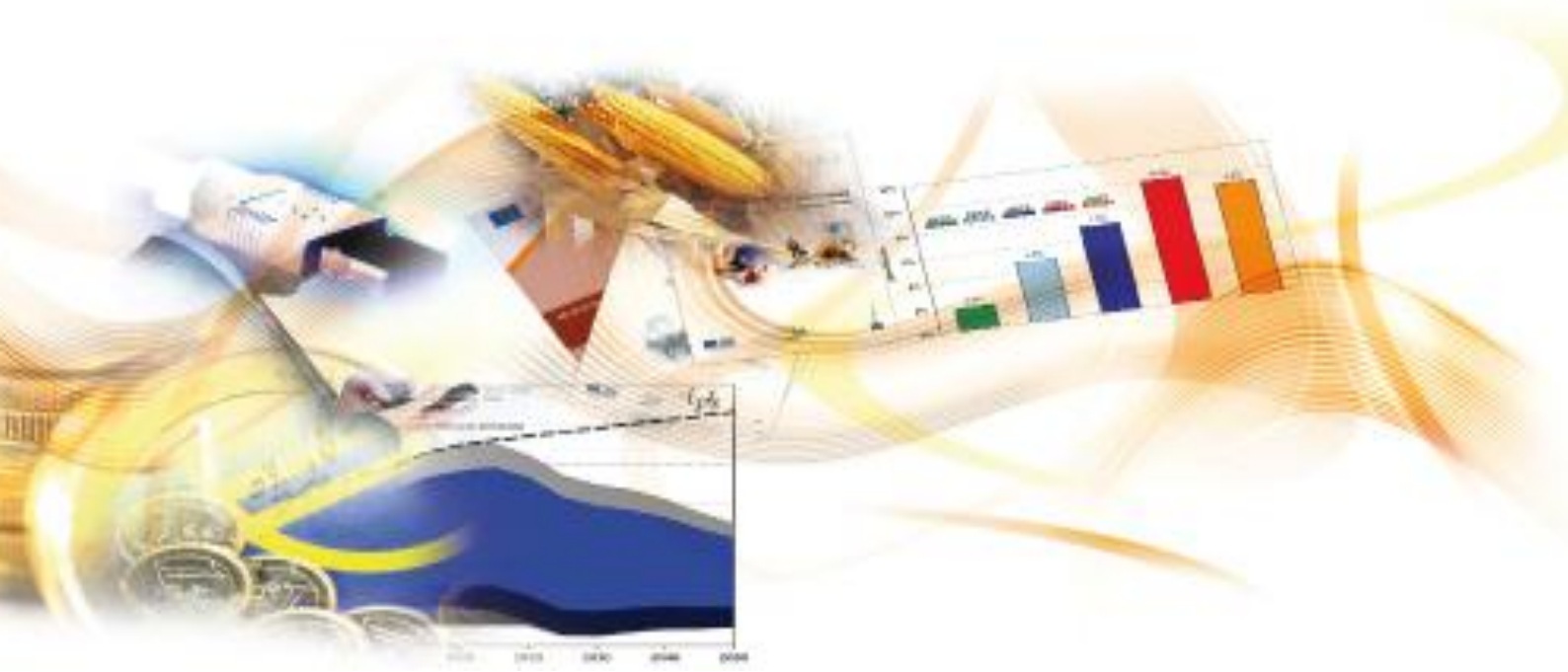

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The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges**,** highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of D'Artis KANCS from JRC-IPTS. The contributions and comments from DG-RTD are also gratefully acknowledged.

The report is currently only published in electronic format and is available on the ERAWATCH website. Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

EXECUTIVE SUMMARY

Latvia is a **small country** with a population of 2.03 million (*October 2012, Central Statistics Bureau - CSB of LV).* The GDP per capita in PPS in 2009-201 was only 51% of the EU-27 average (*€ 9.700 in 2011).* While the annual GDP growth rate was *+12.2% in 2006*. During the economic recession, it fell to *(-17.7%)* in 2009 and to *(-0.3%)* in 2010. Recovery in 2011 resulted in positive growth of *+5.5%* again. The CSB month data for 2012 showed + *5.9%* growth and an annual forecast of + *5.0%.* The Innovation Union Scoreboard 2010 identified Latvia as a **modest innovator**.

Trends: GERD witnessed a drop from 0.61% of GDP in 2008 to 0.46% in 2009, thereby making up only 30% of the EU-27 average. The definite recovery of GERD in 2010 - 2011 is linked to allocations from abroad *(EU SFs + FP7 etc constitutes 50.7%).* Latvia no longer adheres to the GERD target of 3% of GDP by 2020. The National Reform Programme of Latvia *(2011)* and the National development Plan *(adopted 20.12.2012)* has lowered this target to 1.5%, instead. The contribution to science from the national budget in absolute figures declined from €67m in 2008 to €32m in 2011. BERD in 2011 constituted €35m and was smaller than in 2010. Changes between 2010 and 2011 according the Central Statistical Bureau were as follows: GOVERD - +10.3, BERD decreased by 14 %. Financing attracted from abroad increased by 97 %. GERD for Latvia in 2011 was 0.35% when purely domestic investments are counted and 0.70% when investments attracted from abroad are included.

The main **research performers in Latvia** are 30 research institutes which have had a tradition of doing good science for decades and by the record of their participation in EU Framework programmes projects have been well recognised and sought after as partners in the European Research Area since 1999, when Latvia became involved in the FP5. The capital city, Riga was dominant, but during the past decade regional universities in Daugavpils and Ventspils have also developed their own research capacities.

The Latvian **Research and Development *(R&D)* policy** is governed by the Ministry of Education and Science. The Ministry of Economics has the prime responsibility for **innovation policy** and exerts influence on the research domain mainly through selected innovation policy measures. At the political level, a new national authority the Prime Minister's Cross-sectoral Coordination Centre was set up in 2011 to coordinate national development planning.

The current report identifies the following four key structural challenges of the national research, development and innovation *(RDI)* system of Latvia:

1. **Low R&D funding and inconsequent governance.** The allocation of state budget funding for R&D in relative and absolute terms for years 'de facto" is not relevant to " de jure" declarations about strategic importance of R&D and innovation for Latvia in the wording of main planning documents and key policy issues for internal and external use. In contrary no evidences of any financial prioritisation for R&D and innovation.in the Cabinet and the Parliament. The outcome of that are low performance competitiveness indicators for the knowledge based economy, the relevant labour market

and innovation. In recent years public funding for R&D has become excessively dependent on EU Structural Funds *(EU SFs*) and Framework programme funding (*about 50% in year 2011*). That is an extreme situation in comparison with other Member states and is a rather questionable approach in the long-term perspective.

2. **Limited in quantity and quality innovative capacity of the enterprise sector.** Small and medium-sized enterprises are dominating the business structure, but only about 50 SMEs and few of the existing large scale industrial enterprises prove to be internationally competitive in the high-tech domain of the global market. That means overall lack of innovative capacity in industry community as a consequence of rather small number of researchers in general in the country and only 25% of them are employed by enterprises.

3. **Insufficient and decreasing for years supply of a skilled labour force.** The number of employed R&D staff in Latvia has witnessed a sharp decrease from about 30 000 in 1990 to about 5000-6000 by the turn of the century.. Further stagnation of the formerly strong RTD system and "high-tech" industry *(Excellence confirmed by international evaluation led by Danish Council Of Science in 1992)* and the years of crisis has reduced the FTE number to 4000 in 2012 and among them only about 550 are employed in industry. The actual number ready to resume their research careers could double this figure to 8000, but low national funding and accordingly low levels of remuneration of researchers do not act as strong attraction factor for pursuing ones career in science for both nationals and foreigners.

   The problem with the supply of a qualified labour force for R&D and innovation sector has become particularly acute due local and foreign "brain drain" from the system underfinanced for years and as a result not having capacity to stimulate emergence of high added value production. As a consequence the environment for large scale and SMEs level manufacturing industry become highly unfavourable in general and for "high-tech" production in particular. The economy become dominated by specific service sector oriented to local market having low demand for a highly skilled workforce of professionals and research staff.

   The current set-up of the research and academic personnel available in Latvia is in need of a qualification upgrade or rejuvenation in terms of both quantity and quality. The last is directly linked to lack of research activities due to underfinancing.

   There is little interest and a lack of professionalism in university trained young entrepreneurs in technology-intensive branches and no attention is paid to the training of highly qualified science managers.

4. **Low intensity and weakly motivated intra, intersectoral and transnational collaborative practices.** There is lack of collaborative practices in the domains of domestic intersectoral knowledge/technology transfer, as well as insufficient intrasectoral and cross-border S&T cooperation. This is directly linked to the above-mentioned challenges related to the limited in quality and quantity resources and innovative capacity of R&DI system in general and acute demand of researchers labour force in industry. Generally this resulted from the low level of interpersonal trust, ignorance of expertise and weak understanding of RTD policy at the EU level and in particular in neighbouring

countries e.g. Finland and Sweden by the political establishment in Latvia since independence was regained in 1990. The percentage of foreign researchers working in labs in Latvia is far below average in the EU. That is extremely painful to the development of "high-tech" industry facing lack of broader vision about landscape of European Research Area and accordingly problems with relevant public or private research structures in abroad.

The **existing policy mix** in Latvia is **official wording** targeted towards improving the integration of the R&D&I system and the horizontal coordination within it. The EU SFs are declared to be used to strengthen the R&D and innovation support system including the business sector.

As regards R&D specific and innovation financing policies, the annual volumes of many support measures remain rather insignificant and hampered in the oversized bureaucracy which so far have not been very conducive to efficiently addressing the major structural challenges. That is the expected outcome keeping in mind additionally that GERD is only 0.7% of GDP. Certain policy initiatives featuring positive developments over last 1-2 years can be identified with regard to selected newly launched support measures, but their slow implementation during conditions when the R&D&I system and the country as such are in crises, means waste of resources, lost opportunities, and loss of trust in society.

In the light of the **ERA pillars** the national policy mix is to a varying degree aligned with the diverse objectives of this endeavour. Many of these objectives are addressed, though with variable rates of success, and with support of the EU SFs and FP7 project financing. This is particularly the case with those objectives aimed at ensuring the adequate supply of human resources for RTD, as well as the facilitation of partnerships and productive interaction between research in the public and private sectors. Yet, it remains a challenge to address such objectives due to week openness and attractiveness of the national R&D system regarding cross-border flows of funding and human resources.

Considering **possible directions for the evolution of the current policy mix**, the bulk of the national RDI policy measures in Latvia by 2020 are likely to remain focused on R&D specific financial policy, based on EU SFs in particular, and will retain the *modus operandi*, similar to previous EU SFs planning periods which resulted in no remarkable changes in performance of the knowledge-based economy of Latvia.

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1 INTRODUCTION

According to the Central Statistical Bureau of Latvia *(CSB*), Latvia had a total population of 2.028 m in January 2013, and showed a constant decrease in population since 1990.Decrease during the last two years 55 000. In 2011 Latvia accounted for only 0.44% of the EU-27 population. Latvia's gross domestic product *(GDP)* per capita in purchasing power standards *(PPS)* by 2008 had reached 56% of the EU-27 average with GDP having grown at a rate of more than 10% since 2005, however, due to the harsh economic recession in 2009 and 2010 it fell back to 51% of the EU-27 average. The real GDP growth rate was (-3.3) in *2008*, (-17.7) in *2009* and (-0.3) in *2010*. This decline was accompanied by a drop in the total workforce employment rate from 68.6% in 2008 to 59.3% in 2010 *(compared with the EU-27 average of 64.1%)*. By December 2012 the unemployment rate had decreased to 10.5% [1] from the high annual average level of 18.7% in 2010. The forecast for 2012 is close to 12%. Recovery in 2011 resulted in a positive value of GDP +5.5%. The CSB data for 2012 showed + *5.6%*.

Trends: GERD witnessed a drop from 0.61% of GDP in 2008 to 0.46% in 2009, thereby resulting in only 30% of the EU-27 average. The definite recovery of GERD in 2010 - 2011 is linked to allocations from abroad *(EU SFs + FP7 etc. constitutes 50.7%).* Currently Latvia no longer adheres to the GERD target of 3% of GDP by 2020. The National Reform Programme of Latvia *(2011)* and the National development Plan *(adopted at 20.12.2012)* has lowered it to mere 1.5%. The contribution to science from the national budget declined in absolute figures from €67m in 2008 to €32m in 2011. BERD in 2011 constituted €35m and was smaller than in 2010. Changes between 2010 and 2011 according the Central Statistical Bureau were as follows: GOVERD - +10.3 and BERD decreased by 14 %. Financing attracted from abroad increased by 97 %. GERD for Latvia in 2011 was 0.35% when purely domestic investments are counted and 0.70% when investments attracted from abroad are also counted.

While the Summary Innovation Index of the Innovation Union Scoreboard shows a slight improvement for Latvia from 0.195 in 2009 *(2006 – 0.163*) to 0.201 in 2010, the country is still listed as being among the poorest performing of the modest innovators with its **innovation performance** well below the EU-27 average of 0.516 [2]. Latvia contributes an extremely low number of publications in international peer-reviewed academic journals, and, like other CEE countries, it also produces low levels of applications to the European Patent Office. Both indices hardly reach 25% of the EU average. That's mostly caused by to under financing for decades and unfavourable governance.

According to the CSB, in 2011 and in 2012, the total **GBAORD** as a percentage of total general government expenditure made up only 0.50% in comparison to the EU-27 average of 1.5%. *(compared with 0.83% in 2007)* The absolute value of GBAORD is too small to speak of notable differences in its influence on the socio-economic objectives in the country. Over the past five-six years, prioritisation of various sectors of the economy has emerged as one of the tools for pursuing specific knowledge demand by the Latvian government. The following priorities have

[1] State Employment Agency
[2] Innovation Union Scoreboard 2010: The Innovation Union's scoreboard for Research and Innovation,

been approved for the years 2010-2013 [3]: Energy and the environment; Innovative materials and technologies; National identity; Public health and Sustainable use of local resources.

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 central organisation of Latvian R&D policy is the Ministry of Education and Science. In turn, the Ministry of Economics holds the prime responsibility for innovation policy and exerts influence on the research domain, mainly through selected innovation policy measures. Yet, the Declaration of intended activities of the new Cabinet of Ministers signed in November 2011[4] envisages transferring rights to develop innovation policy to the Ministry of Science and Education. The situation even in the first month of 2013 has not seen practical implementation or benefits of such plans. At the political level, a new national authority, namely, the Prime Minister's Cross-sectoral Coordination Centre started to coordinate and monitor national development planning in 2012.

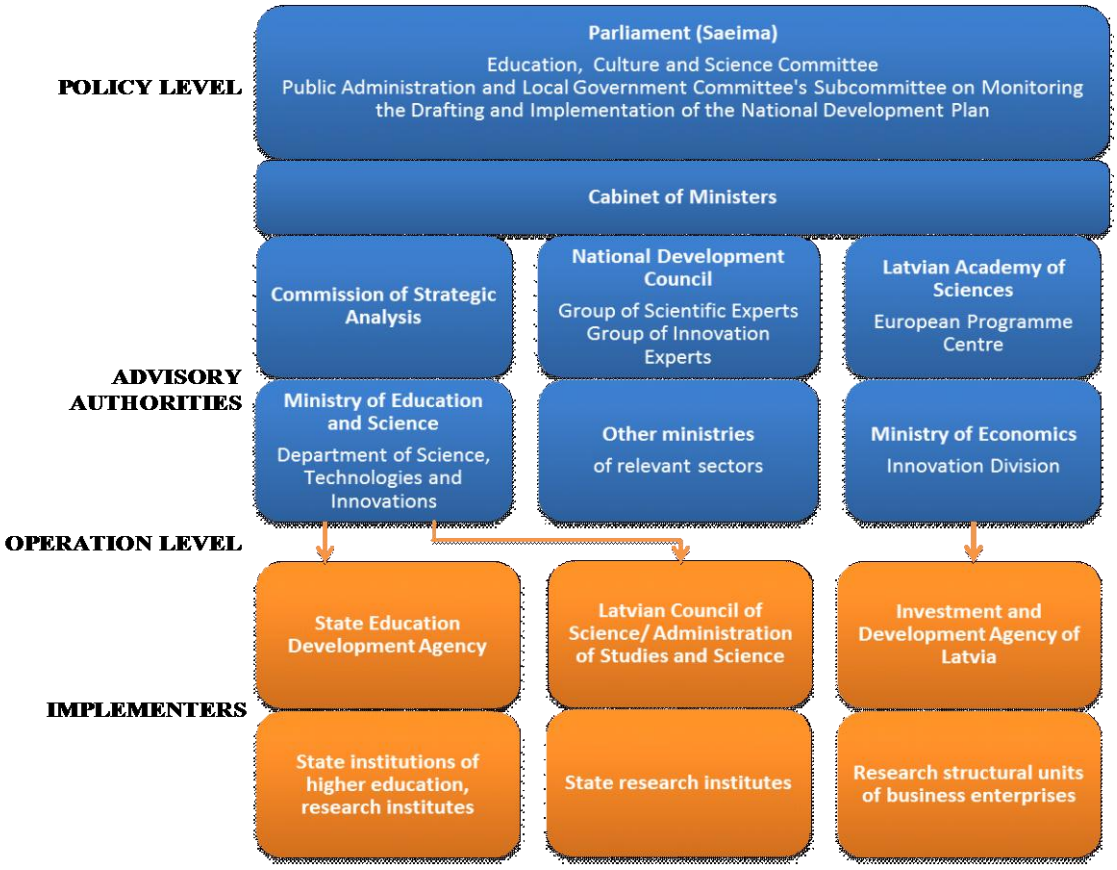

Figure 1. (*Source: Adapted in English from the version of the Ministry of Education and Science)*

[3] Regulations of the Cabinet of Ministers of 31.08.2009 No. 594 on the thematic priorities for funding of basic and applied research, 2010−2013, (In Latvian)

[4] Declaration of the Intended Activities of the Cabinet of Ministers,

Research and innovation policy in Latvia is predominantly developed, funded and implemented at the national level, therefore the institutional **role of the regions** in research governance is comparatively limited *(the country as a whole categorised as a single region at NUTS I and II levels).* The existing five planning regions have neither the level of responsibility nor the funding capacity to develop their own explicit R&D policies.

The main research performers are 30 research institutes which have a tradition of doing good science for decades and have been well recognised and sought after as partners in the European Research Area since 1999, when Latvia became an associate country in the FP5 programme. Among them, 12 are under direct supervision of Ministries. The others are positioned mostly in six public universities having differing legal status and various levels of academic freedom. The capital city, Riga is dominant, , but during the past decade regional universities in Daugavpils and Ventspils have also developed their own research capacity

According to the CSB of Latvia, GDP as a percentage by sectors of performance in 2011 was as follows: higher education sector 0.24 *(48.6%)*, business enterprise sector: 0.22 *(27.6%),* and government sector: 0.14 *(23.2%)*. As regards the affiliation of researchers *(3,947 FTE in 2011)* by sectors of performance, 68,6% are currently affiliated to HES, only 553 or 14,0% - to the business sector and 17.4% are employed in the government sector.

2 RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

2.1 National economic and political context

In 2009, the Cabinet adopted national wide strategic document on the Guidelines for Development of Science and Technology for 2009-2013 – which was collaboratively drafted by the Ministry of Education and Science and the Ministry of Economics. The Document highlighted the goal: to establish science and technology as a basis for enduring development of civil society, long-term economic growth and progress in culture, thereby securing the evolution of the knowledge-based economy and sustainable development. A gradual growth total in R&D expenditure was planned. On 26 April 2011, the Cabinet approved the National Reform Programme of Latvia for the implementation of the "Europe 2020" strategy *(NRP)* setting the following modest targets: 1.0% of GDP by 2015 and 1.5% by 2020, not specifying the split between public and private investment shares, ignoring general tendencies in EU RTD policy and neglecting significant risk of collapse of the national RTD system due to demographic ageing, the persistent and escalating brain drain and serious under-financing during the last 20 years.

The annual levels of R&D funding have fluctuated over the last decade. The availability of EU SFs for RTD since 2004 in addition to increased research funding from the national budget in 2005-2007 improved the situation and opened new opportunities for the development of the national research system. Yet, the dominance of SFs investments in "bricks" instead of "brains", overdeveloped bureaucracy and the economic crisis in 2008-2009 had once again resulted in stagnation or even fall-back. As a result a lot of EU SFs investment in research instrumentation became useless due to the accute shortage of qualified human resources.

Therefore, up to now in the year 2012 Latvia has been listed among the EU countries having the lowest level of innovation performance. The analysis provided by the Innovation Union Scoreboard notes that Latvia is *int. al.* characterised by weak funding and participation of industry in R&D[5] where in 2012, Latvia lagged tremendously behind the EU average of 61%. While there has been a recent upward trend with regard to BERD, in 2010 when it made up only 37% of all R&D funding in Latvia, a fall-back occurred in 2011 to only 24.7%.. As argued by the Innovation Union Competitiveness Reports 2011, the national economy of Latvia is characterised by limited knowledge capacity and intensity, positioning it among countries of "medium-low knowledge capacity with a strong role of agriculture and low knowledge-intensive services"[6]. Also this EC report on the Member States (MS) competitiveness performance and policies analysing the long-term changes in the industrial structures of the MS lists Latvia in the

[5] Innovation Union Scoreboard 2013, p.12.
[6] Innovation Union Competitiveness Report 2011,

group of countries that are catching up, but with trade specialisation in technologically less advanced sectors (*industry value added in 2009 was 9.9% in Latvia).*

The GDP of Latvia in 2012 in current prices made up € 22.1b, of which only 14% was provided by the industrial sector *(CSB, 2013)*. Similar to the average trends in the EU, the major share of Latvia's GDP *(70%)* currently consists of the service sector with a significant role being played by the transport/transit services. Those sectors, however, features insignificant contribution in terms of innovation. In 2008, R&D (both intramural and extramural) in the service sector amounted to approx. € 7m – less than 10% of all R&D expenditure *(€ 85m)* (ibid.).

The current business structure of Latvia is composed mainly of small- and medium-sized enterprises (*SMEs*) (*99.5%),* with micro-enterprises dominating at *82.5% of all enterprises.*[7] Their low capacity to invest in R&D and innovation is demonstrated by that fact that only 17% of SMEs introduce product or process innovations in Latvia, while the respective share in the EU-27 on average is 34% [8]. As summarised by the Global Competitiveness index, Latvia is still in the transition from an "*Efficiency driven*" to an "*Innovation driven*" economy[9]. Deeper analysis revealed, that only about 20 of the existing industrial enterprises *(SMEs*) prove to be unique, research driven and feel strong in worldwide competition in the high-tech field[10].

2.2 Funding trends

GERD as a % of GDP in Latvia in 2011 reached 0.70 *(2008 - 0.61%; 2009 - 0.46%, see Table below)* even under conditions of additional cuts in R&D funding from the state budget – mainly due to the inflow of EU SFs and FP7 project investment. In absolute figures the total government budget outlays on R&D *(GBAORD*) have decreased from €53m *(2008*) to €32.1m *(2011*) resulting in 0.20% of GDP in 2009 and 0.23% in 2011 respectively. That is far below the EU-27 average (0.76 in 2010). The overall trends in GERD positions Latvia still far behind the EU-27 average of 2.1% ranking it among the most lagging EU MS since early 1990s.

Following accession to the EU in 2004, a national target of 3% had been set for GERD. Yet, the provision stipulated by the Law on Research Activity *(2005*) envisaging an annual increase of GBAORD by 0.15% of GDP until it reaches 1% has not been enforced since the upsurge of the economic crisis and this is not expected to change in the coming years. Latvia no longer adheres to the GERD target of 3% of GDP by 2020 – referred above NRP *(2011)* and NAP *(2012)* has instead lowered it to a mere 1.5%.

[7] Economic Development of Latvia, Report, June, 2011
[8] Innovation Union Scoreboard 2010:
[9] Global Competitiviness report 2012-2013: http://reports.weforum.org/global-competitiveness-report-2012-2013/
[10] Kalviņš, I. Ūbelis et al. (2010): Informative report on the necessary support for the development of new exportable products in cooperation with Latvian scientists [Informatīvais ziņojums „Par nepieciešamo atbalstu jaunu eksportspējīgu produktu radīšanai sadarbībā ar Latvijas zinātniekiem]. Riga: Ministry of Education and Science, (In Latvian)

	2009	2010	2011	2020 national target	EU average 2011
GDP growth rate	-17.7	-0.3	5.5	N/A	- 0.3 (2012)
GERD as % of GDP	0.46	0.60	0.7	1.5	2.03s (2011)
GBAORD (€ million)	37,997	40.92	31.9	N/A	510.5s (2011)
GBAORD as % of GDP	0.20	0.16	0.23	N/A	91,277.1 (EU27 total 2011)
BERD (€ million)	30,891	40.55	35.1	N/A	1.26 (2011)
BERD as % of GDP	0.17	0.22	0.20	N/A	24% (2011)
GERD financed by abroad as % of total GERD	15.5	33.3	50.7	N/A	12.7% (2011)
R&D performed by HEIs (% of GERD)	38.9	40.0	46.6	N/A	62.4% (2011)
R&D performed by PROs (% of GERD)	24.8	23.0	22.4	N/A	n/a
R&D performed by Business Enterprise sector	36.5	37.0	24.7	N/A	1.26 (2011)

s - Eurostat estimate, **Data Source: Eurostat, March 2013**

The most recent trends in R&D funding demonstrate that in 2011 the budget funding for R&D in absolute figures remained at about the same level as in 2010 *(€28.9m)*. This is also the case for the year 2012 and is already planned for 2013 according to the Law of State Budget. In 2010, the state budget funding was split in roughly equal shares between **institutional funding** *(40%)* **and competitive (*project-based*)** (60%) **funding**. Of the latter, approx. 60% can be categorised as collaborative funding, which is used in this report to denote projects executed jointly by partners representing different institutional affiliations. While there has been a twofold reduction in the overall state budget funding for science in 2009-2010 due to the budget cuts enforced during the economic crisis, the overall balance between the above-mentioned funding instruments covered by the state budget has not witnessed substantial changes up to budget year 2013. These proportions change, however, when the contribution coming from foreign sources (*abroad, incl. EU SFs, FP7 etc.*) is considered.

As noted before, last 10 years have witnessed considerable growth in the share of EU SFs (*ERDF/ESF*)[11] in the overall R&D funding in Latvia, *int. al.,* reinforcing the emphasis on collaborative measures. Due serious cuts of national funding after 2008 the foreign share started to grow quickly and reached 50,7% in 2011 *(EU SFs and FP7 contribution together).* The tendency can be expected to continue in 2012 and 2013 with a gradually decreasing trend after 2013. Accordingly, given the competitive nature of all EU SF funding, the overall balance between institutional and competitive funding has shifted notably, leaving the former at the level of around a mere 17% in 2010. Such an imbalance frequently results in an R&D system having exaggerated competition based on project-based funding at the expense of stability, as

[11] Since Latvia is categorised as a single region at NUTS I and II levels, funding co-financed by the ERDF/ESF pertains to the country as a whole.

represented by the share of institutional funding[12]. In case of Latvia such imbalance introduced oversized stress, lack of security in research community and is strongly damaging creativity in research activities including applied part of research as well. The increasing share of competitive funding is considered to be conductive to yielding higher returns in terms of knowledge creation, research output and making research organisations more responsive to socio-economic needs[13] , but the level of institutional funding should to ensure long-run stability for research funding in PROs as a basis for creative research activities towards various future demands.

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 *(roughly from €35m to €40m)* and faced a decrease to €35,1m in 2011 again. In 2010 **BERD** had increased to 37% of all R&D funding in Latvia *(25% in 2008)* and faced a decrease once more to 24.7% in 2011. There are still hopes for slight improvement in 2012 and 2013 due to the launch of several new funding schemes encouraging public-private partnerships (*mainly co-funded by EU SFs: e.g., Competence centres, National research centres)* but in particular monitoring of accuracy of such statistics need to be improved.

Few other types of small size R&D funding should be mentioned. **Thematic funding** in Latvia is mainly allocated from the budgetary sub-programme covering funding for five national research programmes. T**ransnational and inter-regional funding** *(as part of total R&D funding from abroad)* in 2010 was estimated to be around 5% of total R&D funding in Latvia. So far there are almost no tax incentives in place for promoting R&D&I in Latvia.

2.3 New policy measures

- Reorganisation of the Ministry of Education and Science of the Republic of Latvia is underway

A major reorganisation is going on at the Ministry of Education and Science during 2012 in order to achieve smaller, efficient, motivated and results-oriented state administration in the domains falling under the responsibility of the Ministry *(including education, science, youth, sports and language)*. Now in 2013 the research community is concerned, that some of the Minister's actions have not been professional and will fail because of the decrease in quality of ministry staff. Relevant dismissals and replacements did not result in increased professionalism of employees and the quality of performance of the Ministry but have already resulted in the delay of implementation of several vital plans.

[12] Radosevic, S. (2011): Challenges of converging innovation policies in a multi-tier Europe: a neo-Schumpeterian perspective, In: Challenges for European Innovation Policy: Cohesion and Excellence from a Schumpeterian Perspective, Radosevic, S., Kaderabkova, A. (eds.), Edward Elgar, 9-46

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

- New competitiveness-driven procedure for the distribution of state-funded research grants in Latvia

The new call under the state-budget funded programme for basic and applied research projects which had a closing date on 1 October 2012 envisaged several new elements in the submission and evaluation procedure of grant applications. Most of those are geared towards boosting international competitiveness and the overall quality of national research proposals submitted by Latvian researchers. The response to the call from small in number research community was impressive – 346 applications. In independent international evaluation 217 projects (63%) received marks above quality threshold. Money available allows financing only 65 projects having marks above 85 from 90 possible. It was supposed that financing of successful teams would begin from January 1, 2013, but now it's delayed till April 2013. 152 excellent projects remain not financed yet. The research community in Latvia is deeply concerned and coordinators of retained projects face problems keeping staff needed for implementation of pending projects for at least 3 months without salaries.

The outcome of this competition is clear internationally received evidence of high quality of research community in Latvia which was already proved during the last 14 years by 22% success rate of Latvia in EU Framework Programmes *(FP5&FP6&FP7)* calls since 1999. Such outcome is strong evidence that problems of Latvian R&D sector are not in quality, but in under financing, small size *(in absolute and in 'per capita" terms)* and unsuccessful governance.

- Continued governmental support for international science and research collaboration

On 19 June 2012, the Cabinet of Ministers accepted new "*Rules of procedure for the provision of State aid for participation in international cooperation programmes in research and technology"*. The hitherto applied rules of procedure, accepted in 2008, were outdated because, since then Latvia has joined many new international programmes and new legislative acts have been adopted by the EuropeanParliament and Council. The new Rules of procedure stipulate that support shall be provided for participation in FP7 projects, including coordination and support actions ERA-NET and ERA-NET+ and the related projects, COST actions, GEANT, €ATOM, EuropeanJoint undertakings for ITER and F4E, projects in the frames of BONUS and €OSTARS programmes, as well as ARTEMIS and IMI Joint Undertakings. Those rules are promising, but the Ministry budget for 2013 has rather small financing to provide such aid.

2.4 Recent policy documents

Besides Council Country Specific Recommendations for Latvia *(discussed in 2.8)* there were two documents released in 2012 which highlighted the need for urgent policy measures:

- On 07.03.2012 the State Audit Office released the Audit report "The Efficiency and Compliance with the Requirements of Regulatory Enactments of the Activities of the Ministry of Education and Science in Developing and Organising the Implementation of the National Science Policy" in which policy of the Ministry and Cabinet was carefully analysed regarding statements and guidelines of the above mentioned policy. Inconsistencies, and contradictions between policy statements and implementation acts in national RTD policy during last 10-20 years were highlighted in this report with the convincing statement that funding of the national

research system from the state budget was far below the basic needs, investment of resources from EU Structural funds budget were badly planned and managed and the research sector in the country is in deep crises. The summary statement is dramatically painful: "The national science policy implemented by the MES as the leading State administration institution during the audited period did not facilitate the attainment of main objective of the RTD policy – to shape science and technology as the basis for the long-term growth of public society, economy and culture, ensuring the implementation of a knowledge-based economy and a sustainable growth..."

➢ New insight into the Latvian society provided by the annual Human Development Report The most recent annual Human Development Report of Latvia for 2010/2011 prepared by the Advanced Social and Political Research Institute of the University of Latvia addresses topical issues related to national identity, mobility and capability in the Latvian society. The 2010/2011 report particularly focuses on emigration issues (*about 200 000 people left the country during the last 10 years*), because human development is weakened by a reduction in the size of the country's population and evidently the human capacity of RTD sector of Latvia. Until now there were not excesses of sharp increases in emigration of researchers, but the year 2013 could become an exception. About 500 – 1000 (*of ca. 4000 researchers in total in the country)* young and experienced researchers mostly with PhD degree are facing choice to emigrate or to become jobless or live with a ridiculously small salary. Two programmes Attraction of Human Resources to Science and Support to the implementation of doctoral programmes (2009 - 2015) financed by EU ESF started in 2008. The first is ending in 2012. The general goal of this one was to maintain sustainable growth of human resources engaged in the research sector, to promote re-emigration of researchers currently working abroad and to attract foreign researchers to work in Latvia. The aim with regard to the tangible outcome of the programme was to attract and finance an additional 1,000 researchers (*as FTE*). Altogether 154 project proposals were submitted - out of those 119 were rejected and 35 approved and are ending in 2012/2013. There was a substantial decrease in RTD funding since 2008 and a further reduction is foreseen in 2013. Knowledge based industries are rather week and research driven SMEs number fewer than 100 in the country. That is a crises situation for 1000 researchers mentioned. If crises management measures are not taken by the Government a radical increase in the "brain-drain" is expected.

2.5 Research and innovation system changes

The research and innovation system in Latvia face vital survival problems and research and innovation system changes should be directly linked with crises management measures in the area of human resources to face aging, brain-drain and shortage of personnel "critical mass" in labs *(per capita 2-4 times less than in advanced MS and far below numbers of Finland the country having twice the populations of Latvia*) to be operational to compete for new projects for various sources of public funding on national and EU levels and to react to the requirements of the national scale or the EU level industry for applied research efforts. It is crucial to alter the principles for the allocation of the state science budget in a systematic way by increasing amount of money and giving priority to the research relating to the thematic priorities like EU key enabling

technologies and to traditionally strong research institutes well recognised in the EuropeanResearch Area *(ERA)*. In addition, concrete efforts are to be made in Latvia to ensure further rejuvenation and expansion of the research and academic staff (*including resuming the careers of lot of unemployed or those working in non-relevant professions*) as well as enhanced contacts and networking with the Latvian industrial and the research diaspora *int. al.* to facilitate massive return of expatriates. This could be notably encouraged if 10-15 traditionally scientifically strong national research institutes or their associations would be advanced towards becoming world class centres of excellence in terms of research infrastructure, staff competencies and remuneration. The presence of such capacity in the country was confirmed via participation of research institutes of Latvia in the calls of: FP7-RESPOT-2007-2013 *(Unlocking and developing the Research Potential of research entities established in the EU's Convergence Regions and Outermost region)*. The success rate for this programme was 7% and Latvia had 5 projects financed from the total number of 144 financed in 7 years and ranked high in per capita terms among 25 participating countries.

Latvia is privileged to use EU Structural Funds money to solve the above mentioned problems. Actually several measures started in 2012 should be mentioned. The EU SF co-funded Cluster programme launched in January 2012. The programme is aimed at facilitating cooperation between mutually unrelated commercial, research, educational and other institutions for boosting the competitiveness or selected branches and business companies, increasing export volumes and development of new innovative products. Other R&D policy instruments geared towards the industrial sector include Support for development of new products and technologies, Support for establishing industrial property rights, and Support for introduction of new products and technologies into production managed by the Latvian Investment and Development Agency. Also note should be taken of the activity aimed at enhancing motivation for innovation and business start-up. Keeping in mind mentioned acute shortage of RTD personnel those instruments face a risk of failure or ineffective implementations. A comprehensive national wide effective timely programme to raise quality and quantity of human resources in the RD sector could be helpful.

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

Research policy in Latvia is developed, funded and implemented at the national level. Formally it isn't regionally structured. In practice some aspects of regionalisation comes from historical heritage and is also promoted by EU SFs and other resources coming from EU common programmes. Before return to the national level, regionalisation issue will be briefly discussed.

To promote balanced development of all territories, five planning regions of Latvia *(Riga, Kurzeme, Latgale, Vidzeme and Zemgale*) have been created. With its population slightly above 2 million, Latvia has six NUTS 3 regions – they are the same as planning regions, except that the Riga planning region is split into Riga *(the city*) and Pieriga *(the surrounding area)* according to the NUTS 3 classification.

At the level of regional planning, the main body is the Planning Region Development Council, which is elected by the municipalities of the respective planning region. These Councils ensure the regional development planning and coordination, as well as cooperation between municipalities and the national government. They are responsible for setting the main principles, objectives and priorities of its long-term development, drafting the regional development programme and undertaking territorial planning in compliance with the national development strategy. As such environment RTD policy for them is an intangible matter and their reaction is strongly linked to awareness of the number of persons on duty.

The main responsibilities of the municipalities include the provision of public utilities, local infrastructure, primary and secondary education, social assistance, etc. The municipalities also have to promote economic activity in their territories.

Most of the research activities in Latvia are concentrated in the capital city of Riga where the majority of higher education institutions *(HEIs)* and public research organizations are located. Outside Riga, research activities are undertaken in some of the largest cities. In fact, each of the planning regions hosts at least one HEI – Kurzeme has HEIs in Liepaja and Ventspils; Latgale has HEIs in Daugavpils and Rezekne, Vidzeme hosts Vidzeme University of Applied Sciences in Valmiera and Zemgale hosts a National Agriculture university in Jelgava. That is promising. These universities or university colleagues can emerge as engines of development in case of favourable political environment in the country and can make research area and economic development across the country more balanced and in case of Eastern part of Latvia to contribute to the development of distant border regions of EU.

Planning regions have neither the responsibility nor the funding capacity to develop their own research policy or programmes. There is a certain "regionalisation" element in the national research and innovation policy, which draws attention to the need to promote research and innovation outside the capital city. Regional HEIs are seeing themselves as, but are rarely highlighted, as potential centres for research and technology development. In conditions when the entire research system in the country faces a chronic lack of financial and human resources, regional HEIs are far behind their capital city partners in levels of support even having excellent research capacities.

One of the tasks set forth by the Guidelines for Development of Science and Technology for 2009-2013 is aimed at promoting higher education and research activities in the regions. Moreover, national research and innovation programmes also support the establishment of technology transfer centres, business incubators and innovation centres at HEIs and municipalities outside the capital city. Those are great promises, but State Audit Office of the Republic of Latvia in its March 7, 2012 report identified a dangerous inconsistency of Ministry of Science and Education and the Government in following those guidelines

Positive highlights and trends towards regional level RTD are demonstrated via EU international inter-regional and cross-border programmers including research and innovation promotion elements. In the case of INTEREG initiatives Latvia has become involved in several regional initiative projects launched under the INTERREG-IV-C programme *(Priority "Innovation and the knowledge economy")*. Mention has to be made also of the Latvia-Lithuania cross border cooperation programme 2007-2013 *(Priority "Encouragement of socio-economic development and competitiveness of the region"* inter

alias *aimed at facilitating research and technology development*) as well as the Baltic Sea Region programme 2007-2013 *(Priority „Fostering innovations").*

The elaboration of a **multi-annual RTDI strategy** was started in Latvia in the mid-2000s. In 2009, the Guidelines for Development of S&T for 2009-2013[14] and research priorities (*five in total)* for the same four-year period were approved by the government. The features of this strategy have been earlier incorporated in the National Development Plan 2007-2013 and the National Strategic Reference Framework where the strengths and weaknesses at the national level in the area of human resources and employment, innovation and entrepren€ship as well as infrastructure and services have been analysed. The implementation of this R&D&I strategy has been further specified in the Strategic Development Plan of Latvia for 2010-2013, and eventually in *the National Reform Programme of Latvia (NRP) for the Implementation of the "Europe 2020" strategy.*. The latter documents demonstrate a certain attempt to reconsider the **priorities of R&D&I strategy** in the light of the current economic situation since the Guidelines were elaborated in 2006-2008 prior to the crisis. Namely, the more recent documents tend to place greater emphasis on academia-industry relations and the role of the enterprise sector. The NRP as the most recent strategy document sets the following priorities with regard to the R&D domain: advancement of the potential of scientific activity; development of a long-term cooperation platform for enterprises and scientists; and support for development of innovative enterprises. The named priorities have been selected mainly on the basis of the low share of R&D in GDP, which is explained by the small amount of state budget funding, and an insufficient contribution of the private sector to research. More specifically, the key underlying challenges to be addressed by the listed priorities have been attributed to:

(1) the small number *(2-3 times less than EU average "per capita" indicators, but successful in international quality tests, see 2.3 above*) of employed in science and research and by industry, (*ageing of scientists, insufficient number of doctoral candidates)*,

(2) under-developed scientific and research infrastructure *(insufficient number of up-to-date equipped laboratories for implementing technology-oriented projects*),

(3) weak commercialisation potential of research results (*acute lack of well trained science managers having natural science or engineering background*) , poor cooperation between scientific and industrial sectors facing problems to recruit skilled researchers due to small overall number in the country , and

(4) accordingly: low part of high-tech products in export; low high-tech sector; limited capacity of SMEs as the dominant component of the business structure of Latvia towards research driven activities,

As a consequence of said above limited growth capacity towards knowledge based economy and high added value production, lost opportunities and limited resources to invest in R&D.

[14] Guidelines for Development of Science and Technology for 2009-2013, Riga, Ministry of Education and Science of the Republic of Latvia, (In Latvian)

The government in power from March 2009 until October 2011, declared the development of manufacturing companies and increase in export volumes as a basis for economic recovery[15], and the Ministry of Science and Education applied this approach in distributing rather small available funds. In the light of this policy orientation *(unfortunately not supported by financial flows accordingly)* **specific business sectors** were identified as high-priority sectors[16]: Information and communication technologies; Production of electric devices and optical appliances; Chemical and pharmaceutical industry; Mechanical engineering and metal working; Transport and logistics; Forest industry; and Food industry. Similar approach has been used in several other governmental decisions, including the NRP. These priorities have been set in parallel to the ones identified with regard to scientific development *(since 2005; currently for 2010-2013)*. While a certain level of conformity between the two sets can be observed, a more tangible inter-relationship could be desired. So far this sectorial prioritisation of research and the national economy at large has been carried out rather independently, followed only by a post factum substantiation of the mutual conformity thereof[17].

It can be noted that due to the economic downturn, in the end of 2008 the set of research and innovation policy support measures was re-considered and several EU SF co-funded programmes were either temporarily suspended or experienced their budget cuts. This was the case with the activities aimed at the attraction of highly skilled labour force in companies, establishment of technology transfer centres, development of Riga S&T park, implementation of the cluster programme, upgrading of IT infrastructure for research activities as well as strengthening the development and administrative capacity of research and innovation policy. At the same time among the then prioritised activities one should mention programmes dealing with competence centres, liaison offices for technology transfer, development of new products and technologies, business incubators, high value added investments, attraction of human resources to science, support to doctoral studies, support for science and research, development of research infrastructure, etc. Some of the latter, however, have experienced a rather late launch *(formal approaches and lack of professionals for implementation)* thus also breaking down the logic of their succession and undermining efficient implementation thereof.

On the whole, it can be argued that over the last five years, under the conditions of economic recession, the identification of challenges and the definition of priorities in the field of R&D&I policy were more aligned with the economic set-up of the country. At the same time, in terms of concrete policy measures the crisis has exerted a negative impact given the suspension of several important R&D and innovation support programmes, not least due to the lack of resources for ensuring the necessary co-funding from the state budget – the evidence confirming the low priority of R%&DE&I issues in overall state budget policy of decision makers in Latvia.

There were expectations to obtain a more strategic outlook with the elaboration of the National Development Plan of Latvia for 2014-2020, The plan approved by the Saeima on December 20,

[15] An improvement could be observed in 2010 with import volume only by 21% (41% in 2008) exceeding the export volume, both having increased by 20-23% since 2009.

[16] Informative Report on the Mid-term Economic recovery Plan, (In Latvian)

[17] Development of Science and Technology in Latvia, 2011, Riga: Ministry of Education and Science,

2012 as the final version doesn't reflect such tendencies, particularly keeping in mind foreseen modest target - 1.5% of GDP for GERD in 2020.

In the end of 2009, the national research and innovation policy of Latvia was **evaluated** by the CREST Policy Mix Peer Review, see 2.7 below. The external evaluation of the national RTDI policy resulted in evident conclusions - Latvia needs significant structural reforms in economy in order to promote development of the national innovation system. While the elaboration of a multi-annual R&D&I strategy was started in Latvia in the mid-2000s, over recent years some further strongly bottom up attempts have been made to reconsider the **national research and innovation priorities** in the light of the current economic situation. Since 2005, one of the strategic elements used in the national research policy is also represented by the prioritisation of scientific branches, with a new set of five thematic priorities approved for 2010-2013.

Having this generally correct wording in policy documents, the national R&D community has little reason to be optimistic in near future while state budget for 2013 foresees no higher priorities towards research and development.

Up to now, mostly sinking reforms and prioritization of science are offered from the top-down in a deep bureaucracy and bottom-up initiatives from research structures are neglected, but worth to be mentioning here to demonstrate how smart the specialization should be and could be.

Several bottom-up initiatives have already brought to the country millions of € of investments in the R&D system. The latest example – a strong emerging team in quantum computing. A very talented young researcher has returned to Latvia with an FP6 M-C return grant after he built his early carrier in the Massachusetts Institute of Technology and in several other universities in North America. Together with colleagues in his home lab he won prestigious FP7 FET-OPEN projects and just now was the first who succeeded winning a brilliant ERC AdG grant for 5 years in the domain of quantum computing (*success rate 7% for both cases*). There was practically no national investment in this field for years and no mentioning in any document for science priorities in Latvia. The same situation can be seen in the traditionally strong but never prioritized domain of photonics[18] in Latvia. Bottom-up initiatives in those two domains introduced real structural changes in the Latvian R&D system mobilizing national intellectual capital counting millions of €, bringing investments from outside close to €10m at the end of 2012 – sums comparable with annual state budget contributions to R&D in Latvia and finally providing signals for investors, that Latvia has internationally approved capacities. Both teams are still waiting recognition by national policy makers and ministries and relevant ranking in the priority list.

[18] Brussels, 30.09.2009, COM(2009) 512 final: "Preparing for our future: Developing a common strategy for key enabling technologies, in the EU

2.7 Evaluations, consultations

At the end of 2009, the national research and innovation policy of Latvia was **evaluated** by the CREST Policy Mix Peer Review [19]. It was reported 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) link to instruments providing incentives for successful entrepren€s and researchers to move home.

In many cases the needed changes focus on governance or interventions that are not very expensive but that support the development of capacities and institutions needed for the future [20] *(see also Kristapsons, Adamsone-Fiskovica & Draveniece, 2011)*. It has been argued that larger investments can initially be financed from EU SFs and then gradually transferred to the state budget. Yet, this approach might be difficult to enforce in the foreseeable future given the need to use the state budget to pay back the international loan granted for the purpose of overcoming the crisis.

While this review was well accepted by the research community and the provided recommendations have been considered by policy-makers, there was no official government's response to these recommendations. Soon after the expert group produced the Policy Mix Peer Review, CREST was reorganised, renamed to ERAC and given a revised mission. Thereby the review was not formally approved by the CREST committee and 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 Science[21] and submitted to the Government. Accordingly, in April 2011 the Cabinet of Ministers made a decision about carrying out in 2012, an additional external **evaluation of research policy and PROs in Latvia**. Whereas the CREST evaluation primarily focused on evaluation of innovation and R&D policy

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

[20] Adamsone-Fiskovica, A., Bundule, M. (2011): Monitoring Policy and Research Activities on Science in Society in Europe (MASIS). National report: Latvia, European Commission, DG Research. September. 46 pp,

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

and synergies between the two domains, the upcoming evaluation shall deal more specifically with the assessment of the operation and scientific output of individual research institutes, as stipulated by the Law on Research Activity.

This latest decision of Cabinet demonstrates formal approach leading to waste of administrative resource and unnecessary bureaucratic intervention in chronically since early 90's underfinanced research community. The evaluation now is postponed until 2013.

The CREST report mentioned already highlights the main problems but tests of capacity and competitiveness' of the RTD system in Latvia in the ERA are on going since 1999, when Latvia became an associated member to the FP5. The capacity and quality of research entities in Latvia have been constantly tested via participation in multinational consortium Framework programme project proposals. The number of successful projects together with a number of invitations to become consortia partners clearly demonstrates the visibility of the institute or its research groups in the ERA and the level of excellence in becoming a valuable partner for a consortium project despite harsh competition where success rates are usually lower than 20%.

The Latvian National Contact Point System for EU Framework Programmes has a full record of participation *(success and failures)* of Latvian research entities in Framework programmes and structured ranking among different groups of players. This ranking complementary with the results of participation in national scale calls and in other EU programmes provides a clear picture of the strong and weak points of each institution.

Now at the end of 2012 and in the light of the **ERA pillars** the national policy mix is to a varying degree aligned with the diverse objectives of this endeavour. Many of these objectives are addressed, though with variable rates of success, with support of the EU SFs and FP7 project financing. This is particularly the case with those objectives aimed at ensuring an adequate supply of human resources for research, development of research infrastructure, as well as facilitation of partnerships and productive interactions between research institutions and the private sector. Policy efforts are also increasingly targeted at enhancing knowledge circulation across Europe and strengthening international cooperation in science and technology. Yet, it still remains a challenge to address such objectives as the openness and the attractiveness of the national R&D system for cross-border flows of funding and human resources. The presence of foreign researchers in labs in Latvia in % is far below the average in the EU.

2.8 Policy developments related to Council Country Specific Recommendations

European Commission published its Working document EC Brussels, SWD(2012) 320 final on 30.5.2012 [22] followed by Council Recommendation 11261/12[23] on 06.07 2012. Both

[22] COMMISSION STAFF WORKING DOCUMENT Assessment of the 2012 national reform programme and convergence programme for LATVIA Accompanying the document Recommendation for a COUNCIL RECOMMENDATION on Latvia's 2012 national reform programme and delivering a Council opinion on Latvia's convergence programme, 2012-2015 {COM(2012) 320 final}

documents together provide comprehensive general insight and in particular deeply reveals problems related to education, research and innovation and the following statements are worth citing:

- Despite relatively good overall educational attainment, the quality of tertiary and vocational education remains a cause for concern. There is evidence of skills mismatches on the labour market, including an insufficient number of graduates in science and technical subjects. There is also a low degree of employment in knowledge-intensive activities.
- Latvia's poor innovation performance impairs its competitiveness and the country has no systematic and effective research and innovation policy. There is little R&D investment by domestic companies or large foreign affiliates to support specialisation in knowledge-intensive and innovation-driven sectors.
- While in the past the Latvian authorities have demonstrated their ability to implement planned expenditure cuts, these have often taken the form of 'across-the-board' expenditure reduction.
- Despite the relatively high educational attainment *(tertiary attainment rates improved significantly from 18.6 % in 2000 to 32.3 % in 2010 and have almost reached the EU average*), a significant share of the workforce have no professional qualifications and limited access to quality education, especially higher education. Universities perform poorly in worldwide rankings *(also compared with other Baltic countries)*. Higher education suffers from low international competitiveness (low share of international students, publications and international lecturers) and weak cooperation between universities and businesses. The share of mathematics, science and technology graduates is the lowest in the EU. There are concerns about decision-making and governance in higher education institutions.

[23] Brussels, 6 July 2012, 11261/12, COUNCIL RECOMMENDATION of on the National Reform Programme 2012 of Latvia and delivering a Council opinion on the Convergence Programme of Latvia, 2012-2015

3 STRUCTURAL CHALLENGES FACING THE NATIONAL SYSTEM

3.1 Low R&D funding and short-term focused governance system

The analysis provided in sections above highlights and argue that the allocation of state budget funding for R&D&I in relative and absolute terms for years 'de facto" is not relevant to " de jure" declarations about strategic importance of R&D and innovation for Latvia in the wording of main planning documents and key policy issues for internal and external use. In contrary no evidencies of any financial prioritisation for R&D and innovation.in the Cabinet and the Parliament for years. The outcomes of that are low performance competitiveness indicators for the knowledge based economy, the labour market and innovation. In recent years, public funding for R&D has become excessively dependent on EU SFs and Framework programme funding (*about 50% in year 2011 and the same tendencies for 2012 and 2013).* The extreme problems with R&D intensity and growth in Latvia have also been noted by the Innovation Union Competitiveness Report 2011. The national governance system for years has not been aware, sufficiently motivated and responsible to secure and maintain the strategic role of R&D and innovation guaranteeing sustainable welfare of the country for years ahead.

It's evident, that such rather questionable approach is dangerous to the competiveness of the country in mid-term perspective and lagging behind other Member States.

While in 2011 GERD reached 0.70% of GDP a further increase as a per cent of GDP can hardly be expected after 2012 given the saturation to be reached by the SF funding by that time. The year 2013 marks the end of the current planning cycle of SFs and, based on the previous experience, it can be assumed that the actual funding will be made available no earlier than two years after the launch of the new cycle. That means the lowest level of GERD among member states for years to come.

The unsustainability and stagnating for years R&D funding can be attributed to the overall weakness of the national governance system, where the responsibility for R&D and innovation policy is divided between several institutions, see CREST peer review[24]. The national governance system has not ensured the strategic role of R&D in the social and economic development of the country. Therefore Latvia is already facing severe consequences which will worsen in the coming years endangering officially declared successful recovering from the crisis.

3.2 Limited innovative capacity of the business enterprise sector

Latvia has been listed among the EU countries having the lowest level of innovation performance. The analysis provided by the Innovation Union Scoreboard 2013 notes that Latvia characterised by weak funding and participation of industry in R&D. While there has been a upward trend with regard to BERD, in 2010 when it made up only 37% of all R&D funding in

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

Latvia, a fall back occurred in 2011 with only 24.7% Latvia lagged well behind the EU average above 60% in 2012.

The current business structure of Latvia is composed mainly of small- and medium-sized enterprises (*SMEs*) (*99.5%),* with the strong domination of micro-enterprises (*82.5% of all enterprises)*[25]. Their low capacity to invest in R&D and innovation is demonstrated by that fact that SMEs introducing product or process innovations in Latvia make up only 17% of all SMEs, while the respective share in the EU-27 on average is 34%.

The GDP of Latvia in 2011 in current prices made up €22.1, out of which only 14% were provided by the industrial sector *(CSB, 2013)*. The industrial sector is undersized to make a significant contribution in terms of the overall innovation performance of the country to increase export share of "High-Tech" products and suffers from the weakness and under financing of R&D system.

3.3 Insufficient supply and sustainability of the skilled labour force

The number of employed R&D staff in Latvia has witnessed a sharp decrease from about 30 000 in 1990 to about 5000-6000 by the turn of the century.. Further stagnation of the formerly strong RTD system and "high-tech" industry *(Excellence confirmed by international evaluation led by Danish Council Of Science in 1992)* and the years of crisis has reduced the FTE number to 4000 in 2012. The advanced average quality of this small community has been discussed in chapter 2.3 above and also mentioned in Innovation Union Scoreboard 2013 The actual number ready to resume their research careers could double this figure to 8000, but low national funding and accordingly low levels of remuneration of researchers do not act as strong attraction factor for pursuing ones career in science for both nationals and foreigners.

The problem with the supply of a qualified labour force has become particularly acute under the conditions of major emigration of the Latvian population during the last 6 years, because the R&D and innovation system, which has been underfinanced for years, has low demand for a highly skilled workforce, including professionals and research staff and therefore is week contributor to the nation's economy development.

Recent research-based estimates show that during the last 11 years *(2000-2011*) around 200,000 people have left the country, the majority of which are educated and highly skilled individuals[26] That was already referred above that in addition 55 thousand people have emigrated in just over a two year period *(2011-2012)* with this sharp increase featuring the direct effects of not stopped economic crisis.

[25] *Economic Development of Latvia, Report, December, (In Latvian)*

[26] Hazans, M. (2011): The alternating face of the Latvian emigration: 2000-2010, In: Latvia. Human Development Report 2010/2011, B. Zepa, E. Kļave (eds.), pp. 70-91, (In Latvian)

According to the Global Competitiveness Report Latvia is ranked 96th *(Lithuania – 57th, Estonia – 62nd)* in terms of the availability of scientists and engineers[27] *(GCR, 2011)*. A substantial part of the existing staff (*in 2011, R&D personnel made up 5,432 FTE, incl. 3,947 researchers (CSB, 2012))* are over 60 years of age and the overall number of researchers per thousand labour force is 3.6 compared to the EU-27 average of 6.3. While a national target has been set to award at least 425 new PhDs annually[28], so far this level has not been reached *(2009 – 133; 2010 – 176, 2011 – 257*). The number of new doctorate graduates (*€ODICI2011*[29]) per thousand population aged 25-34 is 0.4 in Latvia compared to the average of 1.4 in the EU-27 *(2009)*[30] and much further behind Finland. The main shortage of researchers can be observed in the business enterprise sector where only about 550 of all researchers are employed *(CSB, 2013*), The current set-up of the research and academic staff available in Latvia *(including estimated 4000- 5000 unemployed or working in not relevant fields)* is in need of a qualification upgrade or rejuvenation in terms of both quantity and quality. The last is directly linked to lack of research activities due to underfinancing.

This, together with a significant number of repatriates is an essential strategic reserve of human resources in Latvia and the general policy should address changes to facilitate it. So far there have been limited incentives notably boosting the quality of research at public research organisations.

Should be also noticed that there is little interest and a lack of professionalism in university trained young entrepreneurs in technology-intensive branches and no attention is paid to the training of highly qualified science managers having natural science or engineering background.

3.4 Low intensity and weakly motivated intra- and intersectoral collaborative practices

The Global Competitiveness Report ranks Latvia comparatively low in terms of the state of cluster development *(94th)* and university-industry collaboration in R&D (*57th)*. A survey reveals that in 2006-2009 only 3-7% *(against the EU-27 average of 15%-25%)* of Latvian enterprises had developed strategic relationships with research institutes and educational institutions to support innovation *(Innobarometer, 2009*). Confirming what was said before the Innovation Union Competitiveness Report 2011 mentions Latvia among the countries with a decrease in the intensity of contractual R&D collaborations over the period 2000-2008.

There is lack of collaborative practices in the domains of domestic inter-sectoral knowledge/technology transfer, as well as insufficient intra-sectoral and cross-border S&T cooperation. This is directly linked to the above-mentioned challenges related to the limited resources and innovative capacity of R&D&I system. Generally this resulted from the low level of interpersonal trust, ignorance of expertise and weak understanding of RTD policy at the EU level and in particular in neighbouring countries, Finland and Sweden by the political establishment in Latvia since independence was regained in 1990. The percentage of foreign researchers working in labs in Latvia is far below average in the EU. That is extremely painful to

[27] The Global Competitiveness Report 2011-2012, World Economic Forum,
[28]: Guidelines for Development of Science and Technology for 2009-2013, Riga, Ministry of Education and Science of the Republic of Latvia, (In Latvian)
[29] €ydice (2011): Science education in Europe: National Policies, Practices and Research, Education, Audiovisual and Culture Executive Agency,

the development of "high-tech" industry facing problems in contacts with relevant research structures lacking broad vision about landscape of European Research Area.

HUMAN RESOURCES	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	0,4
Percentage population aged 25-64 having completed tertiary education	
Open, excellent and attractive research systems	
International scientific co-publications per million population	
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	
Finance and support	
R&D expenditure in the public sector as % of GDP	0,23
FIRM ACTIVITIES	
R&D expenditure in the business sector as % of GDP	0,24
Linkages & entrepren€ship	
Public-private co-publications per million population	
Intellectual assets	
PCT patents applications per billion GDP (in PPS€)	
PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	
OUTPUTS	
Economic effects	
Medium and high-tech product exports as % total product exports	5
Knowledge-intensive services exports as % total service exports	
License and patent revenues from abroad as % of GDP	N/a

[30] Innovation Union Competitiveness Report 2011,

4 ASSESSMENT OF THE NATIONAL INNOVATION STRATEGY

4.1 National research and innovation priorities

In addition to analysis provided in previous sections is worth in summary to mention that the elaboration of a **multi-annual RTDI strategy** was started in Latvia in the mid-2000s. In 2009, the Guidelines for Development of S&T for 2009-2013 and research priorities (*five in total)* for the same four-year period were approved by the government. The features of this strategy have been earlier incorporated in the National Development Plan 2007-2013 and the National Strategic Reference Framework[31] where the strengths and weaknesses at the national level in the area of human resources and employment, innovation and entrepren€ship as well as infrastructure and services have been analysed. The implementation of this RTDI strategy has been further specified in the Strategic Development Plan of Latvia for 2010-2013, and eventually in the National Reform Programme (NRP) of Latvia for the implementation of the "Europe 2020" strategy adopted in 2011[32]. Namely, the more recent documents tend to place greater emphasis on academia-industry relations and the role of the enterprise sector. The NRP as the most recent strategy document sets the following priorities with regard to the R&D domain: advancement of the potential of scientific activity; development of a long-term cooperation platform for enterprises and scientists; and support for development of innovative enterprises.

The named priorities have been selected mainly on the basis of the low share of R&D in GDP, which is explained by the small amount of state budget funding, and an insufficient contribution of the private sector to research *(see section 3.2*). More specifically, the key underlying challenges to be addressed by the listed priorities have been attributed to:

(1) the small number *(2-3 times less than EU average "per capita" indicators*) of employed in science and research (*ageing of scientists, insufficient number of doctoral candidates)*,

(2) underdeveloped scientific and research infrastructure *(insufficient number of up-to-date equipped laboratories for implementing technology-oriented projects*),

(3) weak commercialisation potential of research results, poor cooperation between scientific and industrial sectors facing problems to recruit skilled researchers due to small overall number in the country , and

(4) accordingly: low part of high-tech products in export; low high-tech sector limited capacity of SMEs as the dominant component of the business structure of Latvia towards research driven activities; limited growth capacity and limited resources to invest in R&D,

[31] National Strategic Reference Framework, Riga,

[32] National Reform Programme of Latvia for the Implementation of the "Europe 2020" strategy, Riga,

Specific business sectors were identified as high-priority sectors[33]: Information and communication technologies, Production of electric devices and optical appliances, Chemical and pharmaceutical industry, Mechanical engineering and metal working, Transport and logistics, Forest industry, and Food industry. Similar approach has been used in several other governmental decisions, including the NRP.

4.2 Evolution and analysis of the policy mixes

The Latvian R&D system and innovation system have not been truly integrated. Since the R&D system is public research-centred, the majority of R&D is performed by public universities and state-owned research institutes. The design and implementation of research and innovation policies is shared between the Ministry of Education and Science and the Ministry of Economics, and not steered at the highest political level. A certain indication towards a more coordinated approach is demonstrated by the declaration of the new government in office as of 1 November 2011 envisaging the transfer of the rights to develop innovation policy from the Ministry of Economics to the Ministry of Science and Education. However, it is still unclear when and how this could be put into effect given the fate of other initiatives/reforms that have been envisaged in different policy documents but have remained either unfulfilled or have been substantially delayed. It is also too early to assess to what extent is the newly established high-level Cross-sectoral Coordination centre going to contribute to a better national governance of R&D.

So far the promotion of research and innovation has not been identified as a key contributing factor to enhance competitiveness, job creation and improve the quality of life in Latvia. The role that R&D and innovation could play in the acceleration of economic development and in the recovery from the economic recession has not yet been duly considered by the authorities. At the same time the current set of research and innovation funding mechanisms are, insufficiently effective due to oversized diversity, bureaucratic management and in most cases have insufficient resources to unlock the research potential in the country. The lack of notable progress with regard to boosting research and innovation in Latvia has also been attributed to non-strategic planning of the EU SFs and the low quality of the evaluation studies on the absorption of these funds. These features are crucial especially given the heavy reliance of Latvia on the SFs in the domain of R&D and innovation. The same applies to the scarce budgetary resources. With regard to the latter it can be mentioned that while the report on the Development of S&T in Latvia produced by the Ministry of Education and Science claims to provide an assessment of the national research programmes *(2005/2006-2009),* the given analysis stays at a rather formal level without any critical reflection on the implementation, outcomes and broader impacts of these programmes. On other side when perfect evaluation is on place (see 2.3) the reaction to use the results and to support initiatives of researchers not follow.

In regard to support measures for R&D and innovation, there can hardly be made a distinction between those directly fostering innovative performance and the ones shaping and affecting the broader economic framework conditions that are relevant for innovative performance as part of

[33] Informative Report on the Mid-term Economic recovery Plan, (In Latvian)

the overall R&D and innovation policy mix[34]. The existing policy mix is partially suited to tackle the identified structural challenges facing the innovation system. As regards the limited innovative capacity of the business enterprise sector, several policy measures/actions can be identified that have been launched with an aim of facilitating the start-up and growth of innovative companies.

The Competence centre programme may be seen as a mitigating factor in tackling at least two of the identified structural challenges regarding the innovative capacity of the enterprise sector and the development of collaborative practices. Yet, this programme has faced many bureaucratic obstacles and unresolved legal matters, and thereby it well illustrates the overall situation that an efficient implementation of support measures is largely hindered by the limited experience in designing and managing such large-scale programmes. Also, the policy measures to attract additional human resources to science against the background of major outward migration of the Latvian population cannot be expected to give straightaway and guaranteed results. Many scientists that had a successful start of their career in Latvia now work abroad and though certain attempts are made to attract them back, so far these have been limited in their capacity to achieve notable numbers of re-emigrant researchers. While the Support for implementation of doctoral study programmes is seen to be a rather successful policy measure as the number of individuals having received doctoral degrees has been growing, these programmes are not specifically aligned with the priorities set in the domain of research and national economy. Likewise, these are not followed up by post-doctoral grants allowing these individuals to stay within the research domain.

Aside from the quantitative aspects of human resources, the quality of the HE and research activities are also high on the agenda. For instance, it took quite some effort to pass amendments to the Law on HEIs in 2011 that stipulate new provisions facilitating the attraction of foreign guest lecturers (*at least 5% of all academic staff*) and a mandate granted to public HEIs to carry out study programmes not only in Latvian but also in the official languages of the EU *(up to 10% in each programme)*. At the same time the proposal to admit also Russian as the language of instruction at public HEIs was rejected thus leaving the latter in an unfavourable position in the competition for foreign students from the neighbouring Russian-speaking countries vis-a-vis private HEIs that are not legally bound by such a restriction. Along with these provisions also stricter criteria to researchers and PROs have been set with an aim to enhance internationalisation, openness of research organisations and improve their competitiveness.

The existing evaluations and analysis of the current policy mix aimed at fostering R&D&I in public and private sectors in Latvia and the effectiveness of support measures identify a range of bottlenecks. Already mentioned above the report of the high-level task force *(presented to the Cabinet in May 2010)* on the necessary support for the development of new exportable products in cooperation with Latvian scientists points to their unpredictability in terms of timing *(especially crucial for innovative business companies)* as well as the limited amount of the available funding and the rigid system of project evaluation under the currently operational programmes *(Kalviņš et al., 2010see ref.above*). The task was delegated to the Ministry of Economics to proceed with this

[34] OECD (2011b): Science, Technology and Industry Outlook, 2010, OECD, Paris,

unique proposal which was called like country specifically targeted Latvian experiment by experts in DG REGIO. Unfortunately, neglecting recommendations of the Cabinet the idea became trapped in the bureaucracy of the ministries.

Likewise, experts point to the essential lack of measures regarding IPR protection in the public sector inhibiting its commercialisation, the limited incentives of the tax system for increasing private sector investments in R&D, as well as the lack of technology incubators for high-growth companies and seed funding for high-risk companies. The comprehensive analysis of the whole spectrum of measures undertaken by the Ministry of Education and Science in developing and implementing national research policy in 2007-2011 was accomplished by the State Audit Office of Latvia in early 2012.

The **existing policy mix** in Latvia is officially targeted toward improving the integration of the innovation and R&D system and horizontal coordination within it. The EU SFs are supposed to strengthen the R&D and innovation support system including the business sector. Much closer cooperation between the public research sector and the business sector is being encouraged, but designed instruments are to conditional and complicated to be attractive for both sides. Much more has to be done to increase the impact of the input made by the R&D sector on the innovation process. As regards R&D specific and innovation financing policies, the annual volumes of many support measures remain rather insignificant and hampered by the oversized bureaucracy that so far has not been very conducive to efficiently addressing the major structural challenges. That's evident keeping in mind that GERD is only 0.7% of GDP. Certain policy initiatives featuring positive developments over the last 1-2 years can be identified with regard to the selected newly launched support measures, but their slow implementation in conditions when the R&D system and the country as such is in crises means waste of resources and opportunities and reduced trust of the society.

Considering the **possible directions for the evolution of the current policy mix**, the bulk of the national RDI policy measures in Latvia by 2020 is likely to remain focused on R&D specific financial policy, based on EU SFs in particular and will retain the modus operandi. Similar to previous SFs planning periods which resulted in no substantial increase in performance of the knowledge-based economy in Latvia, in the EU and globally.

To avoid that, these funds should be channelled:

- to provide support for the development of innovative research driven enterprises by means of placing company innovation at the centre of research and innovation policy;
- to strengthen existing research capacity and to facilitate emergence of new research.

That means – the state governed R&D system benefiting from SFs as well should become strong enough in quality and quantity, and well recognised in the ERA in the coming few years, to be able to win competitions for HORIZON 2020 implementation projects and industry contracts from large-scale industry groups in the EU and in the world. Only if based on such capacity and quality will the nation's R&D system, it's institutions and individual researchers naturally become welcome partners for long-term cooperation between enterprises and scientists and facilitate the revival of the nation's "high-tech' industry and the percentage of export volume from Latvia.

In summary: it is crucial to alter the principles for the allocation of the state science budget by giving priority in a systematic way to research relating to the thematic priorities and to traditionally strong research institutes in Latvia which are well recognised in ERA. In addition, concrete efforts should be made to ensure further rejuvenation and expansion of the research and academic staff as well as improved contacts and networking with Latvian industry and the research diaspora, *int. al.* to facilitate a significant return of expatriates. This could be notably encouraged if up to 10-15 traditionally scientifically strong national research institutes or their associations would be developed towards becoming world class centres of excellence in terms of research infrastructure, staff competency and remuneration.

4.3 Assessment of the policy mix

Table 1 : Assessment of the policy mix

Challenges	Policy measures/actions[35]	Assessment in terms of appropriateness, efficiency and effectiveness
Insuficient R&D funding and governance system	• Provision of the Law on Res-earch Activity (2005) stipula-ting that state funding shall increase annually by 0.15% of GDP until it reaches 1%. • Establishment of the Prime Minister's Cross-sectoral Co-ordination centre (Dec. 2011). • Reforms of higher education and science (2010-2012). • International evaluation of research institutions receiving institutional funding (2012). • Assessment of national research and innovation policy (2012).	• Over the last several years the legal norm has not been met thereby providing no contribution to stabilising national R&D funding. • Given the very recent establishment of the new high-level body, it is too early to assess its impact on the R&D domain. • It is envisaged to introduce tougher eligibility standards for registering a new research institute and to revise the research-related criteria for allocating institutional funding to PROs and public HEIs.

35 Changes in the legislation and other initiatives not necessarily related with funding are also included.

Challenges	Policy measures/actions[35]	Assessment in terms of appropriateness, efficiency and effectiveness
Limited innovative capacity of the enterprise sector	• Programme "High value ad-ded investments"(2009-2013). • Programmes "Support for development of new products and technologies", "Support for introduction of new products and technologies into production" (2008-2013). • Programme "Support for de-veloping SME's in specially supported territories" (2009-2013). • Programme "Enhancing motivation for innovation and business start-up" (2009-2013).	• The current programmes represent a mix of measures aimed at providing support to boosting the entrepren€ial activity in general that could, in turn, serve as a basis for facilitating the development and growth of innovative companies.
Insufficient supply and sustainability of skilled labour force	• Programme "Attraction of human resources to science" (2009-2013). • Programme "Support for implementation of doctoral study programmes" (2009-2015). • Reforms of national HE and research (2010-2012).	• Reasonable measures showing first positive results. E.g. more than 200 candidates defended their doctoral thesis in 2010 (an increase of 25% compared to 2009). Nevertheless, the sustainability of fixed-term financial aid can be questioned due to the lack of post-doctoral grants, sufficient and secured institutional funding, etc. • Unfortunately in the year 2013 many new scientists are considering emigration facing lack of work places in research institutes which are underfinanced.
Low intensity and weakly motivated intra- and intersectoral collaborative practices	• Competitive Latvian Research Council grants for joint research projects (domestic) (1994-). • Support for market-oriented research projects (1993-). • Establishment of nine National research centres (virtual research facilities) (2011-) • Programme "Competence centres" (2010-2015).	• The established *(state-budget funded)* funding schemes have so far made up only a small fraction in the total R&D funding. • EU SF co-funded programmes have the potential of providing a more considerable leverage effect, but are facing oversized bureaucratic pressure from supervising agencies.

5 NATIONAL POLICY AND THE EUROPEANPERSPECTIVE

The formal coherence of declared national research and innovation policy for the last 5-10 years, with reference to the objectives set forth for the development of the European Research Area (ERA) is clearly visible. The Table below identifies the main short and medium-term challenges at the national level and recent policy changes in Latvia along the lines of the seven ERA dimensions that can be derived from the analysis provided both in the preceding sections as well as in the Annex on the alignment of national policies with ERA pillars. That is in sharp contrast with the depressive set of indicators in highlighting Latvia in the "Innovation Union Competitiveness report – 2011 " and disturbing conclusions of the Audit report of State Audit Office (27.03.2012) "The Efficiency and Compliance with the Requirements of Regulatory Enactments of the Activities of the Ministry of Education and Science in Developing and Organising the Implementation of the National Science Policy" *(159 pages)*[36]

That means there is an urgent need for bringing together stated strategies and policies with relevant crisis management financial instruments at first and precise, transparent financing which has trust in research to unlock creativity and to boost of the RTD community in Latvia.

Table 2: Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

	ERA dimension	Main challenges at national level	Recent policy changes
1	**Labour Market for Researchers**	• Ensuring stability and international competitiveness of researchers' remuneration • Facilitating a much more balanced inward and outward flow of researchers • Targeted training of MSc level students and young researchers towards eventual employment in research driven SMEs	• Implementation of the EU SF co-funded programme "Attra-ction of human resources to science" • Amendments to the Law on HEIs providing for increased attraction of foreign guest lecturers • Up to now relevant measures are pending
2	**Cross-border cooperation**	• Developing a more strategic approach to joint program-ming and jointly funded research activities with partner countries • Strengthening national research programmes to enable selective openness to foreign legal entities	• Implementation of the established *(mainly externally funded)* programmes for cross-border cooperation • There are several proposal for specific instruments proposed from RTD community and relevant reaction is expected from decision makers

36 (http://www.lrvk.gov.lv/index.php?&id=2207&start=20&temaid=0&lietaid=0&zz=1)

	ERA dimension	Main challenges at national level	Recent policy changes
3	**World class research infrastructures**	• Providing efficient means for making full use of the nationally available RIs by all stakeholders • Ensuring the political framework and systematic support for national participation in relevant ESFRI projects • Fostering adequate training and supply of researchers capable of handling advanced research technologies	• Launch of the EU SF co-funded programme "Develop-ment of research infrastruc-ture" *(National research centres)*, but facing serious organizational problems in 2012-2013. • Drafting of the National ESFRI roadmap • Gradual involvement of Latvian partners in several ESFRI roadmap projects
4	**Research institutions**	• Undertaking targeted and timely actions for implementation of the planned reforms of national HE and research • Facilitating mobilisation of research competencies and resources (both bottom up and top down initiatives) conductive to the develop-ment of large-scale projects • Providing more reliable long-term funding of research ins-titutions on a national level	• Launch of an international evaluation of the HE study programmes • Adoption of amendments to the Law on HEIs setting stricter criteria for the operation of HEIs • Incentives for introducing performance-based funding model of HEIs • Development of National research centres (*EU SF co-funded programme "Development of research infrastructure")*
5	**Public-private partnerships**	• Ensuring full delegation of rights over IP created as a result of state-funded research to the involved PROs • Securing preferential legal framework conductive to the development of public-private R&D partnerships • Promoting more substantial representation of researchers in the business sector	• Draft amendments to the Law on Research Activity • Continued support to 8 liaison offices for technology transfer at HEIs • Resumption of new calls under the national funding scheme for market-oriented research projects • Implementation of the EU SF co-funded programmes "Support for science and research" and "Competence centres" • Draft proposal of the programme "Innovation in 'green' manufacturing" • Launch of the Cluster programme
6	**Knowledge circulation across Europe**	• Expanding the scope and intensity of reciprocal international exchange of HE students and academic staff • Ensuring efficient means for facilitating beneficial return of outbound human resources • Speeding up the development of institutional repositories providing open access to scientific information • Motivating researchers towards more intensive publication of scientific papers in international journals	• Amendments to the Law on HEIs allowing for study programmes in the official languages of the EU • Draft regulations on granting scholarships to foreign students for pursuing studies at Latvian HEIs • Enhanced coordination of scholarships for outbound students and research staff • Withdrawal of former funds for individual scientists earmarked for covering costs associated with participation in internatio-nal conferences.

	ERA dimension	Main challenges at national level	Recent policy changes
7	**International Cooperation**	• Broadening the thematic scope and intensifying research cooperation with third countries • Encouraging elaboration of proactive collaborative research projects lead by Latvian peers	• Implementation of the EU SF co-funded programme "Support for international collaborative projects in S&T" • Intensification of participation in FP7 PEOPLE –IRSES (*international staff exchange)* calls and increased success rate

LIST OF ABBREVIATIONS

BERD	Business Expenditures for Research and Development
CERN	European Organisation for Nuclear Research
CSB	Central Statistical Bureau of Latvia
EC	European Commission
ERA	European Research Area
CEE	Central and Eastern Europe
CoM	Cabinet of Ministers of the Republic of Latvia
COST	European Cooperation in Science and Technology
ERA-NET	European Research Area Network
ERDF	European Regional Development Fund
ESA	European Space Agency
ESF	European Social Fund
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
EU-27	European Union including 27 Member States
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
GCR	The Global Competitiveness Report
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
IPR	Intellectual Property rights
IUS	Innovation Union Scoreboard
LAS	Latvian Academy of Sciences
MoE	Ministry of Economics
MoF	Ministry of Finance
MoES	Ministry of Education and Science
NACE	Nomenclature Générale des Activités Économiques dans les Communautés Européennes (French, EU classification system)
NUTS	Nomenclature of territorial units for statistics
PPS	Purchasing power standards
PRO	Public Research Organisations
R&D	Research and development
RI	Research Infrastructures
RTDI	Research Technological Development and Innovation
SF	Structural Funds

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Abstract
This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.
The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.
The reports were produced by independent experts under direct contract with IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from external experts.

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