

ERAWATCH Country Report 2009

Analysis of policy mixes to foster R&D investment
and to contribute to the ERA

Lithuania

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EUR 23976 EN/4 - 2009

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JRC 53709
EUR 23976 EN/4
ISBN 978-92-79-13310-7
ISSN 1018-5593
DOI 10.2791/ 17103

Luxembourg: Office for Official Publications of the European Communities

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Printed in Spain

ERAWATCH COUNTRY REPORT 2009: Lithuania

**Analysis of policy mixes to foster R&D
investment and to contribute to the ERA**

ERAWATCH Network – Research and Higher Education Monitoring and
Analysis Centre

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Acknowledgements and further information:

This analytical country report is one of 33 reports for EU Member and Associated States prepared as part of ERAWATCH. ERAWATCH is a joint initiative of the European Commission's Directorates General for Research and Joint Research Centre. For further information on ERAWATCH see <http://cordis.europa.eu/erawatch>. The analytical framework and the structure have been developed by the Institute for Prospective Technological Studies of the European Commission's Joint Research Centre (JRC-IPTS) in collaboration with DG-RTD and the ERAWATCH Network.

The report has been produced by the ERAWATCH Network (<http://www.erawatch-network.eu/>) in the framework of the specific contract on ERAWATCH Policy Mix Country Reports 2009 commissioned by JRC-IPTS. It makes use of information provided in the ERAWATCH Research Inventory with support of the ERAWATCH Network.

In particular, it has benefited from comments and suggestions of Ken Guy, who reviewed the draft report. The contributions and comments of Gerard Carat from JRC-IPTS and DG-RTD are also gratefully acknowledged.

The report is only published in electronic format and available on the ERAWATCH website: <http://cordis.europa.eu/erawatch>. Comments on this report are welcome and should be addressed to Mariana Chioncel (Mariana.Chioncel@ec.europa.eu).

Executive Summary

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are thus at the heart of the Lisbon Strategy. This is reflected in guideline No. 7 of the Integrated Guidelines for Growth and Jobs. This advocates increasing and improving investment in research and development (R&D), with a particular focus on the private sector. This report aims at supporting the mutual learning process and the monitoring of Member States efforts. Its main objective is to characterise and assess the evolution of the national policy mixes in the perspective of the Lisbon goals, with a particular focus on the national R&D investments targets and on the realisation and better governance of the European Research Area. The report builds on the analytical country reports 2008 and on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

Recent economic growth in Lithuania and the process of integration into the ERA resulted in research being set as one of the key objectives of national policy. New developments in national research policy have resulted in increased investments in the research and development (R&D) sector.

During the last 5 years gross domestic expenditure on R&D (GERD) in Lithuania increased every year: from €110.58m (LTL381.8m) in 2003¹ to €232.59m (LTL803.1m) in 2007. Although the increase is significant, the level of investment in research constitutes only 0.82% of gross domestic product (GDP) and is far from the target set in the National Lisbon Strategy implementation programme, i.e. 2% of GDP by 2010. Public support for research dominates (47.9% of total GERD in 2007), but the tendency towards a growing share of foreign support for R&D in recent years is clear (from 14.3% in 2006 to 19.6% in 2007). The share of business support in gross expenditure on R&D increased as well (€49.873m (LTL172.2m) in 2006, €57.026m (LTL196.9m) in 2007).

The increase in business enterprise R&D expenditure (BERD) has been remarkably high: from €23.228m (LTL80.2m) in 2003 to €66.352m (LTL229.1m) in 2007. However, the growth of BERD has slowed down in very recent years (in 2006 annual growth of BERD was 66.33%, while in 2007 it amounted only to 24.64%).

In 2008, the Lithuanian Government approved two important programmes on development of the national economy which were aimed at increasing competitiveness, knowledge production and innovation: the renewed National Lisbon Strategy Implementation Programme for 2008-2010 and the new Programme of the Government of the Republic of Lithuania. Ongoing reform of the research and higher education (HE) system alongside these two new programmes (which are supported by the EU Structural Funds (SF)) will make vital contributions to basic improvements in the national system of HE, research and innovation.

The national target of 1% of GDP for R&D investment coming from the business sector looks as if it will be difficult to achieve. The main barriers for private R&D

¹ If not indicated otherwise, all quantitative indicators are based on Eurostat data.

investments are the low knowledge absorption capacity of industry, low motivation and lack of incentives for private business R&D investments.

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
Lack of capacity for strategic governance of the research system	New policy instruments like foresight, improvement of strategic planning, introduction of monitoring and evaluation activities are to be included in the new strategic programmes for research. Learning from the best practices of research policies in other EU countries can lead to essential improvements of the strategic governance of R&D policy in Lithuania There is a risk that outputs of the above mentioned programmes will not be applied in policy formulation and implementation.
Lack of strategic vision of research and innovation system	There is a risk that the new programmes and measures aimed at the reorganisation and improvement of the competitiveness of R&D system may not be fully implemented due to lack of a clear vision of the research system. Most of the measures in the national policy mix are of a very general nature. The new programme for reform of research and HE opens up new possibilities to reach a consensus on the future of research system in Lithuania.
Broadly scattered priorities	There is a big risk that broadly scattered R&D programmes will not be financed in the next couple of years as no precise plans for targeted investments are foreseen in the policy mix. Implementation of the national research programmes and changes in the governance of the research system should foster better orientation towards national and international knowledge demand.
Low administrative capacity	Successful implementation of the new government programme will lead to improvement of the administrative capacity of the R&D system. Strong administrative capacities are essential for successful implementation of reforms. Bureaucratic burden, related to the implementation of the reform programmes, has to be diminished. On the other hand, SF provide possibilities to improve administrative capacities of R&D administration system.
Weak horizontal and vertical policy coordination	The new government initiatives aimed at reforming R&D and HE system, as well as the current structure of the ministries provide opportunities for better policy coordination. There is a risk that reforms will be suspended due to unstable position of the new government, deepening economic decline or resistance of the system to changes.
Low knowledge absorbing capacity of industry	Successful implementation of the reform and the SF programmes will lead to essential improvement of knowledge absorbing capacity of Lithuanian industry. The existent innovation support system has to be largely improved to create better links, technology transfer, IPR and commercialisation schemes.
Low attraction of foreign high-tech companies and R&D investments	Measures aimed at creation of favourable conditions for attracting foreign high-tech companies and foreign direct investments have to be improved. If the reform of the research system fails, new measures of encouraging foreign investment will fail.
Low motivation and lack of incentives for private business R&D investments	New tax incentives make provisions that businesses can deduct expenses on R&D from taxable income, and innovation supporting measures (like national support for patenting) are aimed at increasing private R&D investments.

The implementation of the National Lisbon Strategy and measures of the new government programme on R&D could lead to sustainable progress in R&D investment. However, delays in the implementation of the programmes and the general economic situation during the world recession could lead to failure to achieve the targets set for 2010. The main risk is that R&D governing and administrative bodies do not have the capacity to coordinate such radical reforms and new ambitious research programmes. Therefore facing the challenge of monitoring and performance assessment of the new measures became a priority.

Major changes in the national policy on research and HE, implementation of the National Lisbon Strategy Implementation Programme for 2008-2010 and the possibilities provided by the EU SF represent a unique opportunity to reform the research system in Lithuania. This would encourage integration in the ERA and contribute to increasing the competitiveness of the Lithuanian economy. The current reforms in Lithuania are aimed at improving the quality of national research, the modernisation of research infrastructure, the creation of a dynamic environment that attracts talented people to research and the improvement of public- private partnerships. R&D is seen as a key driver of the development of the national economy. Nonetheless, some barriers to the successful implementation of the reforms exist. Lithuanian research capacities are too limited and fragmented to be able to achieve excellence in the broad national research priorities that have been set. As major reforms are foreseen and the research funding outlook is not currently very easy to foresee, more efforts must be made to monitor the implementation of all the new measures and maintain the growth of investment in the R&D system. Strong political determination to implement the reform will be the key to catalysing the improvements in the research system.

The new law for Research and Studies stresses the importance of integration into the ERA. The SF programmes will help to implement the reform; the key objectives of the SF action programmes for research are related to the implementation of key ERA initiatives, including strengthening of research career opportunities, modernizing and opening access to research infrastructures and strengthening international cooperation. However, the question of internationalisation in the development and implementation of the research reform needs to be stressed even more to overcome current weaknesses. More attention also has to be paid to the management of IPR in knowledge transfer activities and to the introduction of joint programming.

	Short assessment of its importance in the ERA policy mix	Key characteristics of policies
Labour market for researchers	<ul style="list-style-type: none"> Improvement of researchers' career prospects and control of 'brain drain' process are seen as one of the key objectives of the national research policy. 	<ul style="list-style-type: none"> International mobility of researchers is encouraged via variety of mobility grants, including reintegration of Lithuanian researchers working abroad. Programme for increase of researchers' salaries is approved.
Governance of research infrastructures	<ul style="list-style-type: none"> Process of changing governance of research institutions in progress. More efforts have to be put on encouraging the development of networking activities and access to international state-of-the-art research infrastructures. 	<ul style="list-style-type: none"> Major projects for modernisation of the research infrastructure and development of open access facilities are planned. Reform of research and HE is aimed at reorganisation of governance and the network of research institutions and universities.
Autonomy of research institutions	<ul style="list-style-type: none"> Lack of autonomy of research institutions is seen as major challenge in the reform of research and HE. Strategic governance of R&D system has to be improved by establishing a clear role of the state in the governance of research institutions. 	<ul style="list-style-type: none"> Ongoing reform of strategic governance and planning. New regulations, related to greater autonomy of universities, election of university boards, legal status of universities are foreseen in the new project of the law on research and HE.
Opening up of national research programmes	<ul style="list-style-type: none"> Opening up of national research programmes for international participants still remains a challenge. 	<ul style="list-style-type: none"> Introduction of national research programmes is approved in line with national and international research priorities.

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1 Introduction

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are thus at the heart of the Lisbon Strategy. This is reflected in guideline No. 7 of the Integrated Guidelines for Growth and Jobs.² This advocates increasing and improving investment in research and development (R&D), with a particular focus on the private sector. For the period 2008 to 2010, this focus is confirmed as main policy challenge and the need for more rapid progress towards establishing the European Research Area, including meeting the collective EU target of raising research investment to 3% of GDP, is emphasised.

A central task of ERAWATCH is the production of analytical country reports to support the mutual learning process and the monitoring of Member States' efforts in the context of the Lisbon Strategy and the ambition to develop the ERA. The first series of these reports was produced in 2008 and focused on characterising and assessing the performance of national research systems and related policies in a comparable manner. In order to do so, the system analysis focused on key processes relevant for system performance. Four policy-relevant domains of the research system have been distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. The analysis within each domain has been guided by a set of generic "challenges", common to all research systems, which reflect possible bottlenecks, system failures and market failures which a research system has to cope with. The analysis of the ERA dimension still remained exploratory.

The country reports 2009 are build and extend on this analysis by focusing on policy mixes. Research policies can be a lever for economic growth, if they are tailored to the needs of a knowledge-based economy that suit to the country and are appropriately co-ordinated with other knowledge triangle policies. The policy focus is threefold:

- An updated analysis and assessment of recent research policies
- An analysis and assessment of the evolution of national policy mixes, which is aimed at meeting the Lisbon R&D investment goals. Particular attention is paid to policies that foster private R&D and addressing its barriers.
- An analysis and assessment of the contribution of national policies to the realisation of the ERA. Beyond contributing to national policy goals, which remains an important policy context, ERA-related policies can contribute to a better European level performance by fostering, in various ways, efficient resource allocation in Europe.

² COM(2007) 803 final, "INTEGRATED GUIDELINES FOR GROWTH AND JOBS (2008-2010)", http://ec.europa.eu/growthandjobs/pdf/european-dimension-200712-annual-progress-report/200712-annual-report-integrated-guidelines_en.pdf

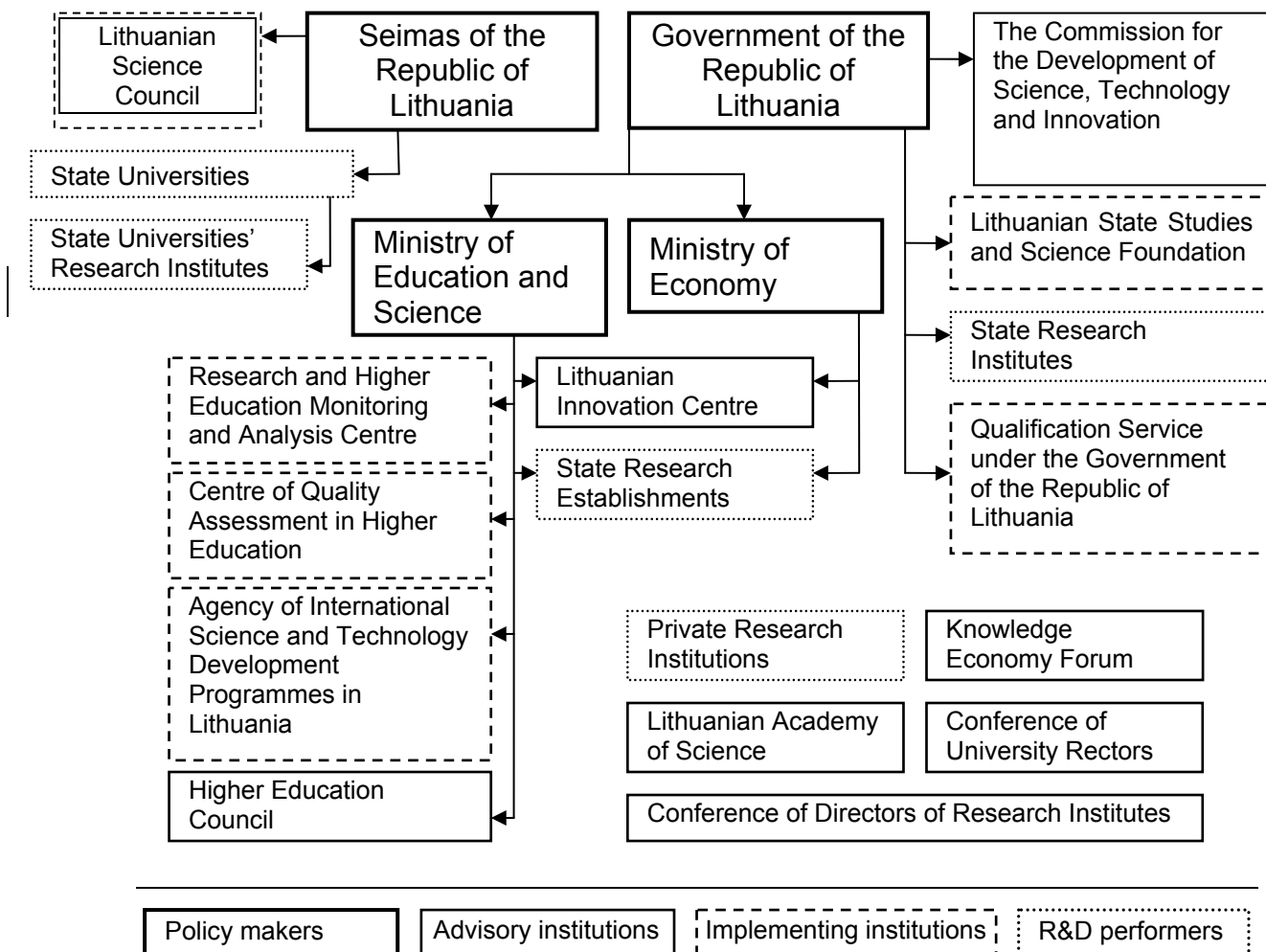
2 Characteristics of the national research system and assessment of recent policy changes

2.1. Structure of the national research system and its governance

Lithuania with about 3.4 million inhabitants is one of the smallest EU member states. Lithuania is a single-region country. Although during recent years the scale of expenditure on R&D in Lithuania has increased from 0.75% of the GDP (in 2005) up to 0.82% (in 2007) it remains very low compared to the EU average which is 1.83% (in 2007). Business expenditures on R&D as a percentage of GDP are also lagging behind the EU average. BERD in Lithuania amounted to 0.23% of GDP in 2007 while for the same year the EU aggregate was 1.17% of GDP.

Main actors and institutions in research governance

Figure 1: Overview of the governance structure of the Lithuanian research system



Source: compiled by authors of the report

Research policy is set by the Lithuanian Seimas (Parliament). The high-level coordination body is the Science, Technology, and Innovation Commission reporting to the Government. The Commission participates in the development of national

policy for R&D, technology and innovation, comprises ministers and other government officers, representatives from the research sector, HE and business communities and is chaired by the Prime Minister.

The main responsibility for implementation of HE and R&D and innovation policies is in the hands of two ministries: the Ministry of Education and Science and the Ministry of Economy (see the Figure 1). The Ministry of Education and Science is responsible for encouraging excellence in public research. The Ministry of Economy promotes development of R&D in the business sector.

A number of institutions perform a range of different functions related to the implementation of research policy: the Lithuanian Science Council, the Research and Higher Education Monitoring and Analysis Centre, the Lithuanian Science and Studies Foundation, the Agency for International Science and Technology Development Programmes, the Lithuanian Centre for Quality Assessment in Higher Education and the Qualification Service under the Government of the Republic of Lithuania.

The Lithuanian Science Council serves as a scientific adviser to the Seimas and the Government. The Council makes proposals for the implementation of R&D and HE policies, evaluates research activities and their effectiveness and compatibility with the state needs and administers and provides support for research activities. It is composed of the Board of the Council and two committees: the Committee of Humanities and Social Sciences and the Committee for Natural and Technical Sciences. The members of committees are recognised scientists. Candidate members for these committees are proposed by the Government and approved by the Seimas. In 2007, the Science Council was delegated the responsibility to administer competitive funding schemes for research.

The Research and Higher Education Monitoring and Analysis Centre is an analytical and advisory body. The Centre draws up recommendations on the development of the national research and HE system, organises research and HE monitoring, analyses the state of the Lithuanian research and HE system, as well as participating in the development and implementation of research and higher education policy.

The Lithuanian State Science and Studies Foundation is responsible for the development of a competitive R&D system as well as for the administration of targeted R&D programmes which are run in national priority fields.

The Agency for International Science and Technology Development Programmes is responsible for the administration and coordination of EU Framework Programmes, EUREKA, COST, BONUS, EUROSTARS as well as other programmes and activities related to international cooperation in R&D. In 2007, the Agency was assigned the coordination of the implementation of National Integrated Programmes financed by the SF.

The Centre for Quality Assessment in Higher Education evaluates new programmes of study, assesses their quality with a view of accreditation, carries out institutional assessment of HE establishments and research institutes and assesses efficiency, viability and relevance of R&D.

Other bodies with policy advisory functions are the Lithuanian Academy of Science, the Lithuanian University Rectors' Conference, the Lithuanian Research Institute Directors' Conference, the Lithuanian Higher Education Council, the Knowledge Economy Forum and the Lithuanian Innovation Centre.

As set out in the Programme of the Government, adopted by the Lithuanian Seimas on 9 December 2008 (Seimas of the Republic of Lithuania, 2008), the institutional reform of R&D and higher education governance system is aimed at improving strategy and governance, policy coordination and communication. The Government has also pledged to establish a permanent institution – namely, the Research, Technology and Innovation Agency to take the reform programme forward.

The draft Law on Research and Higher Education is under consideration at the Seimas. The draft law provides for changes in governance, financing and quality assurance mechanisms, creation of new mechanisms for competitive research funding and the strengthening of cooperation between academia and business.

Main research performer groups

There are five major groups of R&D performers in Lithuania: state research institutes (17), state universities (15), state university institutes (18), state research establishments under the ministries (8)³ and private research institutions.

The research activities within private research institutions are at an early stage of development as private research institutions started their activities just a few years ago.

The support for the public research system is dominated by state budget allocations. The composition of GERD according to the source of funds (2007) is as follows: government sector – 47.9%, higher education sector - 7.5%; business enterprises - 24.5%, non-profit sector 0.5% and foreign sources 19.6%.

2.2 Summary of strengths and weaknesses of the research system

The R&D sector in Lithuania consists mostly of public research institutions plus the R&D undertaken by the private sector. Public R&D expenditures dominate the total R&D expenditures. A large influx of funds for R&D and innovation has come through the EU Structural Funds for 2007-2013. The main barrier for the modernisation of the R&D system is the small size of the country and limited number of the high-tech enterprises. This creates a demand constraint for the output of R&D. The interaction between companies, research institutions and universities is small scale and infrequent.

The main strengths, concerning resource mobilisation are the slow but sustainable increase of public R&D funding (mainly coming from the EU SF), high youth enrolment in tertiary education, a relatively high share of S&T graduates as well as quite a high number of researchers. Nonetheless, problems in the strategic governance of the research and higher education system lead to poor quality and performance, ‘brain drain’, limited research career opportunities which, weaken the chances of the Lithuanian research and HE system attracting and retaining either young PhDs or experienced academic staff.

The process of integration into the ERA is very gradually helping to increase public funding for R&D, is encouraging the improvement of public research infrastructures and strengthening human resources all of which should result in raising the competitiveness of the research system. However, the current level of funding is

³ Source: Institute of Mathematics and Informatics, <http://www.mokslas.mii.lt/mokslas/>

inadequate for increasing the competitiveness of the system significantly and makes it impossible to increase the quality and scope of research. Not only is there a shortage of funds, but the scarce resources are not allocated efficiently. The largest proportion of funding is allocated directly to public research organisations. The existing allocation system is not based on evaluation of effectiveness and efficiency and does not create incentives for efficient and effective use of existing resources. The level of funding for priority research areas allocated on a competitive basis is very low in comparison to total research funding. Therefore, the state has very limited capacities to ensure implementation of strategic objectives and facilitate efficient use of resources.

The business sector is hardly visible in the Lithuanian research landscape. There is poor coordination between R&D and innovation policies, the private sector expresses its research demands badly and so has low levels of impact on research planning in the public sector, the level of private sector investments in R&D is very low which in turn limits further the applicability of research results to industry. There is also a lack of efficient mechanisms to enable the participation of the private sector in the national R&D system. This causes problems in creating sustainable public/private partnerships involving investments over the longer term in strategic projects aimed at raising competitiveness of the national research system. As a result, Lithuania's main challenge is to start thinking strategically about how to reform the fragmented public R&D infrastructure, look closely whether or not to maintain such a large network of universities and public research institutes, and also how to focus the limited business R&D resources more effectively.

The articulation of research demand could be considered to be the weakest link in the chain of the Lithuanian research system. Although national priority setting processes continue on a regular basis and national research priorities have been adopted from the priorities of the FP, national public funding for research and HE is not well linked to these priorities. As a result, the strategic vision for the research system is poorly formulated. Each financial instrument for research supports a particular research area and almost all fields of research, become priority areas. This results in the fragmentation of the limited research resources and in a poorly performing research system. The existing evaluation methodology of public R&D is based on scientific excellence and ignores the demand side of the R&D equation. As the local market for innovative products is limited, private sector demand for R&D is poorly expressed and not sophisticated.

Participation in international research programmes (FPs, EUREKA, COST) contributes to raising competitiveness of the Lithuanian research system. Nonetheless, more effort should be put into encouraging higher levels of participation and project leadership in the international programmes. Many Lithuanian researchers are going to draft proposals for the national research programmes funded by SF and this might decrease their participation in international projects, because the competition at the national level is less intense than for international projects.

Turning to knowledge production the first thing we notice is that the volume of scientific production at the international level are still small. The number of publications has been constantly growing, however the citation index is still very low. The existing knowledge production schemes in the public sector are poorly oriented to knowledge transfer or commercialisation and exploitation of research results and the intellectual property indicators reflect this. There is a need to strengthen the framework for the commercialisation of research by clearing up legal issues related

to establishment of university spin-off companies and the management of IPR within public research institutions.

Though Lithuania is one of the leading EU countries in enrolment in tertiary education, young people are not so eager to choose research careers. The number of doctoral students in Lithuania in proportion to the total number of graduates is one of the lowest in EU. An even smaller percentage of doctoral graduates, who are the key to inter-sectoral knowledge transfer, make their research careers in business. The existing initiatives aimed at strengthening business and university cooperation are not very efficient because business doesn't see any clear benefit in participating. The network structures of business and R&D partnership support are not very efficient in strengthening knowledge circulation. This is partly determined by low capacity for knowledge absorption in business, poor orientation of public research towards business needs and inefficient IPR initiatives. As there is a lack of incentives to attract foreign direct investment in technology development, lack of experience and low levels of motivation for participation in international research programmes, the country does not profit from the international knowledge base as much as it potentially could.

Table 1: Summary assessment of strengths and weaknesses of the national research system

Domain	Challenge	Assessment of strengths and weaknesses
Resource mobilisation	Justifying resource provision for research activities	EU SF makes it possible to increase public R&D funding significantly, but business investment in R&D is very limited.
	Securing long term investment in research	National budget is the most important source for securing long term investment in R&D system; there are no clear research priorities, low proportion of competitive funding for research.
	Dealing with barriers in private R&D investment	Schemes to support business R&D are established; business participation in R&D system is still very low.
	Providing qualified human resource	Poor relations between participants of the innovation system and the education system lead to poor quality training of researchers. Systems for training specialists at universities and other HE institutions are too slow to adapt to changing labour market requirements.
Knowledge demand	Identifying the drivers of knowledge demand	National priorities fully aligned with FP6 and FP7 priorities, but weakly linked to funding and business demands; hence, the priorities are more symbolic and do not have an actual impact on concentrating public resources.
	Co-ordinating and channelling knowledge demands	Business rarely uses the results of work of Lithuanian researchers as directions of research priorities are not well related to business needs; new measures are foreseen to more precisely address business R&D demand.
	Monitoring of demand fulfilment	Lack of evaluation at the priority setting and programme implementation level limit policy impact.
Knowledge production	Ensuring quality and excellence of knowledge production	Knowledge production and quality assessment are concentrated in the public sector; there is no mechanism for performance-based management; inefficient IPR initiatives.
	Ensuring exploitability of knowledge	There is a low level of knowledge exploitation for national competitiveness caused by the Lithuanian industrial profile and weak links between business and R&D sectors.

Domain	Challenge	Assessment of strengths and weaknesses
Knowledge circulation	Facilitating circulation between university, PRO, and business sectors	Businesses express willingness to cooperation in innovation projects, however, there are inefficient knowledge transfer structures between R&D and the business sector.
	Profiting from international knowledge	Mechanisms are established to support participation in international R&D activities. However, participation rates are still restricted by limited research and administrative capacities and the lack of experience.
	Enhancing absorptive capacity of knowledge users	High percentage of S&T graduates has continued upward trend, but still low absorptive capacity in the business sector. Incentives for mobility in S&T are planned.

2.3 Analysis of recent policy changes since 2008

The contribution of research and research policies to the Lisbon goals (as well as to other societal objectives) goes beyond the fostering of R&D investment. It is therefore important to analyse how other remaining shortcomings or weaknesses in the research system are being addressed by the policy mix. The focus of this section is the analysis of main recent policy changes which may have a relevant impact on the four policy-related domains.

2.3.1 Resource mobilisation

Mobilisation of R&D resources is one of the key challenges identified in the new government programme for the reform of the research and HE system.

The National Lisbon Strategy Implementation Programme (2008-2010) sets the target of 2.0% of GDP for R&D in 2010 in which both public spending and business spending should reach 1.0% of GDP. The objective is far too ambitious to be achieved. Still, the established targets motivate actors to improve national research policy and the efficiency of funding mechanisms.

While seeking to balance 'block' R&D funding schemes (which dominate currently due to direct budget allocations to the public research institutions), a competitive funding model for R&D was introduced through the national research programmes (approved July 2008) which are administrated by the Lithuanian Science Council. The national research programmes are expected to start in 2009. They stimulate the use of research to address national socio-economic and technological challenges, improve efficiency in the use of public research resources and strengthen national research competitiveness. The National Integrated Framework and National R&D and Business Collaboration Framework programmes will contribute with €677.5m to the development of researcher training, knowledge transfer, improvement of research infrastructure and the strengthening of collaboration between business and research.

New measures to promote business R&D are planned in the Innovations in Business Programme. These measures are designed to increase the share of innovative, high and medium tech businesses in industrial and service sectors. Support will be provided for technology-based firms, spin offs from R&D institutions and industry parks seeking to attract FDI. Amendments to the Law on Corporate Income Tax provide corporate income tax concessions for R&D investments aimed at new technologies creating high added value.

The EU SF provides a great opportunity for improving qualifications of human research resources. The Researchers' career programme (€118m) will support

measures aimed at raising the number and competence level of researchers and doctoral students, increasing their mobility, improving the age balance, promoting S&T among young people and society at large. Also, while striving to improve the sustainability of scientific human resources the government approved a long-term programme (Government of the Republic of Lithuania, 2008a) to raise the salaries of researchers and university teachers. Other recent policy changes reflect progress in preparation for implementation of a whole complex of measures aimed at mobilisation of national research resources. The research and HE reform and the project of a new Law on Research and Studies encourage the improvement of efficiency and quality in the research and HE system.

Table 2: Main policy changes in the resource mobilisation domain

Challenges	Main policy changes
Justifying resource provision for research activities	Recognition of the significance of research; increased share of public funding has been allocated to research.
Securing long-term investment in research	<ul style="list-style-type: none"> • Regulation on National Research Programmes Executed on Competitive Bases approved in July 2008. • National R&D and Business Collaboration Framework Programme approved in March 2008. • Draft of Innovations in Business Programme (2008-2013). • National Integrated Framework Programme approved in September 2008.
Dealing with uncertain returns and other barriers to business R&D investments	<ul style="list-style-type: none"> • Amendments to the Law on Corporate Income Tax promoting private R&D investments (April 2008). • Implementation of new public support schemes for private R&D started.
Providing qualified human resource	<ul style="list-style-type: none"> • Researchers' Career Programme revised in August 2008. • Programme for Increase of Salaries of Scientific and Educational Staff for 2009-2011 approved in May 2008. • Programme for attracting researchers to Lithuania approved in November 2008. • National Studies Programme approved December 2007.

2.3.2 Knowledge demand

The national research priorities cover almost all fields of research. This means that the very limited resources are spread to thinly and not used efficiently. This problem stems from the government not having put in place a clear research strategy with prioritised objectives administered through competitive research programmes.

The process of identifying national challenges to be addressed by research led to the creation of a range of projects (Valleys) aiming at leveraging knowledge demand in five areas covered by National research programmes.

Implementation of all new measures includes monitoring and evaluation procedures. Nonetheless, policy decision making and setting of strategic policy objectives is not always closely linked with results of monitoring, evaluation and analysis. Monitoring and evaluation activities mainly focus on input indicators while impact assessment is still underdeveloped. A monitoring and analysis system for research and HE is also being developed.

Table 3: Main policy changes in the knowledge demand domain

Challenges	Main policy changes
Identification of knowledge demand drivers	<ul style="list-style-type: none"> • Government decision concerning the list of National research programmes approved in October 2008. • Implementation of 'Valley' programmes approved. • Development of Integrated Framework Programmes in priority areas approved in May 2008.
Co-ordination of knowledge demands	Changing governance of the research system and funding mechanism by restructuring the Lithuanian Science Council.
Monitoring of demand fulfilment	<ul style="list-style-type: none"> • System to evaluate research production, research and HE institutions is being reviewed by the Ministry of Education and Science. • Development of research and higher education monitoring and analysis system.

2.3.3 Knowledge production

The quality of the knowledge production system is limited by relatively weak research capacities and the poor infrastructure of the Lithuanian research system. The new planned programmes are aimed at improving national research infrastructure and increasing compatibility of the Lithuanian HE system with international standards and encouraging participation in international mobility and research programmes. In addition two major reforms have been initiated in 2008. On the one hand, the government adopted a resolution on the reorganisation of the network of the public research institutes and university institutes by incorporating some of the institutes into the structures of the universities and by merging some of the others, in an effort to increase critical mass and efficiency of the public research system. On the other hand, reforms initiated in the public research sector and in the HE system aiming at a significant improvement of HE quality, strengthening links between disciplines, research and innovation, as well as improving efficiency of research and HE system governance which should result in an increased ability of the system to meet social, economical and international needs.

The system for quality assessment of knowledge production has been constantly improved by harmonising quality assessment standards with international ones. The Centre of Quality Assessment in Higher Education annually organises evaluation of research production and quality of HE institutions. Only public research institutions are evaluated and results influence allocation of public support to them.

The fact that research results are not taken up by industry is addressed by the General National R&D and Science and Business Partnership Programme that includes measures oriented towards strengthening public/private partnership. A number of measures will foster the development of an innovation-friendly infrastructure and provide services for technology transfer, business and innovation promotion and the development of IPR schemes. In order to facilitate further development of the national HE, research and innovation systems, the Integrated Framework Programme in priority areas addresses both scientific knowledge supply and demand.

Table 4: Main policy changes in the knowledge production domain

Challenges	Main policy changes
Quality and excellence of knowledge production	<ul style="list-style-type: none"> • Consolidation in the public research sectors in an effort to increase efficiency and create critical mass • Development of internationally harmonised methodology for research production quality assessment and the related funding mechanisms, April 2008. • Standards for evaluation of research and HE institutions revised in May 2008. • Research and HE system development programme approved in May 2008. • Programme for stimulation of internationalisation of higher education (2008–2010) approved July 2008. • Procedures for implementation of National research programmes approved in November 2008.
Exploitability of knowledge production	<ul style="list-style-type: none"> • Implementation of General National R&D and Science and Business Partnership Programme. • Development of implementation programmes for Valleys. • Development of Integrated Framework Programmes in priority areas approved in May 2008.

2.3.4 Knowledge circulation

The need to strengthen knowledge dissemination, especially by strengthening links between HE, the labour market and research and innovation institutions is stressed in the programme of the newly elected government as well as in the projects for the reform of the research and HE system. SF funding will be directed to promote researcher mobility and career prospects, activities of scientific institutions in commercialisation of research results, development of an innovation-friendly infrastructure and provision of services of technology transfer to businesses.

Implementation of new measures under the General National R&D and Science and Business Partnership Programme related to the development of innovative clusters, supporting activities of technology parks, technology platforms, technological business incubators, and intermediary institutions started in 2008.

Together with the efforts to improve circulation of knowledge within the national research system, efforts are made to increase access of researchers in international research networks. For this purpose schemes for supporting the development of project proposals for the FP7 and for co-financing the participation in such projects of public and private research institutions have been approved.

Table 5: Main policy changes in the knowledge circulation domain

Challenges	Main policy changes
Knowledge circulation among university, PRO, and business sectors	<ul style="list-style-type: none"> • Implementation programmes of Integrated Science, Study, and Business Centres (Valleys) approved. • Development of integrated framework programmes in priority areas approved in May 2008. • Development of knowledge transfer infrastructures (“Inogeb LT 1-2”). • Development of innovative clusters (“Inocluster(+) LT”).

Challenges	Main policy changes
International knowledge access	<ul style="list-style-type: none"> • Support schemes for Lithuanian public and private research institutions participating in EU research programmes for project proposal development and co-financing for project implementation approved. • Support to the internationalisation of business and science partnership platforms (technology parks, “Inogeb LT 2”). • Development of open access research communication and information centre approved in September 2008.
Absorptive capacity	<ul style="list-style-type: none"> • Researchers’ Career Programme revised in 2008. • Implementation of General National R&D and Science and Business Partnership Programme.

So, in conclusion, it is fair to say that many important new steps have been taken to design and approve new measures aimed at strengthening knowledge circulation between academia and business and encouraging Lithuanian integration in the ERA.

2.4 Policy opportunities and risks related to knowledge demand and knowledge production: an assessment

Reforms in the R&D and innovation systems in Lithuania are implemented by reorganisation of the network of the public research institutes. The implementation of the ‘Valley’ programmes is expected to help to concentrate physical and human resources in the research system, to strengthen science-industry interactions and restructure public research institutions in specific research areas. Increases in salaries of scientific and university staff is aimed to increase the attractiveness of a research career. New measures to improve conditions for research and innovation activities in Lithuanian business are being implemented. These new actions are expected to strengthen the infrastructure, human resources and competitiveness of the Lithuanian research system by combining resources from national and European funds.

Major risks that might prevent the successful implementation of the new reforms and measures are related to the current global economic recession as well as to political will and the capacity of the Lithuanian research and HE governance system to meet the public finance targets set out in the governmental anti-crisis programme. The lack of strategic vision for the research and HE system may impede the sustainable implementation of complex measures that are designed for the development of a well balanced and competitive research system. Better coordination between the measures aimed at strengthening research and innovation infrastructure, helping to maintain and improve the human resources and the absorptive capacity of the research and innovation actors is a priority. It is especially important to accelerate the implementation of measures that are to be supported by the EU SF and to start implementation of the complex of operational programmes aimed at strengthening productivity growth by improving skills and raising innovation performance as well as by attracting foreign direct investment. Furthermore, greater efforts should be made to simplify legislation, to reduce administrative burden in implementing change, to strengthen monitoring activities and to improve the quality of impact assessments. Implementation of the reforms and the new measures need to be closely monitored. In the globalising economy, development of research and innovation systems in Lithuania as well as its economic competitiveness can only be ensured by

strengthening international cooperation in the field of research and successful integration in the ERA.

Table 6: Summary of main policy related opportunities and risks

Domain	Main policy opportunities	Main policy-related risks
Resource mobilisation	<ul style="list-style-type: none"> • Restructured R&D system, improved public research and innovation infrastructure. • Reformed HE system, new measures to concentrate on human resources and attractive research career possibilities. • Established business R&D infrastructures and strengthened business R&D investment. • Competitive R&D sector for national development and scientific excellence. 	<ul style="list-style-type: none"> • Slow implementation of the national reforms and the research programmes, put at risk the attainment of the objectives to increase investments in R&D. • The efforts for improving research carriers would not be sufficient for preventing 'brain drain' of highly skilled labour. • Poor coordination of modernisation of research infrastructure and human potential development programmes.
Knowledge demand	<ul style="list-style-type: none"> • Concentration on national research priorities to meet national socio-economic and technological challenges. • More competitive research system with orientation towards fulfilment of international knowledge demand as a result of reform of research and higher education system. • Reformed research system has more potential to address business needs, thus facilitating the growth of R&D demand in the private sector. 	<ul style="list-style-type: none"> • Lack of clear strategic vision and clear research priorities of research system undermine the efforts for creating critical mass in selected research areas. • Poor coordination of HE, research and innovation policies and governance mechanisms. • Pending implementation of new measures planned under support of EU SF.
Knowledge production	<ul style="list-style-type: none"> • Development of measures aimed at strengthening the quality of research and HE system. • Development of knowledge exploitation mechanisms through implementation of integrated research, higher education and business centres. 	<ul style="list-style-type: none"> • Remaining legislative barriers and insufficient concentration of policies could reduce attractiveness of R&D sector for FDI. • Lack of critical mass and research specialisation to achieve research excellence in industry related.
Knowledge circulation	<ul style="list-style-type: none"> • Strengthening of technology transfer and innovation support structures linking the business and R&D sectors. • Better coordination of national and ERA policies, measures to encourage participation in international research programmes. 	<ul style="list-style-type: none"> • Low research absorptive capacity of business sector is not properly addressed. • Growth of research intensive sectors in business remains too slow. • Lack of propensity to internationalisation of majority of SMEs. • Separation between research policy design and policy implementation at the governance level.

3 National policy mixes towards R&D investment goals

The aim of this chapter is to deepen the analysis of national policy mixes with a focus on public and in particular **private R&D investment**. The Lisbon strategy emphasises an EU overall **resource mobilisation objective** for 2010 of 3% of GDP of which two thirds should come from private investment. R&D investment is seen as important yardstick for the capacity of economy to turn the results of science and research into the commercially viable production of goods and services, and hence knowledge into growth. Corresponding investment policies are mainly pursued at national level and determined with a national focus.

The chapter is structured around five questions:

1. What are the specific barriers in the country that prevent reaching the Lisbon goal? What barriers do exist in the country to prevent reaching the specific targets, particularly related to the private sector R&D investments?
2. Given the above, what are the policy objectives and goals of the government that aim to tackle these barriers?
3. What Policy Mix routes are chosen to address the barriers and which specific instruments and programmes are in operation to implement these policies?
4. What have been the achievements in reaching the above mentioned R&D investment objectives and goals?
5. What are the reasons for not reaching the objectives, adaptation of the goals?

The chapter aims to capture the main dimensions of the national policies with an emphasis on private R&D investment. The chosen perspective for looking at investments in R&D is the concept of Policy Mixes. The analysis and assessment follows a stepwise approach following the five questions mentioned above.

3.1 Barriers in the research system for the achievement of R&D investment objectives

The main barriers of the research system could be summarised as follows:

Lack of capacity for strategic governance of the research system

The research system in Lithuania is not governed effectively or strategically. The cycle of research policy development and implementation is not well balanced i.e. most efforts are put into developing and implementing the policy measures and less attention is paid to the development of clear objectives or evaluation and monitoring of the system performance against these objectives.

Lack of strategic vision for research and innovation system

A strategic long term vision and a set of broadly agreed objectives appropriate to the specific profile of the country in terms of research and innovation are missing. There is an imbalance in the conceptual development and programme design in favour of the 'research-push' innovation model. The HE system is also criticised for poor quality and being poorly linked to the needs of the labour market.

Broadly scattered priorities

The national research priorities in Lithuania have mainly been set according to the priorities of the EU Framework programme. National R&D priorities are scattered across different strategic documents and programmes without effective coordination. New attempts to design more context-sensitive models of priority setting, such as national integrated programmes, have been made. Lithuania suffers from a lack of resources which will prevent it from focusing on many fields, at least in the near future. More targeted priorities would allow Lithuania to develop niches, implement skills and technologies and define its strengths.

Low administrative capacity

Although there is no formal gap between policy objectives and instruments, no sufficient governance capacity has been devoted for the efficient implementation of the reforms which have been planned. The innovation policy, having been basically imported from various European national models to Lithuania, may turn out to be inefficient. Implementation of policy, while creating new innovation centres, innovation agencies, technology parks, innovative business incubators, national technology platforms, innovative clusters, and science-business valleys from the very beginning lacked effective coordination. The highest level question is whether the government in a broad sense will be able to carry out its policies in this field. Most of R&D and innovation oriented SF programmes (2007-2013) are still pending. Furthermore, it appears that the capacity of ministries and agencies is too limited for the challenges of the R&D system. There is too much of a rush in planning to spend the amount of money available and the not enough work being done to underpin the weakness in administrative capacities.

Weak horizontal and vertical policy coordination

Better levels of horizontal and vertical policy coordination are needed to ensure the efficiency and effectiveness of the reform. The horizontal coordination of policy, especially between the Ministry of Education and Science, the Ministry of Economy and the Ministry of Finance has to be improved. The challenges ahead, new structural programmes, more “top-down” funding, new regulation across the whole innovation system necessitate high-level coordination in order to avoid inefficient use of the EU SF and to achieve the desirable coherent strategic changes in the system.

Low knowledge absorbing capacity and research activity in industry

Human resources for R&D in business are limited and fragmented and only a small number of doctorates are employed in the business sector. Low absorptive capacity is reflected in the low engagement of the business sector in research. As described in the draft Programme for Innovations in Business for 2009-2013, the R&D and innovation capacity of Lithuanian industry is low and the number of researchers employed in the business sector is lagging behind the EU average. The country has a profile of low-tech industry that engages in incremental innovation. The number of innovative enterprises has remained low (18.4% of total companies), however their turnover makes up 52.3% of total turnover of Lithuanian enterprises. This could be strength for the economy if the overall innovation capabilities across all sectors are further mobilised and accompanied by a growing high-tech sector. The share of innovative companies in the low-tech sector is considerable and suggests these sectors might be good places to encourage innovation and profitable new growth in

the future bearing in mind innovation is not by definition restricted to high-tech sectors.

Low attraction of foreign high-tech companies and R&D investments

Lithuania is lagging behind the EU countries in attracting FDI, especially in terms of R&D. It is striking that the specific advantage of the country, low labour unit costs in combination with a high tertiary enrolment and high number of graduates, does not attract more research activities from abroad. The Lithuanian public science base seems attractive to foreign companies, but doesn't actually attract industrial R&D capacities to the country. National research and innovation policy measures, as well as financial instruments including EU SF support are mainly aimed at local exploitation of locally generated knowledge. Only international research programmes such as the EC's FP are stimulating the internationalisation of the R&D system.

Low motivation and lack of incentives for private business R&D investments

Lithuanian enterprises have invested little in innovative activities due to the lack of mechanisms for compensation for the risks of innovating, low quality of measures to support innovation and insufficient Government attention to intellectual property management and protection and knowledge transfer activities. The whole system of the public procurement in research and innovation sector has to be rationalised.

3.2. Policy objectives addressing R&D investment and barriers

The government sets the target of 2.0% of GDP for R&D in 2010 in which both public spending and business spending should reach 1.0% of GDP. The achievement of this ambitious target for Lithuania depends on identifying and overcoming the barriers to the attainment of R&D investment objectives.

The main objective for research policy on that direction is to improve competitiveness of the national research system. Policy goals and measures, as set out in the National Lisbon Strategy Implementation Programme, formally cover most of the barriers listed in section 3.1. Table 7 shows that special attention is paid to improve strategic governance and attracting foreign and domestic private business investments in R&D. In addition emphasis is given on strengthening public private collaboration, development of innovation culture, improvement of researchers' qualifications and modernising public R&D infrastructure.

Table 7: Correspondence of policy goals of the National Lisbon Strategy Implementation Programme and the new Lithuanian Government Programme to the barriers in raising R&D investments

Barrier	NRP(2008-2010) policy objectives	New Government Programme policy objectives
Lack of capacity for strategic governance of the R&D system	To implement monitoring of implementation of the innovation policy	<ul style="list-style-type: none"> • To improve the overall business environment • To develop legal basis for innovation development system
Lack of strategic vision for research and innovation system	To implement monitoring of implementation of the innovation policy	<ul style="list-style-type: none"> • To improve strategic planning and management • To attract investment in the areas with global, long-term growth potential • To define a joint action policy and strategy for science and technology
Broadly scattered		<ul style="list-style-type: none"> • To promote development of the knowledge

Barrier	NRP(2008-2010) policy objectives	New Government Programme policy objectives
priorities		society and knowledge economy clusters <ul style="list-style-type: none"> To support development of advanced technology areas
Low administrative capacity	To implement monitoring of implementation of the innovation policy	<ul style="list-style-type: none"> To start public administration reform, including strategic planning system reform and introduce assessment and evaluation of policies and implementing institutions
Poor horizontal and vertical policy coordination	To create centres promoting business, capable of competing internationally	<ul style="list-style-type: none"> To introduce new legal basis to regulate the innovation development system in Lithuania. To establish a permanent institution that will unite the various current efforts to coordinate research, technologies, and innovations
Low knowledge absorption capacity and research activity in industry	To provide financial support to participants of innovative activities in business	<ul style="list-style-type: none"> To promote development of the knowledge society and knowledge economy clusters To improve the overall business environment, concentrate support from the SF on breakthrough areas
Low attraction of foreign high-tech companies and R&D investments	To promote FDI in high and medium-high technology sectors	<ul style="list-style-type: none"> To promote international production relations on the basis of FDI To support advanced technology areas and high-tech companies To strengthen IPR mechanisms
Low motivation and lack of incentives for private business R&D investments	<ul style="list-style-type: none"> To provide support to public innovation support services To create the voucher scheme for innovative enterprises To provide financial support to protect IPR and patent inventions. 	<ul style="list-style-type: none"> To develop the legal basis to regulate the innovation development system To promote and co-finance investment by Lithuanian companies to R&D and innovations

3.3 Characteristics of the policy mix to foster R&D investment

This section is about the prioritisation and governance of the national policy and instrument mix chosen to foster public and private R&D investment. While policy goals are often stated at a general level, the policy mix lies on how these policy goals are implemented in practice. The question is what tools and instruments have been set up and are in operation to achieve the policy goals? The following sections will each try to tackle a number of these dimensions.

3.3.1 Overall funding mechanisms

It is widely thought that improvement of the efficiency of the research system presupposes priority setting and reorganisation of the R&D funding mechanisms. The design of R&D public funding mechanisms, which is underway, will be influenced by the new model of competitive R&D funding, which was approved in December 2007 (Government of the Republic of Lithuania, 2007a). According to the new model, R&D inputs and outputs will aim at targets strategically defined by the Lithuanian Science Council, which will administer the national research programmes. The main responsibility for funding corporate R&D remains with the Ministry of the Economy.

Presently, R&D activities are funded from the national budget, business and international sources. Institutional funding is allocated according to the Methodology of Demand and Allocation of Budget Assignments Estimation for Science and Higher

Education Institutions. Core government funding covers approximately 94% of funding for the state R&D institutions. The average share of competitive research funding was approximately 6% of the annual government allocations during 2004-2006. According to the Methodology, 30% of the government assignments for research institutions and universities are distributed according to the evaluation of research results over the last 3 years. The remaining 70% is based on the budget allocations for the previous year. In the Methodology it is recommended that at least 30% of institutional governmental funding should be directed towards research needs. Research institutions have a right to reallocate government funding between research and teaching activities according to their own needs.

3.3.2 Policy Mix Routes

The "Policy Mix Project" identified the following six 'routes' to stimulate R&D investment:

1. promoting the establishment of new indigenous R&D performing firms;
2. stimulating greater R&D investment in R&D performing firms;
3. stimulating firms that do not perform R&D yet;
4. attracting R&D-performing firms from abroad;
5. increasing extramural R&D carried out in cooperation with the public sector or other firms;
6. increasing R&D in the public sector.

The routes cover the major ways of increasing public and private R&D expenditures in the country. Each route is associated with a different target group, though in some cases they overlap. The routes are not mutually exclusive as we can see in examples such as competitiveness poles of cluster strategies which aim to act on several routes at a time. Within one 'route', the policy portfolio varies from country to country and region to region depending to policy traditions, specific needs of the system, etc.

A new mix of measures for the development of the R&D system in Lithuania is planned for the new programming period of 2007-2013. The measures, related to the improvement of R&D capacities and development of human resources are grouped into the two large operational programmes – the Operational Programme for Economic Growth for 2007–2013 and the Operational Programme for Human Resources. However, implementation of the new measures is still delayed. The policy mix is grouped into two broad priorities: "Research and development for competitiveness and growth of the economy" and "Increasing business productivity and improving environment for business". The first priority group address the need to increase R&D capabilities in business and public sectors and the second - to establish linking mechanisms between the two lines of work in order to facilitate higher added value innovations in business.

Route 1: Promoting the establishment of new indigenous R&D performing firms

The new measure "Intelektas LT+" will provide support for implementation of R&D projects and the development of research infrastructures (for large R&D projects and developments) in business organisations. Creation of new innovative companies will also be supported. The call for proposals was announced in March 2008.

Route 2: Stimulating greater R&D investment in R&D performing firms

Amendments to the law on corporate income tax were made in March 2008 in order to increase investment in R&D. They provide for tax incentives R&D investments, the possibility to discard fixed assets used in R&D, etc. These incentives should stimulate technology investments and increase the productivity, competitiveness and energy efficiency of enterprises. Direct support to innovation activities in private companies is also available. Support of patenting activities (€57,924 (LTL200,000)), covering 100% of eligible patenting related costs, is available for Lithuanian legal or private entities. In order to reduce risks related to R&D, the new measures are approved to support development of feasibility studies for R&D projects. Competitive funding for R&D projects and development of research infrastructures is also planned. The draft of the programme “Innovations in Business (2009-2013)” was also completed in 2008.

Route 3: Stimulating firms that do not perform R&D yet

There are no specific policies that directly encourage non-R&D performing firms either to perform or to access R&D. Instead, the emphasis is placed on policies attempting to stimulate innovation and technology absorption, with the expectation that companies may ultimately see the benefits of performing/accessing R&D. Direct support for innovation activities in private companies is provided by the Ministry of the Economy. The new draft Programme of Innovations in Business (2009-2013) also contains measures aimed at creating a better environment for R&D activities in business.

Route 4: Attracting R&D-performing firms from abroad

The scheme “Asistentas-3“, supported by the SF, aims at the development of the international profile of Lithuanian producers and the stimulation of FDI to Lithuania via a range of publicity campaigns and targeted projects. The implementation of the measure has not started yet.

Route 5: Increasing extramural R&D carried out in cooperation with the public sector

New measures have been defined with the support of SF, e.g. “IntelektasLT“, which encourages cooperation between business and the public sector aiming at increasing extramural research. Development of Integrated Research, Studies and Business Centres in the long run will foster long-term cooperation between the business and research sectors.

Route 6: Increasing R&D in the public sector

Though the majority of research activities are currently concentrated in the public sector, the reform of research and HE aims at the optimisation and improving the business orientation of the network of research institutions and more efficient allocation of research resources. The research system will be concentrated and reorganised to better meet business needs by the implementation of ‘Valley’ programmes. The National Integrated Framework Programme will support the development of study programmes in the priority research areas to ensure training of skilled professionals for the reformed research system. It also envisages supporting research projects in the competitive research breakthrough areas which have been identified. National research programmes will significantly contribute to the introduction of a greater share of competitive funding for research activities in

Lithuania. Efforts are being made to increase the salaries for researchers through the Programme for Increase of Salaries of Scientific and Educational Institution Staff. The Researchers' Career Programme is a major long term mechanism which uses research mobility grants and other measures to develop a more attractive environment for researchers. The National Studies programme will contribute to significantly improving the quality of the HE system in Lithuania.

Assessment of the importance of policy mix routes and their balance

Not all the routes set out above are equally important in the research policy mix in Lithuania.

The involvement of the R&D sector in innovation policies will be facilitated via the initiatives of the Ministry of Education and Science. The new initiatives to foster university knowledge transfer for industry will be implemented in 2007-2013 alongside the General National Framework Programme (The Ministry of Education and Science, 2008) and the National R&D and Science and Business Partnership Programme (The Ministry of Education and Science, 2008).

A more proactive approach has also been taken regarding business R&D investment. The Investment Promotion Programme for the 2008-2013 seeks to create a favourable environment for investment in high value added sectors. Financial mechanisms promoting new ventures and reducing risks of business innovation-related activities were designed under the Operational Programme for Economic Growth for 2007–2013. The controlling fund will be established in order to provide micro credits to SME's and support new ventures, especially new technology based companies via the provision of venture capital funds. Interest on guaranteed business loans will be partially covered under the same measure as a tool to promote further business investments and development.

In order to strengthen business R&D, and also focus public sector performed R&D, support measures will cover two phases of R&D activities – firstly, feasibility studies on R&D projects with the aim to reduce the risks related to R&D development and, secondly, implementation of R&D projects and the development of research infrastructures. The development of knowledge intensive clusters around the public knowledge poles is planned as a key initiative in order to support innovative companies.

Table 8: Importance of routes in the national policy and recent changes

Route	Short assessment of the importance of the route in the national policy	Main policy changes since 2008
1	Policy measures directed to promoting the establishment of new indigenous R&D performing companies are indirect and do not have strong support in policy mix. Importance – medium.	Additional tax incentives for RTDI expenditures New rules for state support to innovations SF measure „Intelektas LT+“
2	Stimulation of greater R&D investment in R&D performing companies is one of main priorities in policy mix, especially in high-tech priority areas. Importance - high	National Lisbon strategy implementation programme for 2008-2010. Additional tax incentives for R&D expenditures and support of patenting activities introduced. New rules for state support to innovation. SF measures „Ideja LT, Intelektas LT, „Intelektas LT+“. Innovations in Business programme.
3	Policy measures for stimulating companies that do not perform R&D yet are mainly	New rules for state support to innovation. Draft of Innovations in Business

Route	Short assessment of the importance of the route in the national policy	Main policy changes since 2008
	indirect and targeted to innovation- promoting and consulting institutions. Importance – low.	programme.
4	Policy measures for attracting R&D-performing companies from abroad are mainly indirect and targeted to enhance the international image Lithuania and the activities of the agencies involved. Importance – low.	SF measure „Asistentas-3“
5	Policy measures for increasing extramural R&D carried out in cooperation with the public sector have been used for programming period 2002-2006 and are still operational. Importance – medium.	SF measure „IntelektasLT“.
6	Increasing R&D in the public sector is one of most important priorities in the policy mix. Importance- high.	Support schemes to Lithuanian public and private research institutions. Programme on reform of the network of state research institutions. Development of national research programmes and Valleys. Researchers' career, National Studies programme, National Integrated Framework Programme.

3.4 Progress towards national R&D investment targets

The National Lisbon Strategy Implementation programme (2008-2010) sets the target to increase R&D investments up to 2.0% of GDP by 2010 i.e. both public and business spending should reach 1.0% of GDP. However, no upward movement has been observed yet, which suggests that the target is not easy to reach. The planned EU SF investments for RTDI (€1,031 m in the earmarking exercise of the 2007-2013 period) will represent about 0.6% of GDP yearly. The government funding for R&D was 0.39% of GDP in 2007. This suggests that Lithuania could actually reach 1% of GDP for R&D from the public sources.

Lithuanian investments in R&D are growing fast. During the period of 2000-2006 Lithuanian GERD grew by 113% (3rd score in EU after Estonia and Latvia). Annual growth of GERD was 22.1% in 2007 (21.4% in 2006), while growth of GDP was 18.5% (14.9% in 2006). This is influenced by strong support to R&D from EU SF.

40 projects related to business R&D were implemented in 2008. Direct support for business (€14.19m (LTL49m)) was provided following the implementation of the Lithuanian Single Programming Document for 2004–2006. By 31 July 2008, there were 12 projects completed (€3.21m (LTL11.1m)). 6 projects to develop industrial zones (€14.94m (LTL51.6m)) and 7 projects of science and technology parks and technology centres (€11.38m (LTL39.3m)) are in the process of implementation.

A major decision was made to allocate €1031m (LTL3557m) of EU structural support and national funds for the period of 2007–2013 to encourage innovations and development of R&D according to the Economic Growth Actions.

The share of GERD financed by business enterprise as % of total GERD decreased from 26.2% in 2006 to 24.5% in 2007. On the other hand, funds from abroad increased from 14.3% in 2006 to 19.6% in 2007. These figures demonstrate the development of collaboration with foreign investors or partners, as well as the active involvement of Lithuanian researchers in the European R&D programmes.

The GERD financed by the Government is decreasing in comparison to the total GERD (from 62.7% in 2005, to 53.6% in 2006, and to 47.9% in 2007). The GERD financed by the Government increased (from €98.5m (LTL340.1m) in 2005, to €102.12m (LTL352.6m) in 2006, and to €111.33m (LTL384.4m) in 2007). This might be a signal that growing public funding stimulates foreign investment.

Based on the above trends the national target for R&D investments and specially the target for the business sector is not easy to achieve, mostly because of slowly increasing business R&D investments. The measures planned in the National Lisbon Strategy Implementation Programme and the new government programme addressing R&D investment barriers are expected to positively affect R&D investments. However, at the same time, significant delays in starting implementation of SF programmes are causing problems in achieving the targets set.

Table 9: Main barriers to R&D investments and respective policy opportunities and risks

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
Lack of capacity for strategic governance of the research system	New policy instruments like foresight, improvement of strategic planning, introduction of monitoring and evaluation activities are to be included in the new strategic programmes for research. Learning from the best practices of research policies in other EU countries can lead to essential improvements of the strategic governance of R&D policy in Lithuania There is a risk that outputs of the above mentioned programmes will not be applied in policy formulation and implementation.
Lack of strategic vision of research and innovation system	There is a risk that the new programmes and measures aimed at the reorganisation and improvement of the competitiveness of R&D system may not be fully implemented due to lack of a clear vision of the research system. Most of the measures in the national policy mix are of a very general nature. The new programme for reform of research and HE opens up new possibilities to reach a consensus on the future of research system in Lithuania.
Broadly scattered priorities	There is a big risk that broadly scattered R&D programmes will not be financed in the next couple of years as no precise plans for targeted investments are foreseen in the policy mix. Implementation of the national research programmes and changes in the governance of the research system should foster better orientation towards national and international knowledge demand.
Low administrative capacity	Successful implementation of the new government programme will lead to improvement of the administrative capacity of the R&D system. Strong administrative capacities are essential for successful implementation of reforms. Bureaucratic burden, related to the implementation of the reform programmes, has to be diminished. On the other hand, SF provide possibilities to improve administrative capacities of R&D administration system.
Weak horizontal and vertical policy coordination	The new government initiatives aimed at reforming R&D and HE system, as well as the current structure of the ministries provide opportunities for better policy coordination. There is a risk that reforms will be suspended due to unstable position of the new government, deepening economic decline or resistance of the system to changes.
Low knowledge absorbing capacity of industry	Successful implementation of the reform and the SF programmes will lead to essential improvement of knowledge absorbing capacity of Lithuanian industry. The existent innovation support system has

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
	to be largely improved to create better links, technology transfer, IPR and commercialisation schemes.
Low attraction of foreign high-tech companies and R&D investments	Measures aimed at creation of favourable conditions for attracting foreign high-tech companies and foreign direct investments have to be improved. If the reform of the research system fails, new measures of encouraging foreign investment will fail.
Low motivation and lack of incentives for private business R&D investments	New tax incentives make provisions that businesses can deduct expenses on R&D from taxable income, and innovation supporting measures (like national support for patenting) are aimed at increasing private R&D investments.

4 Contributions of national policies to the European Research Area

ERAWATCH country reports 2008 provide a succinct and concise analysis of the ERA dimension in the national R&D system of the country. This chapter further develops this analysis and provides a more thorough discussion of the national contributions to the realisation of the ERA. An important background policy document for the definition of ERA policies is the Green paper on ERA⁴ which comprises six policy dimensions, the so-called six pillars of ERA. Based on the Green Paper and complementing other ongoing studies and activities, this chapter investigates the main national policy activities contributing to the following four dimensions/pillars of ERA:

- Developing a European labour market of researchers facilitating mobility and promoting researcher careers
- Building world-class infrastructures accessible to research teams from across Europe and the world
- Modernising research organisations, in particular universities, with the aim to promote scientific excellence and effective knowledge sharing
- Opening up and co-ordination of national research programmes

In the ERA dimension, the *wider context of internationalisation of R&D policies* is also an issue related to all ERA policy pillars and is normally present in the dynamics of national ERA-relevant policies in many countries.

4.1 Towards a European labour market for researchers

Labour market for researchers faces significant challenges related to both the demand and supply sides.

“Brain drain” and the aging of the academic community are clear indications of the low attractiveness of researcher’s profession and the existing problems at the demand side. One of the key problems of attracting young talented people in the research system as well as foreign researchers is low salary and very limited career

⁴ Commission of the European Communities: Green paper: The European Research Area: New perspectives. Brussels 4.4.2007, COM(2007) 161final
(see http://ec.europa.eu/research/era/pdf/era_gp_final_en.pdf)

opportunities due to the insularity of Lithuanian research institutions. Low demand from the business sector (the number of researchers in business is currently only 0.03% of researchers), poor public research infrastructure and complicated legal procedures all have compounded the situation.

At the supply side the statistics demonstrate that around 17% of the population (503,100) in Lithuania have higher education degree (21% in EU), and this number has been increasing every year since 2002. The annual employment rate is around 50% (534,200), and almost 30% of them have a higher education degree. At the same time 11% (7900) of the unemployed population have higher education.

Though the enrolment in HE in Lithuania is high, the number and growth of doctoral students, especially in the field of S&T, is relatively low. It is especially difficult to attract doctoral students from other countries. Results of a survey carried out by the Department of Statistics in 2007 show that the number of PhD students decreased during the previous two years by 200 in comparison to 2005 (there were 2,338 PhD students in 2007). Following the Operational Law for HE, a young scientist working on achieving a doctoral degree is classified as a student in Lithuania. This status does not provide social security unlike the status of an employee of a research institution. The results of the analyses carried out by the Institute of Social Research in Lithuania concluded that assistance with housing and support for academic research and development of dissertations, sickness social insurance and maternity (paternity) social insurance are all problems faced by PhD students. The scholarship award for PhD students is small and does not cover even basic living expenses. From January 2007 the PhD scholarship is around €347 (LTL1,200) a month. These factors substantially influence the career decisions of young researchers and contribute to the 'brain drain'.

Academics in Lithuania most often are employed on fixed-term contracts for no longer than a 5 year period. They have a right to extended holidays and to sabbatical leave. However, researchers do have the same social guarantees as other employees and academics and researchers receive supplementary public pension. The study made by the Institute of Social Research Lithuanian (2008) concludes that the biggest problems facing those considering a research career are low salary, fixed term contracts and poor support for scientific research.

The level of salaries of researchers is on average 4-5 times lower than in other EU countries. Additionally, many academics have many teaching hours in several institutions and cannot devote enough time to research activities. According to the National Audit Office in Lithuania, the salaries of lectures, assistants and junior researchers are approx. €275-531 per month, i.e. 2-3 times lower than those of public servants.

4.1.1 Policies for opening up the national labour market for researchers

Though the Lithuanian research system faces a problem of long term outward mobility, quite a number (€118m worth) of international mobility grants are planned in the Researchers' Career Programme, oriented at researchers at different stages of their career. Some grant schemes are also planned for inviting visiting researchers to Lithuanian research institutions. Special mobility grants are targeted at Lithuanian researchers working abroad, which are meant to attract them to come back to the country. Also a new national programme for reintegration of Lithuanian researchers working abroad started in 2006. Support is provided for research visits back to Lithuania of up to 6 months. Recently, the Lithuanian Science Council has developed

a proposal for a grant scheme to support short visits, up to 2 months, of foreign researchers to Lithuanian research institutions.

As a small sign of progress toward EU integration, vacant positions for researchers in Lithuania have been announced on the European Researchers' mobility portal since 2007. Universities or public institutes, which have doctoral programmes try to improve them by taking into consideration European developments, by establishing joint doctoral programmes, having doctoral programmes in different foreign languages, enhancing the mobility of doctoral students outwards and, to a lesser extent, inwards. Outward mobility schemes are supported by the Lithuanian State Science and Studies Foundation and the Erasmus exchange program, on the basis on bilateral agreements between Lithuania and other countries and by international foundations. Lithuanian researchers are also active in developing proposals for Marie Curie grants. Nonetheless, due to intense competition, just a few of the proposals succeeded and even fewer researchers came to work in Lithuania.

Collaboration between universities or institutes on a national or an international level is quite strong. All institutions having PhD programmes have extensive networks of partners not only within the country but also abroad. Participation in international research projects, memberships of international associations or networks contribute to the growing internationalisation of R&D and higher education.

4.1.2 Policies enhancing the attractiveness of research careers in Europe

The target set for 2010 in the National Lisbon strategy implementation programme 2008-2010 for the number of researchers is 12,300. In 2007 Lithuania had 13,393 researchers, which indicated that the target was already reached. Still, the Lithuanian research system is facing problems of ageing and 'brain drain'.

Universities and research institutes determine salaries for researchers independently; however, it is the government that decides on the minimum and maximum levels of salaries for different categories of staff. Therefore, universities and research institutes are obliged to consider those guidelines. Universities and research institutes have a right to pay extra remuneration which must not exceed 75% of annual salary.

Though a whole set of new measures to enhance the attractiveness of research careers in Lithuania is planned, implementation of most of the measures has not started yet.

The latest statistics show that there are around 60% men and 40% women employed in research in Lithuania. Among researchers younger than 44 years old there is numerical equality between men and women, however, in the over 45 age group, there is a far higher ratio of men to women. The results of the study developed by the Institute of Social Research in 2008 show that due to insufficient development of science, there is over-representation of the middle aged and older (namely those of 45-65 years) researchers in Lithuania.

Lithuania was one of the first countries in the EU to sign the Charter for Researchers, seeking to encourage gender balance in research; it was approved by the Ministry of Education and science in June 2008. The strategy was developed as a result of EU FP6 project BASNET which analysed gender issues in research and was coordinated by Vilnius University. The final report of the project emphasises that double standards for men and women are still present in scientific institutions in Lithuania,

though women scientists of the older generation point out that the situation in this regard is gradually improving. One clear finding was that women have to achieve more than men in order to be recognised in the scientific community.

Measures related to the implementation of the “Strategy to Ensure the Balance Between Men and Women in Research” provide for the development of a gender monitoring system, a gender in research information portal and qualitative studies of gender issues in research in Lithuania. Implementation of these measures will be supported by SF.

4.2 Governing research infrastructures

We have seen that the public research base is broad-based and fragmented. There are many public research infrastructures (see p. 10), and the private research base is small. Improvement and modernisation of the fragmented and outdated Lithuanian research infrastructure is considered to be one of the key challenges for the reform of the research and higher education system

In 2007, the National Development Institute performed an analytical study, which emphasised the poor situation of the majority of the research infrastructure which was having a negative impact upon the quality of research. The major research institutions were found to be located in leading cities and there were found to be few networks, for example: LABT – network of academic libraries, LITNET – higher education and research computer network, LieDM – network of distance learning. Still, the lack of financial resources and the absence of a long term national research strategy resulted in slow updating of regional innovation strategies. The situation has been improved since 2004 by financial support from SF and successful participation in FP6 infrastructure support projects. A total of more than €58m (LTL200m) was spent to improve research infrastructure. Development of research institutions was declared a priority for investment in a number of strategic research policy documents, like the National State Development Strategy, the Strategy of Economy Development toward 2015, the Long-Term Strategy for R&D, the National Program for Implementation of Lisbon Strategy, etc. During the next seven years the amount of investment in development of regional innovation strategies will amount to approx. €43m (LTL150m).

Today the establishment and operation of 24 national technology platforms has been supported by the government. Significant support of around €1.45m (LTL5m) was also offered for the integration of the Lithuanian technology platforms into the activities of the network of the EU technology platforms 2008.

Development of the Open Access Research Communication and Information Centre, approved in September 2008, will significantly contribute to strengthening the Lithuanian system infrastructure by opening up access to international research databases.

The modernisation of research infrastructure in the private sector and strengthening of innovation infrastructure are planned in of General National R&D and Science and Business Partnership Programme and Innovation in Business Programme.

Growing Lithuanian participation in international research programmes also provides possibilities for strengthening national research infrastructure and for accessing international infrastructure. Lithuania participated in 257 projects in FP5, 279 projects in FP6 and 34 project agreements have already be signed for FP7. Moreover, Lithuania is a full member of the EUREKA and COST programmes, 72 projects have

been launched in EUREKA since 1994, and 151 in COST since 2000. Lithuania is also an active participant in the EUROSTARS and BONUS programmes. Since 2008, the Agency for International Science and Technology Development Programs in Lithuania has been coordinating three transnational R&D programmes: the R&D programme between Lithuania, Latvia and China; the R&D programme “Gilibert” between Lithuania and France; the R&D programme between Lithuania and Ukraine.

Implementation of all new initiatives, supported by the SF, aimed at the improvement of research infrastructure and the reform of research and higher education system provide unique opportunities to modernise the fragmented research system and to increase the efficiency and competitiveness of research. However, more has to be done to accelerate the reform processes and ensure consistency of research infrastructure development with all the ‘soft’ measures.

4.3 Research organisations

After 1990, the transfer from central planning and command-and-control to a ‘steering’ model created a need for different kinds of strategic governance capacities in research and HE. The decision to grant autonomy to Lithuanian research and HE institutions was taken in the 1990s. This was clearly stated in the Law of Higher Education in Lithuania and amended in 2000. The state authority remained effective in the area of the regulation of number of students, accreditation of study programs, and determination of salaries for researchers and teaching staff. Universities have autonomy in all other activities, such as in developing their action plans, research programmes, strategy development, budget planning, student admission, election of rector, senate, choice of candidates for university boards, hiring researchers and other employees, etc. Still, the lack of autonomy in key fields is still an barrier to rapid and flexible decision making. The majority of financial support to public research and HE institutions comes from state budget.

The granting of autonomy to research and HE institutions in practice raised some coordination problems that in practice resulted in diminished ability of the state to steer research and HE sectors and diminished the accountability of research and HE institutions to the state, other stakeholders and society at large. Hence, autonomy is considered as one of the main obstacles to modernising research and HE. So, on the one hand autonomy has brought fragmentation resulting from freedom from reasonable accountability while not allowing the institutions the full benefits of self determination; the division of competencies between the state and institutions is creating an inefficient system.

In 2007, parliamentary political parties signed an agreement on the Basic Principles of Research and Higher Education Reform. Implementation of the National Lisbon Strategy Implementation Programme for 2008-2010, by using the support of SF and the state budget allocations, provides the possibility to reform the research and HE system by improving governance of the system, improving governance of research and HE institutions, developing greater autonomy and improving accountability of universities, changing schemes for financing public research and HE institutions, introducing new schemes for competitive funding for research. Changes of legal status of universities with the aim of giving them more independence making them less dependent on the state budget and other issues which are based on good practice from different European countries plus some recommendations from international experts are also planned in a new Law on Research and HE.

At present the supreme governing body of each university is the Board, which usually has 15 members (5 members are nominated by the University Senate, 5 on agreement between the Rector and the Minister of Science and Education, 5 appointed by the Minister of Science and Education) and is ultimately approved by the Minister of Education and Science. The Board is responsible for ensuring additional support to the University, approving of Rector's annual report and representing public interests. The new Law for Research and HE foresees that Board cannot exceed 9-11 members, half of the members have to be suggested by the university, half by the Minister of Science and Education, and one by agreement between the two parties. The composition of the university Board is approved by the Government of Lithuania. Moreover, a Board might receive more powers, like electing the Rector, decisions concerning the curriculums and setting salaries for university staff. Supporters of the Reform believe that amendments related to the selection of candidates and expansion of functions of the Board would encourage better representation of society's and external stakeholders' interests.

The analysis of annual reports of Lithuanian universities shows that in the majority of universities half of the funding is received from state budget, another half from different sources like grants, support coming from the private sector and participation in international projects.

However, state universities and research institutes are still very much dependent on the state budget allocations. The funding for research activities is received on the basis of the quality and quantity of research results such as publications, patents, international projects, etc. and on the number of staff employed. Participation in international research programmes and other international grants constitute a significant contribution to the budget of the most active and successful research institutions. The competitive funding, introduced by the Law of Higher Education in 1991, still makes up a minor part in the general funding for research. The Lithuanian State Science and Studies Foundation is responsible for coordination of national competitive funding research programmes. Different State Research Programmes have been approved since 1994, however, according to reports of international experts they were based more on the programmes of other EU countries and less on national needs and capacities.

The recent reform and new trends in HE and research governance resulted in a new scheme for competitive research funding. Regulations concerning six National research programmes were approved in 2008. The Lithuanian Science Council was reorganised in 2007 to coordinate and administer the new schemes for competitive funding for research.

4.4 Opening up national research programmes

In 2008 more than €1.74m was allocated for implementation of national research programmes, which are now administered by the Lithuanian Science Council. However, the procedures and rules for applications and requirements for applicants have not been approved yet.

Opening up national research programmes still remains a future challenge for Lithuania. As the concept of national research programmes is still very new and the regulations on the implementation of the programmes are still being developed, it is difficult to assess the possibilities for opening them up internationally. As most of the programmes are in internationally important research areas, it might be expected that

some international cooperation in the implementation of national research programmes could occur.

The only experience so far from opening up research programmes comes from the participation in four ERA-NET projects. Joint programming is also quite new for Lithuania participating in only 3 bilateral programmes and one project of article 169.

4.5 National ERA-related policies – a summary

ERA integration is significantly influencing the current reforms of the research and higher education system in Lithuania. The aims of the reform of the system and new measures planned in the National Lisbon Strategy Implementation Programme for 2008-2010 are in line with the six axes identified in the ERA Green paper.

The greatest emphasis in the ongoing reform is put on reorganisation of the governance and the fragmented network of Lithuanian research and HE institutions to achieve better quality, higher efficiency and increased competitiveness of the system. New financial mechanisms for research and HE are expected to foster an improvement of quality in higher education and stimulate excellence in research.

Major projects, such as development of ‘Valleys’ will be implemented to modernise the research infrastructure. A variety of research and mobility grants is envisaged under the Researchers’ Career Programme. They should significantly contribute to improvement of researchers’ career in Lithuania.

A number of measures are planned to strengthen public/private partnership. They are aimed at developing new schemes and establishing good practices for sharing knowledge between academia and business. The international dimension of developing knowledge sharing platforms is dealt with by supporting more active participation in international research programmes (the FPs in particular), by the introduction of new support schemes for co-financing of participation in international research projects and providing support of proposal development. It is important to ensure that the implementation of new schemes aimed at modernisation of research infrastructure and strengthening of business-academia partnership encourages cooperation not only among national partners, but also international collaborations.

Implementation of national research programmes is planned to start in 2009; that is why better coordination of different research priorities under different research support mechanisms has to be achieved as a matter of urgency.

Many new measures are envisaged to improve the research system in Lithuania. Execution of the majority of the schemes has not been started due to delays in the implementation of operational programmes planned as part of the Structural Funds (2007-2013).

Globalisation is a major challenge for a research system of a country like Lithuania. Internationalisation of research policy and integration in the ERA must be key policy priorities. More efforts have to be made to accelerate the reforms in Lithuania to achieve better competitiveness in the research system but no less effort must be dedicated to coordinating national with European research policies not only on the level of strategic objectives but also on the level of concrete implementation measures.

Table 10: Importance of the ERA pillars in the ERA policy mix and key characteristics

	Short assessment of its importance in the ERA policy mix	Key characteristics of policies
Labour market for researchers	<ul style="list-style-type: none"> Improvement of research career prospects and control of 'brain drain' process is seen as one of key objectives of the national research policy. 	<ul style="list-style-type: none"> International mobility of researchers is encouraged via variety of mobility grants New measures introduced to encourage reintegration of Lithuanian researchers working abroad Programme for increase of salaries of researchers is introduced
Governance of research infrastructures	<ul style="list-style-type: none"> Changes in governance of research infrastructures are on going. More efforts have to be put into encouraging the development of networking activities and international access to modernised national research infrastructures 	<ul style="list-style-type: none"> Major projects for modernisation of research infrastructure and development of open access facilities are planned Reform of research and HE system is aimed at reorganisation of the governance and the network of research institutions and universities
Autonomy of research institutions	<ul style="list-style-type: none"> Lack of autonomy of research institutions is seen as major challenge in the reform of research and HE. Strategic governance of research system has to be improved to establish clear role for the state in governance of research institutions. 	<ul style="list-style-type: none"> Reform of strategic governance and planning is ongoing. New regulations, related to greater autonomy, concerning the governance of universities, elections of university board, legal status of universities are contained the new Law for Research and HE.
Opening up of national research programmes	<ul style="list-style-type: none"> Opening up national research programmes for international participants still remains a challenge for national research policy. 	<ul style="list-style-type: none"> Introduction of national research programmes is approved in line with national and international research priorities.

5 Conclusions and open questions

5.1 Policy mix towards national R&D investment goals

When strengthening the foundations of its knowledge-based economy, Lithuania needs to enhance private spending on R&D. The country is currently well behind the EU average in private sector R&D expenditures. As a share of GDP, private R&D spending accounts for only 0.2% in Lithuania versus an average of 1.2% in the EU. However, this position may well be improved with the appropriate use of the EU Structural Funds combined with a clearer overall R&D strategy. Identifying and exploring some niche markets for the creation of knowledge could be a good idea for the country with its limited resources.

In 2008, the Lithuanian Government approved two very important programmes to foster economic development based on knowledge production and innovation: the National Lisbon Strategy Implementation Programme (2008- 2010) and the new Programme of the Government of the Republic of Lithuania. The ongoing reform of the HE system, together with the implementation of these two new programmes

supported by SF is expected to lead to basic and necessary improvements of the R&D system.

Lithuania spends a significant share of its GDP on public investments in R&D. However, private sector R&D spending needs to increase very significantly. Lithuania occupies the 8th place among the EU27 member states on the share of GDP spent on public R&D, but the 25th place on the share of GDP spent on private R&D. The task of striving for the main Lisbon target – 2% of GDP investment in R&D by 2010, especially 1% R&D investment from business sector, will be extremely difficult due to very slow increases in business R&D investments and the overall slowdown of the economy in the world recession. The implementation of the new National Lisbon Strategy Implementation Programme and the measures of the new Government Programme addressing R&D investment and barriers must deliver some sustainable basic progress. At the same time, big delays with the start of the implementation of the SF programmes could cause a failure to achieve targets by 2010. The main risk is related to the doubts over the capacity of the R&D governing and administrative bodies to implement such radical reforms and control the large SF investments.

5.2 ERA-related policies

Integration in the ERA and the capacity to increase business competitiveness are of key importance to the sustainability of Lithuanian research system. The main objectives of the national reform of research and HE and the national Lisbon Strategy Implementation Programme largely reflect the key strategic objectives of the development of the ERA set out in the ERA Green paper. As the national system of research has to be reformed to achieve better integration in the ERA the need for acceleration in the pace of these national reforms needs to be highlighted.

Changes in national research policy deal with increasing the attractiveness of a research career in Lithuania, optimising the network of research institutions, modernising the research infrastructure and promoting stronger cooperation between research and business institutions to strengthen knowledge sharing and knowledge absorption capacities. The new Law for Research and HE envisages changes in the governance of research and HE institutions by providing them with greater autonomy. New financing schemes, introducing greater proportions of competitive funding for research are also planned and should contribute to reaching the overall reform objectives.

Clearer strategic vision, better coordination and closer monitoring of the implementation of the new instruments to reform the research system are a priority. More focus then has to be put on strengthening the international dimension of the reformed system.

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List of Abbreviations

BERD	Business Enterprise R&D Expenditure (verslo įmonių išlaidos moksliniams tyrimams ir eksperimentinei plėtrai)
EU	European Union (Europos Sąjunga)
ERA	European Research Area (Europos mokslinių tyrimų erdvė)
ERA-MORE	Initiative Network of pan-European of Mobility Centres (Europos mobilumo centrų tinklas)
FDI	Foreign Direct Investments (tiesioginės užsienio investicijos)
FP	European Framework Programme for Research and Technology Development (Europos Sąjungos bendroji mokslinių tyrimų, technologijų plėtros ir demonstracinės veiklos programa)
FP5	Fifth European Framework Programme for Research and Technology Development
FP6	Sixth European Framework Programme for Research and Technology Development
FP7	Seventh European Framework Programme for Research and Technology Development
GDP	Gross Domestic Product (Bendrasis vidaus produktas)
GERD	Gross Domestic Expenditure on R&D (išlaidos moksliniams tyrimams ir eksperimentinei plėtrai)
HE	Higher Education (aukštasis mokslas)
HEI	Higher Education Institutions (aukštojo mokslo įstaigos)
RTDI	Research, Technology Development and Innovations (tyrimai, technologijų plėtra ir inovacijos)
SF	Structural Funds (struktūriniai fondai)
S&T	Science and technology (mokslas ir technologijos)
SMEs	Small and Medium-sized Enterprises (mažos ir vidutinės įmonės)

European Commission

EUR 23976 EN/4

**Joint Research Centre – Institute for Prospective Technological Studies
Directorate General Research**

Title: ERAWATCH Country Reports 2009: Analysis of policy mixes to foster R&D investment and to contribute to the ERA: Lithuania

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Luxembourg: Office for Official Publications of the European Communities
2009

EUR – Scientific and Technical Research series – ISSN 1018-5593

ISBN 978-92-79-13310-7

DOI 10.2791/17103

Abstract

The main objective of the ERAWATCH Policy Mix Country reports 2009 is to characterise and assess in a structured manner the evolution of the national policy mixes in the perspective of the Lisbon goals, with a particular focus on the national R&D investments targets and on the realisation and better governance of the European Research Area. The reports were produced for all EU Member State and six Associated States to support the mutual learning process and the monitoring of Member and Associated States' efforts by DG-RTD in the context of the Lisbon Strategy and the European Research Area. The country reports 2009 build and extend on the analysis provided by analytical country reports 2008 and on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

This report encompasses an analysis of the research system and policies in Lithuania.

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