Strategic Evaluation on Innovation and the Knowledge Based Economy in relation to the Structural and Cohesion Funds, for the programming period 2007-2013

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Executive Summary

Lithuania has experienced tremendous and continuing economic growth since 2000, after the national economy recovered from the impact of the Russian crisis. Although growth is expected to remain high for the next few years, the vital need for new growth resources is obvious. Productivity growth, reduction of energy use in production, knowledge-based innovations are key challenges for the Lithuanian economy in the near future. Analysis of the country's competitiveness shows that Lithuania is still competing on costs, and that the next challenge will be to upgrade productivity in the industry by transforming low value added activities into high productivity and high value added industries.

The high technology sectors, both manufacturing and services, represent an absolute minority in the industrial and employment structure. Therefore the expectations for the growth of a knowledge based economy are more related to the policy concern of upgrading overall industrial structures in the country in the value chain rather than selective R&D investments in R&D of certain industrial sectors.

Implementation of R&D and knowledge oriented measures along with other measures strengthening national industry such as assisting the implementation of innovation techniques, increasing the levels of productivity and reducing the energy consumption and the environmental damage, all aim at the major long term goal set for the economy, i.e. to become "a knowledge intensive high value added internationally competitive and open economy".

The current policy setting (National reform programme, Strategy for the programming period 2007–2013 and operational programmes) provides a comprehensive set of actions that systematically target key challenges for the economy growth. The main critique addresses not the policy document and ideas itself, but the risks of insufficient focus on high strategic areas, and therefore the risk of loosing the economic growth momentum. Selectivity in promoting knowledge and innovation activities with regard to regional potential is crucial for the development of a well functioning national innovation system.

Although Lithuania is statistically and economically considered as a EU mono-region country, this single profile is not valid for the entire economy. Specific development trends appear within different counties. Some of the counties, with high concentration of public knowledge, population density, and developed industries are growing much faster than other less beneficial regions. Permanent winning and loosing counties are emerging in competing for the businesses, skilled labour, FDI, and EU structural support.

Therefore, the EU SF aid should be aim at achieving different targets of the development for different counties. Some of them are already emerging as innovation and knowledge economy leaders, some of them are showing the potential to become county knowledge centers, and some of them face the threat of remaining apart of the knowledge economy developments in the country.
Lithuania, due to a strong technological orientation, also does not fully use its potential in development of knowledge intensive services, such as recreation and wellness, related to medical and physical science solutions linked to natural SPA resources.

Lithuania's approach for confronting the systemic deficiencies in developing a knowledge society in the new programming period 2007-2013 can be summed up in the following axes:

- Production of new knowledge and link research with the economy.
- Commercialisation of knowledge and exploitation for the benefit of the economy.
- Promotion of excellence in the research and production sector.
- The quantitative and qualitative improvement of RTDI personnel.

Within the prevailing National Innovation System and policy mix, the following overall can be made:

- Concentration of R&D resources across priority technology fields and building up high tech clusters;
- Promotion of networking, clustering and development of innovation poles;
- Increasing public and private R&D funding in order to develop critical mass of competencies in the priority areas;
- Gradual shifting of funding towards new market driven funding instruments;
- Development of a National Strategy for Innovation and research, based on the comprehensive technology foresight and evaluation of countries potential for integration into the innovation system of the Baltic region.

Despite the deficiencies of the country's business systems, there is significant potential for future development in the following directions in which EU Structural Funds (SF) contribution could have significant added value:

- Development of urban areas into research and innovation poles, focused on a set of strategic high tech areas and new technology based business. These areas could in turn serve as knowledge centres for the whole economy.
- Upgrading low- mid, and mid – high tech industries in a value chain through the application of cross cutting knowledge developed in biotech, mechatronics, nano and material sciences, lasers and ICT.
- Creating a multifunctional agricultural space and linking agricultural production with the industrial biotechnology developments, and especially production of bio fuel and bio mass.
- Development of high value added tourism and services sector, linking SPA and recreation services with the medical and physical science poles and with natural heritage of mineral waters.

EU SF interventions should be diversified across the different areas, based on their potential and capacity. Research funding should be focused in those counties with research capacity while measures supporting technology transfer, creation of innovative funding mechanisms, improvement of governance etc. can be supported in all regions.
1 Introduction

In March 2000, the EU Heads of State and government launched an ambitious political initiative for the European Union to become “the most competitive, dynamic, knowledge-based economy by year 2010”. The agenda, which has become known as the ‘Lisbon Strategy’, has included a broad range of policies and regulatory measures to achieve this goal.

At the 2005 Spring Council of European Union, Heads of State and government concluded that all appropriate national and Community resources, including those of Cohesion Policy, should be mobilised in order to renew the basis of Europe’s competitiveness, increase its growth potential and its productivity and strengthen social cohesion, placing the main emphasis on knowledge, innovation and the optimisation of human capital. In short, the Council recognised that while some progress has been made since 2000 in moving towards the goals enshrined in the Lisbon Strategy there remains a need to create “a new partnership for growth and jobs”.

In launching the discussion on the priorities for the new generation of cohesion policy programmes, the Commission published on 6 July 2005 draft Community Strategic Guidelines entitled “Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013”. One of the specific guideline is to improve the knowledge and innovation for growth. More specific areas of interventions, which are proposed by the Commission, include: improve and increase investment in RTD, facilitate innovation and promote entrepreneurship, promote the information society for all, and improve access to finance.

Innovation is an important factor in releasing the potential of the Lisbon agenda. The knowledge captured in new technologies and processes can drive growth and competitiveness and create new jobs. But knowledge must be treated as part of a wider framework in which business grow and operate. Developing knowledge-based economy requires adequate levels of investment in R&D, education, and ICT as well as creating a favourable environment for innovation.

Less developed areas of the Union are also confronted with this new competitiveness challenge. Increasing cohesion leads to improvements in living standards and the reduction of economic and social disparities, which depend to an important extent on increases in productivity. Increasing competitiveness implies economic change through the introduction of new technologies and new methods of production as well as the development of new skills. Innovation is at the heart of this process. Technological and organisational change and new demands generated by rising income levels and factors which create new economic opportunities and therefore, contribute to the growth potential of these countries.


Structural Funds are the main Community instruments to promote economic and social cohesion. In the past and current programmes, they have contributed to enhance the research potential and innovation in businesses and to develop the information society, particularly in the less developed areas. Cohesion policy has also promoted the development of regional innovation strategies and other similar initiatives in the field of the information society.

The overall objective of the strategic evaluation study, as set out in the terms of reference, is that the study should provide conclusions and recommendations for the future of Structural Fund and Cohesion policy. In particular, the Strategic Evaluation will be used to prepare the negotiations with the Member States for 2007-13, to prepare the next operational programmes and to provide input into the 4th Economic and Social Cohesion Report.

In line with the tender specifications, this country report addresses the following issues:

1. An analysis of the current situation in the field of innovation and the knowledge-based economy at national and regional level. For the national level, performance is compared to the average performance for the EU25 Member States plus Romania and Bulgaria; and at regional level, where possible given available statistics, compared to a typology of EU regions;
2. Lessons from the past and current experience of implementing innovation and knowledge economy measures in the Structural Funds, both in terms of priorities and strategic approaches; as well as in terms of operational implementation;
3. Main needs and potential for innovation in the eligible regions drawing on available studies, strategy development and future and foresight studies; and
4. Recommendations on main investment priorities for Structural Funds over the programming period 2007-2013 and their implications for regional development.
2 Investing in innovation and knowledge: a comparative overview of regional performance

This section provides a synthetic overview of the relative performance of the country, and where relevant main regions, with respect to the EU25 average for a number of selected key structural indicators of innovation and knowledge. The analysis aims to identify main disparities and needs at national, and wherever possible, regional level with a view to supporting the definition of priorities for future Structural Funds interventions (see sections 5 and 6 of this report).

2.1 Country overview: innovation and the knowledge economy

Exhibit 1 below provides a snapshot picture of the relative position of Lithuania compared to the EU-25 average for a series of key knowledge economy indicators.

Exhibit 1: Relative country performance for key knowledge economy indicators

Source: calculations of MERIT based on available Eurostat and national data from 2002-2003 depending on indicator. Detailed definitions and data for each indicator are provided in Appendix B.

Lithuania, as most of the new EU member states, lags behind on most of the EU-25 knowledge economy indicators. The results were also confirmed by the European Innovation Scoreboard (EIS) 2005, as well as the TrendChart report on Lithuania,
covering periods 2003-2004 and 2004-2005. The above EU average indicators are in GDP per capita growth, higher education, industry value added, agriculture value added, youth and female activity rate.

The economy produced a turnaround in the aftermath of the Russian crisis of 1998. GDP grew over 6% in 2001-2002, and by 9.7% in 2003. However this was the peak after which the real GDP growth fell to 6.7% in 2004, and 7.5% in 2005. Although growth is expected to remain high for the next few years, the vital need for new growth resources is obvious. Productivity growth, reduction of energy use in production, knowledge-based innovations are key challenges for the Lithuanian economy in the near future. Analysis of the country's competitiveness shows that Lithuania is still competing on costs, and that the next challenge will be to upgrade productivity in the industry by transforming low value added activities into high productivity and high value added industries.

The high technology sectors, both manufacturing and services, represent an absolute minority in the industrial and employment structure. Therefore the expectations for the growth of a knowledge based economy are more related to the policy concern of upgrading overall industrial structures in the country in the value chain rather than selective R&D investments in R&D of certain industrial sectors.

Given the weak position of the Lithuanian economy in terms of its employment structure with only 3% of the workforce in medium-to-high tech manufacturing and only 1.7% in high-tech services in 2003, the need for sustained investment in skills' development is clear. The only positive note in terms of human resources is the relatively high rate of science and engineering graduates (127% of the EU25 average).

Knowledge creation indicators such as public R&D expenditure, business R&D expenditure, and share of medium-high tech R&D remain far below the EU25 level. Although the level of public expenditure on R&D is slightly higher than that of Estonia or Latvia it remains well below the EU25 average, while the level of business R&D expenditure is amongst the lowest in the enlarged EU. The overall R&D/GDP ratio remains one of the lowest within the EU25, and equals 0.68. More worrying is that there is no real evidence of a positive and sustained upward trend, especially in business R&D investments.

Having in mind that Lithuania is one of the poorest EU countries, such a low level of investments does not give much positive indications that knowledge inputs to the economy will improve in the very short term. According to official statistics of Lithuania, 381.8 MLTL (1 EUR = 3.45 LTL) were allocated for reserach and development in 2003, or approximatelly 100 LTL per capita (or 30 EUR per capita). 35.5 % of them – for fundamental research, 38% - for applied research, and 26.5% for experimental development. Taken together state budged funds allocated for R&D and higher education are 1.1% of GDP, or 160 LTL per capita (or 46 EUR per capita) in 2004. Accumulated funds from all sources for R&D and higher education constituted 2.2% of GDP, or 200 LTL per capita (or 60 EUR per capita).

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3 Although problems with accounting of R&D expenditure explain part of the gap.
In 2002, business sector announced, that R&D activities were performed by 67 enterprises, and 58 MLTL were devoted for R&D activities in enterprises, and 36 MLTL for business R&D performed by public sector. This consist less than 0.2% of GDP.

Lithuanian R&D sector employs 5000 researchers (full time equivalent), or 3 researchers per 1000 inhabitants (EU mean – 6, Finland – 14). This number in terms of the science/ employee potential equals to the level of 1965, and in number of scientists - 1975\(^5\). Business sector employed 500 researchers (of which 90 scientists) in 2003. Despite the increased numbers of PhD graduates, in the period 1998 – 2003, the number of researchers decreased by 22%.

R&D sector faces a rapid aging problem- today in the 25 – 34 age group there are 3 times less researchers than in EU, and 5 – 7 times less than in Finland and Sweden

All these all trends show that the country does not generate a critical mass of resources, needed for a knowledge based economy growth (R&D investments, R&D employment, and upgrading of qualifications of the highly skilled remain far below the EU25 average).

Although Lithuania has kept its competitive strength in the development of innovation drivers (innovation input resources), traditionally emphasizing the development of highly skilled human resources (by keeping an increasing trend above the EU average in S&E graduates, population with tertiary education, and youth education attainment level), insufficient attention was paid to sustaining the skills created. Life long learning indicator, in which the country was outperforming in the recent decade, while still below the EU average (66 %), has increased significantly for the period 2004 - 2005 – by 18 percent points which shows that innovation and education policy measures oriented towards life long learning are showing the first results.

R&D employment remains below EU average and in the business sector is close to zero, reducing business R&D and absorptive capacities to the lowest levels among EU. On the contrary, the indicator on business-financed university R&D remains highly above the EU average (237%), which shows that business investments into R&D are mainly operated trough higher education establishments, and business does not have any potential for its own R&D, first of all in terms of human resources.

The imbalance between industrial structure and educational levels has caused an intensive brain drain and negative migration of skilled white and blue collar workers, which has reduced unemployment rates to 4-5% in 2005 without creation of new jobs in the country. The estimated calculations show that 200 000 people have already left the country, and 15 000 will leave it yearly in the near future.

Innovation output indicators remain far below the EU average, which again shows the continuing lack of links between knowledge development and knowledge application in the Lithuanian innovation system. The only indicator improving slightly is high tech manufacturing, still reaching only 47% of the EU average. Employment in high tech services and manufacturing is up to 50% of EU average. This reflects Lithuanian industrial structure characterised by the domination of low-mid tech industries. Wide spreading of high tech applications in all industries would the appropriate mid-term strategy for the economic upgrading of Lithuania rather than development of pure high tech industries.

The intellectual property development remains far below the average, which is related to the lack of original knowledge development within NIS and correlated with the dominant innovation type – development of new to firm, but less new to market products, i.e. innovation adoption instead of new knowledge creation. This is supported by the fact that Lithuania has the lowest share of strategic innovators within the EU (EIS 2004).

2.2 Regional disparities and recent trends

In order to analyse and describe the knowledge economies at regional level in the EU, the approach adopted was to reduce and condense all relevant statistical information available for a majority of regions. The approach involved firstly reducing the information from a list of selected variables into a small number of factors by means of factor analysis. These factors are:

- Public Knowledge (F1): human resources in science and technology combined with public R&D expenditures and employment in knowledge intensive services is the most important or common variables in this factor. Regions with large universities will rank high on this factor.
- Urban Services (F2): The most important variables for this factor are value-added share of services, employment in government administrations and population density. A key observation is that academic centres do not necessary co-locate with administration centres.
- Private Technology (F3) This factor is most strongly influenced by business R&D, occupation in S&T activities, and employment in high- and medium-high-tech manufacturing industries.
- Learning Families (F4). The most important variable in this factor is the share of the population below the age of 10. The Learning Families factor could also be interpreted as an institutional factor indicating a child-, learning- and participation- friendly environment, or even a ‘knowledge-society-life-style’ based on behavioural norms and values that are beneficial to a knowledge economy.
In a second step, the 200 plus EU27 regions were grouped into 11 types of regions (see appendix A) displaying similar characteristics by means of a cluster analysis. Lithuania is considered in this analysis as a one region country and was classified in cluster 8 – Rural Industries. Besides a low per capita GDP, Rural Industries regions have in common a low score on both the factors Urban Services and Private Technology. Population density is very low. The service sector is often very small. Especially agriculture but also manufacturing industries are relatively dominant sectors.

Exhibit 2a: Regional factor scores per region

Source: MERIT. The bars are stapled factor-scores showing the deviation (1=standard deviation) per factor from the average of 215 EU regions (0.00). The longer the bar, the bigger is deviation. Detailed regional scorecards can be found in Appendix B.

Lithuania, being a small and mono-region country, has no internal regions. But it can be analysed at the level of counties, or of the urban and rural areas. Some of the counties, with high concentration of public knowledge, population density, and developed industries are growing much faster than other, less beneficial counties. Permanent winning and loosing counties are emerging in the country in competing for the businesses, skilled labour, FDI, and EU structural support.
Within each county level, the situation differs between industries concentrated in the cities, and their peripheral areas where agricultural activities and traditional industries predominate. Many of the traditional industries are based on the local agricultural production inputs – especially in a food sector, which in Lithuania is dominated by the milk and meat production.

The analysis of GDP per capita in different counties shows that regional disparities are high, and further increasing. In 2004, GDP per capita in Vilnius county was 44.4% higher than the national average, and Klaipėda county equaled the national average (showing negative trend), while all other counties were below national average.

Exhibit 2b: GDP per capita in Lithuanian counties

<table>
<thead>
<tr>
<th>GDP per capita in Lithuanian counties</th>
<th>Compared to national average, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>National average</td>
<td>100</td>
</tr>
<tr>
<td>Alytus county</td>
<td>81.9</td>
</tr>
<tr>
<td>Kaunas county</td>
<td>95.9</td>
</tr>
<tr>
<td>Klaipeda county</td>
<td>112.7</td>
</tr>
<tr>
<td>Marijampole county</td>
<td>73.2</td>
</tr>
<tr>
<td>Panevezys county</td>
<td>90.4</td>
</tr>
<tr>
<td>Siauliai county</td>
<td>77.5</td>
</tr>
<tr>
<td>Taurage county</td>
<td>61.7</td>
</tr>
<tr>
<td>Telšiai county</td>
<td>85.3</td>
</tr>
<tr>
<td>Utena county</td>
<td>84.5</td>
</tr>
<tr>
<td>Vilnius county</td>
<td>133.4</td>
</tr>
</tbody>
</table>

Source: Statistics Lithuania

The EU accession has brought significant changes in employment, and unemployment rate has reduced to 4% in the 1st quarter of 2006 as a result of migration of working population. The most dynamic Lithuanian regions (Vilnius, Kaunas, Klaipėda, Siauliai, Marijampole6) feel the lack of labour with unemployment rates below 4%, while others (Akmene, Ignalina) still experience high unemployment (mainly long term unemployment related) rates.

Vilnius, being a capital city, and Kaunas, the second largest city, together have the largest share and concentration of public knowledge, developed industries and infrastructure, high population density. Kaunas, being the second largest city has a strong technological and educational tradition, and has been dominating as a centre of engineering and industrial development. Kaunas University of Technology stands among the largest technology universities in the Baltic countries. GDP of Vilnius and Kaunas cities together creates 25% of GDP of all Baltic countries.

Population in Vilnius and Kaunas counties is up to 1.6 million, or half of all Lithuanian population, which gives an additional push to the knowledge and innovation dynamics. Vilnius has emerged as the country’s financial, economic and cultural centre, with the proportion of the population working in the services industry

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6 Lithuanian labour market. Regional unemployment chart, 1st quarter 2006.
reaching up to 70% of the total working population in the city. The city’s economic growth has been pushed up by foreign direct investment (FDI).

These two counties have also developed a strategy for becoming knowledge economy drivers for the country. This is reflected by the Dipole project of Vilnius and Kaunas (http://www.vilnius.lt/dipolis/). These two counties have a high concentration of higher education and research institutions (7 universities), and a relatively well developed knowledge infrastructure (innovation centres, technology parks, knowledge based cluster initiatives, business incubators operating in close relationship with universities) Vilnius county dominates in ICT, biotechnologies and lasers, and Kaunas in software development and IT applications, mechatronics and emerging nanotechnologies.

Klaipeda, the third largest city, benefits of an ice-free port, and related industries, local university and innovation support infrastructure. Siauliai, the forth largest city, has a strong industrial tradition in mid-high tech industries, as well as in traditional ones, and benefits from a local university and has established innovation support infrastructure. Due to the young age of both of these support structures they are not yet self sustaining with the significant impact on the economy, although there are rapid and positive changes.

The other industrial cities - Marijampole, Alytus, Panevezys, Utena, Telsiai - concentrate on mid-high technologies, but also have a strong component of traditional low tech industries – food and textiles, and have no local R&D infrastructure.

The data presented in exhibit 3 reflect the situation of 1996-2002, but in Lithuania this period is characterised with structural shifts and reorganisation of businesses and markets from east to west, liberalisation of markets, and EU accession. The trends that remain until 2006, - high enrolment in tertiary education, high GDP growth (driven by internal consumption, development of credit systems, etc.) and low R&D investment rates, all reflect the difficulties of creating a knowledge economy.

**Exhibit 3: recent trends per region in key indicators**

<table>
<thead>
<tr>
<th></th>
<th>Unemployment</th>
<th>Per capita GDP</th>
<th>Industry share</th>
<th>Agriculture share</th>
<th>Population density</th>
<th>Tertiary education</th>
<th>R&amp;D intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>-0.80</td>
<td>7.98</td>
<td>-1.29</td>
<td>-6.40</td>
<td>-6.51</td>
<td>1.44</td>
<td>0.17</td>
</tr>
</tbody>
</table>

*Source: MERIT based on Eurostat data for period indicated*
### 2.3 Conclusions: innovation and knowledge performance

#### Exhibit 4: summary of key disparities and needs per region

<table>
<thead>
<tr>
<th>Region / group of counties</th>
<th>Key factors explaining disparity of performance (weaknesses)</th>
<th>Key needs in terms of innovation and the knowledge economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vilnius - Kaunas</td>
<td>• Insufficient growth dynamic of knowledge intensive, high tech sectors</td>
<td>• The R&amp;D base and skills has to be strengthened up to the world standards in the priority areas, intellectual entrepreneurship initiatives are needed (in terms of innovation venture capital, support infrastructure, etc.)</td>
</tr>
<tr>
<td>Other larger industrial cities with original knowledge infrastructure (Klaipėda, Šiauliai, Panevėžys)</td>
<td>• Lack of knowledge generation capacities and capabilities. Relatively small business and R&amp;D communities with diversified needs</td>
<td>• Knowledge and research infrastructure has to be further developed in close relationship to the regional development needs</td>
</tr>
<tr>
<td>Industrialised cities without original knowledge infrastructure (Alytus, Marijampolė, Šakiai, Telsiai, ...)</td>
<td>• Diversified needs and non existing local knowledge inputs</td>
<td>• The development of well functioning competence networks and national clusters that would link the regions to the national knowledge generation centres situated in the largest regions</td>
</tr>
<tr>
<td>Curort cities with natural SPA resources (Druskininkai, Birštonas, Neringa, Palanga, etc.)</td>
<td>• Lack of contemporary knowledge on SPA services development and recreation tourism • Undefined, week links to national medical and physical science resources</td>
<td>• Development of SPA and wellness cluster, attracting qualifications and resources from medical and physical knowledge centres –Kaunas (University of Medicine, Lithuanian Academy of Physical Education) and Vilnius University</td>
</tr>
<tr>
<td>Rural peripheral areas of all counties</td>
<td>• Low education level, high unemployment, major occupation in low value added agricultural activities</td>
<td>• Support to structural changes, development of agricultural industries and services (agro tourism, etc.), and increase of productivity.</td>
</tr>
</tbody>
</table>
3 Innovation and knowledge: institutional context and policy mix at national and regional levels

Structural Fund support for innovation and knowledge is contingent on and seeks to generate strengthen the existing national (and/or regional) innovation system in each Member State. In particular, institutional, legal and financial factors in the innovation system can limit the potential for certain types of intervention. Moreover, within the framework of the EU’s “Lisbon objectives”, Structural Fund interventions are expected to complement and provide added value to national (or regional) policy framework. In some Member States, Structural Fund interventions in favour of innovation and knowledge are marginal with respect to the national investment and policy effort, in others Structural Funds provide a main source of funding for such interventions. In both cases, there is a need to identify relevant national and EU policies which can have an impact on decisions on funding priorities.

3.1 Institutional and legal framework for innovation and the knowledge economy

This section of the report appraises two broad factors that condition the potential for coordinated intervention of EU and national (regional) policies in favour of innovation and knowledge:

- The first concerns the organisational structures of public and semi-public bodies responsible for the design, implementation and monitoring of innovation and knowledge economy policies. In particular, the analysis considers the responsibilities for funding or managing specific types of measures liable to be considered for support under the Structural Funds;
- The second concerns the institutional, legal and financial frameworks, which condition the linkage of national (regional) financing with EU financing.

The continuing efforts in trying to initiate an innovation-based economic development during the last five years were translated in the development of an innovation policy framework and the setting up of an institutional innovation support network. The major criticism that the Lithuanian NIS continuously faces is the lack of linkages and interactions among various groups of actors – especially between R&D and the higher education sector, and the business and innovation intermediaries.

The general Lithuanian policy directions are set by Lithuanian Seimas (Parliament). The Lithuanian parliament has approved a national strategy towards a knowledge economy and set as a highest priority the development of knowledge and high value added activities in the country.

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7 The network of organisations, individuals and institutions, located within or active within national or regional boundaries, that determines and shapes the generation, diffusion and use of technology and other knowledge, which, in turn, explain the pattern, pace and rate of innovation and the economic success of innovation.
The Innovation and R&D policy framework has undergone significant changes since 2001. In order to achieve higher co-ordination of the Innovation policy, the Science and Technology Commission of the Government of Lithuania was established in 2002. However, since its establishment, it has been criticised as not having enough institutional power to have tangible impacts on the synchronisation of policy actions due to its consultative nature. Its impact was also limited because of a weak representation of the Science and Education policy actors. These latter were operating in the parallel functioning Science and Education Commission.

In spring 2005 the two Commissions were merged into a single Science, Technology and Innovation Commission, which should join the efforts of both the scientific and the business community. Its major objective is to achieve a faster upgrading of the economy towards a knowledge intensive economy. This Commission is chaired by the Prime Minister of Lithuania. Its operates on a regular basis and has a permanent secretariat.

Another important high level policy advisory body on R&D and Innovation policy is the Science Council of Lithuania. It serves as a scientific adviser and consultant to the Seimas (Parliament) and the Government in solving strategic issues of research and higher education.

The implementation responsibilities for the R&D and innovation policy are split between two main ministries. The new knowledge generation and R&D, higher education development and other related activities are shaped by the Ministry of Education and Science, while the function of development and implementation of innovation policy is assigned to the Ministry of Economics.

Summing up, R&D and Innovation policy integration and co-ordination remains a difficult task, especially at the implementation level. Despite the ongoing efforts R&D and innovation policies are not inter-related and this results in poor R&D and innovation performance in both public and business sectors. There are no measures designed and implemented to facilitate synergetic efforts between innovation in business and competitive R&D sector. The High Technology development programme is the only case, where both ministries – Economy and Education and Science are extensively involved.

Figure 1 categorizes some of the major players in the Lithuanian innovation system into three groups according to the role they play: policy decision-makers, policy support and implementation agencies, and target organisations.
Exhibit 5: main organisations per policy area.

<table>
<thead>
<tr>
<th>Policy objectives</th>
<th>Type of organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving governance of innovation and knowledge policies</td>
<td>• Ministry of Economy and Ministry of Education and Science</td>
</tr>
<tr>
<td>Innovation friendly environment</td>
<td>• Ministry of Economy</td>
</tr>
<tr>
<td>Knowledge transfer and technology diffusion to enterprises</td>
<td>• Ministry of Economy</td>
</tr>
<tr>
<td>• Lithuanian Innovation Centre, Science and Technology Parks</td>
<td>• Ministry of Economy</td>
</tr>
<tr>
<td>Innovation poles and clusters</td>
<td>• Ministry of Economy</td>
</tr>
<tr>
<td>Support to creation and growth of innovative enterprises</td>
<td>• Ministry of Economy</td>
</tr>
<tr>
<td>• Agency of Business Support, Technology business incubators, Science and Technology Parks</td>
<td>• Ministry of Economy</td>
</tr>
<tr>
<td>Boosting applied research and product development</td>
<td>• Ministry of Economy and Ministry of Education and Science</td>
</tr>
</tbody>
</table>

Source: study team based on national/regional policy documents, TrendChart reports, OECD reports, etc... See appendix C for a detailed definition of the policy categories.
3.2 Policy mix assessment

This section provides a summary overview and analysis of the national and regional policy mix in favour of innovation and knowledge in which the Structural Fund interventions take place. The analysis is conducted with respect to seven broad categories of objectives of innovation and knowledge policies (see appendix C for an explanation of each category).

Measures identified per category of policy objectives are then further sub-divided in terms of the direct beneficiaries of funding (or legislative) action. To simplify, the report adopts three broad types of organisation as targets of policy intervention:

- Policies supporting academic and non-profit knowledge creating institutions;
- Policies supporting intermediary/bridging organisations involved in innovation support, technology transfer, innovation finance, etc.;
- Policies supporting directly innovation activities in private sector.

The matrix below summarises the current policy mix in at national level. The intensity of support (financial or political priority) for different policy areas and targets is indicated by a colour coding system.

Exhibit 6: Policy mix for innovation and knowledge

<table>
<thead>
<tr>
<th>Target of policy action</th>
<th>Academic /non-profit knowledge institutions</th>
<th>Intermediaries/bridging organisations</th>
<th>Private enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of R&amp;D activities of public institutions</td>
<td>Evaluation of the performance of public funded institutions</td>
<td>Development of regional innovation strategies</td>
<td></td>
</tr>
<tr>
<td>Development of Science and technology parks, Technology business incubators linked to universities</td>
<td>Support for the development of innovation support infrastructure, S&amp;T parks, business incubators development of national innovation centre, etc.</td>
<td>Direct support for technology and knowledge transfer in enterprises</td>
<td></td>
</tr>
<tr>
<td>Support for participation in business R&amp;D projects</td>
<td>Support for participation in business R&amp;D projects</td>
<td>Beneficiaries of clusterisation activities</td>
<td></td>
</tr>
<tr>
<td>Support for mobility of researchers to business sector</td>
<td>Development of innovative firm establishment and support</td>
<td>Support for development and commercialisation of innovation</td>
<td></td>
</tr>
<tr>
<td>Support for the mobility of researchers to business sector</td>
<td>Development of innovative firm establishment and support</td>
<td>Support for business R&amp;D</td>
<td></td>
</tr>
<tr>
<td>Support for participation in business R&amp;D projects</td>
<td>Direct support for R&amp;D in enterprises</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend
- Top policy priority
- Secondary priority
- Low priority

Source: calculations of study team based on national/regional policy documents, TrendChart reports, OECD reports, etc.
The period since September 2004 saw the implementation of the first round of EU SF aid for Lithuania. The distinctive feature of this period is the parallel development of business and innovation support infrastructure and innovations in the business sector.

**Improving governance of innovation and knowledge policies**

Little importance is given so far to innovation policy governance issues, and the only initiatives emerge within the ministry of Economy. Recently, a number of studies regarding innovation policy implementation and achievement of goals were completed; of which the 'complex study on national competitiveness growth sources' was completed in early 2006. This study forms the base for the development of the national Economy Growth operational programme (for the period 2007 – 2013).

The commitment of public administrations however is limited by the funds and human resources directed towards this policy area. The few and rather fragmented initiatives are without continuity and without proper follow-ups. Moreover, the capacity for planning, monitoring and funding RTDI measures is very weak.

The current development of Regional innovation strategies (FP6 and national funds) is a first exercise of innovation policy building and has a national wide coverage. The country faces a strong need to perform an extensive technology foresight, which should build a solid base for the selection of S&T priorities. Absence of a focused S&T policy is leading to the waste of R&D resources.

The monitoring of the implementation of government programmes and other innovation policy measures is executed while analysing whether the quantitative targets were reached, but without a broader evaluation and monitoring exercise. Therefore only subjective judgments on how far the performance of smaller tasks can only be made.

Evaluation of R&D activities, public R&D and higher education institutions is performed on the yearly base, since this forms the basis for the institutional R&D funding. However, this evaluation is based on quantitative criteria and lacks strategic foresight.

**Innovation friendly environment**

The most successful long term government actions related to innovation could be defined as continuing improvement of business and investment conditions. One of the major goals of Lithuania, since it regained its independency, was to create a functioning market economy and favourable business conditions. Simplification of business establishment and bankruptcy procedures, favourable tax system, promoting the use of new information technologies in business and in the society has brought Lithuania to one of the top 20 locations on easiness of doing business in the world\(^8\).

The main objectives, in the context of this policy area, are the creation of a modern environment conducive to innovation, in terms of regulations, infrastructures (such as ICT), availability of funding, improvement of skills and the quality of services provided by the public administration. This includes a number of actions designed in

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\(^8\) World Bank Report, 2004
order to reduce red tape inhibiting entrepreneurship, particularly through the use of advanced ICT. There still remains a lack of incentives that would facilitate access to finances, especially venture capital for innovation and new technology based firms.

At present, the development of an entrepreneurial and innovative culture in the society, of venture capital funds and of highly skilled human resources for knowledge economy remain more declarative statements and are not as such translated into concrete actions beyond lifting administrative hassles.

Knowledge transfer and technology diffusion to enterprises
The main policy objective within this policy area is to increase the competitiveness of enterprises. Emphasis is put on technological upgrading, which in most cases is not linked to innovation. Competitiveness is seen as linked with knowledge transfer through increased collaborations and exploitation of R&D results from research organisations.

The development of innovation support infrastructure, could be clearly evaluated and shows a positive development trend. However longer term impacts still need to appraised. In order to achieve significant results further support should be provided for these institutions, in order to achieve the expected quality of services and to develop new services, managerial skills and their human potential.

There is only one university (Kaunas University of Technology) that operates a technology liaison office in Lithuania. Therefore, in order to facilitate the public knowledge transfer to the private sector, such activities should be expanded. Technology business incubators should be established not only in Kaunas, but also in other cities with technology innovation potential.

Lithuanian NIS features a gap in supporting IPR protection – most of all in terms of consultancy and IPR management skills accessible by enterprises. This leads to a weak motivation to develop intellectual property, or loss of it in benefit of more sophisticated foreign innovation and R&D partners.

Innovation poles and clusters
The basic objectives of this policy area were to strengthen collaborations between the various actors in the National Innovation System and to create a minimum critical mass of competitive organisations in selected fields. This policy area is covered by various programmes with direct and indirect impact on clustering, particularly with regard to SME’s.

Although Lithuania is a leading new member state country in cluster development, following Slovenia, its clusters were formed in low tech low value added industries. Cluster initiatives were supported in both – business and NGO’s sector. However, they did not receive wide attention from the various targeted cluster members. Another challenge lies in upgrading existing clusters in a value chain, by integrating

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9 Although declaring the importance of highly skilled human resources for innovation based growth, Lithuania is losing the momentum in the share of population with tertiary education since 2000.

10 Establishment of technology parks (6 to 8), setting representatives of Lithuanian innovation centre in 6 to 8 locations of Lithuania, etc.
them into international production networks, and by developing high value added activities or linkages (machinery and equipment, biotech, ICT, mechatronics, etc.)

**Support to creation and growth of innovative enterprises**

The main objective is to support the development of high value added, R&D based innovations in industry, and to facilitate the development of new technology based applications in existing, and in newly established companies. The main problems that remain are the low patenting activities by enterprises, researchers' lack of entrepreneurial culture and the lack of international perspective / strategy of the majority of SMEs. Of equal importance is the inability of many SMEs to exploit the plethora of measures due to management inefficiencies and lack of information and qualified personnel.

The future policy development should more clearly respond not only to the new technology and R&D based innovations, but also to the innovation needs in the traditional industrial sectors.

Although some incentives for keeping qualification of the working force up to present day standards have been started, more attention should be paid here, especially because of the increasing brain drain and negative migration of the young and most qualified labour force.

**Boosting applied research and product development**

Major R&D development targets, following the Lisbon Strategy are set in a quantitative statement – to increase R&D funding by 0.1% of GDP yearly, and achieve 1% of GDP by 2010. The other 2% of GDP, following the Lisbon agenda, should come from the business sector. This is supported today by tax incentives, allowing enterprises to cover R&D and patenting expenditures as all other expenditures, differently from previous regulations that forced these types of expenditures to be covered by profit. Keeping in mind the very low business investments in R&D (the State provided for 88% of total R&D financing in 2003), and weak linkages between R&D and business communities, the tax incentive might be insufficient to achieve these ambitious goals. The Lithuanian government in its programme for 2004-2008 has set the target to develop special schemes that would promote business investments in R&D.

The ministry of Education and Sciences launched a grant scheme in 2004, with the assistance of the SF, to improve the quality of human resources for R&D and innovation in areas of Science and Technology development such as: biotechnology, agriculture and forestry, mechatronics, laser and optical technologies. Those measures are related to the development of R&D infrastructure in these same technological areas.
### Conclusions: the national innovation system and policy mix

#### Exhibit 7: Key opportunities and constraints for investment by the Structural Funds

<table>
<thead>
<tr>
<th>Policy objectives</th>
<th>Opportunities for Community funding (national priorities)</th>
<th>Constraints or bottlenecks (factors limiting Community funding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving governance of innovation and knowledge policies</td>
<td>• Technical assistance and evaluation support. Building of policy building communities and networks for better co-ordination and consensus building</td>
<td>• No action groups foreseen in SPD (2004 – 2006), but development of regional innovation strategies is stated in National Reform Programme</td>
</tr>
</tbody>
</table>
| Innovation friendly environment | • Innovation financing  
• e-government  
• Development of human capital for knowledge economy (training of researchers in various institutional combinations) | • Non existing venture capital funds and restricted legal base to apply State aid for such a development  
• Still low internet penetration rates and relatively low computer skills in the society – complex actions are needed in the development of e-government and public computer skills |
| Knowledge transfer and technology diffusion to enterprises | • Funding of infrastructure and services for technology parks, innovation centres, university liaison and transfer centres |  |
| Innovation poles and clusters | • Innovative cluster development, support to technology business incubators, development of innovative intellectual entrepreneurship poles | • Bottom-up approach is needed. To ensure critical mass of skills, entrepreneurship has to be developed in the S&E community |
| Support to creation and growth of innovative enterprises | • Support for technological business incubators, competence networks and business excellence centres. Indirect support for high level innovation assistance in SMEs  
• Direct support for SMEs |  |
| Boosting applied research and product development | • Industry-science co-operation  
• Research infrastructures  
• Technology platforms | • Direct support for enterprise has been very successful in selected cases, however general potential for R&D in SMEs is very low, therefore the public assistance is needed not only via funding, but also via technical assistance |
4 Structural Funds interventions to boost innovation and create a knowledge economy: 2004-2006

This section of the reports provides an analysis of the patterns of Structural Fund expenditures in the fields of innovation and knowledge-based economy during the current programming period (2000-2006 for EU-15 or 2004-2006 for the new Member States). It examines the patterns from both a strategic point of view (the policy mix pursued by the Structural Funds programmes) and at an operational level (consumption of funds, management of innovation measures, indications of relative effectiveness of measures, case studies of ‘good’ practice).

4.1 Strategic framework for Structural Fund support to innovation and knowledge

4.1.1 Strategic approach to innovation & knowledge in Structural Fund programmes

The major policy document, defining implementation of EU Structural funds in Lithuania is the Single Programming Document (SPD). This aid is provided under the four major themes – energy and infrastructure, human resources, industrial competitiveness, and upgrade of rural areas, agriculture and fishery. The first programming period is characterized by relatively low investments in human resources compared to the infrastructure and energy sectors. The 2004-2006 programming period however witnessed, compared to the previous Phare programming, significant increases in funding for innovation and R&D infrastructure and for the development of highly skilled human resources for innovation, and the qualifications' upgrading of the employed work force.

The SPD has several grant schemes with measures directly addressing Innovation:

- **“Improvement of Business conditions”** (Ministry of Economy and Lithuanian business support agency), for developing a SME support system, an innovation support system, the development of science and technology parks and technology centers, the development of industrial zones, associated business structures and clusters, the implementation of environmental measures in business and the improvement of the image of Lithuanian products and services internationally.

- **“Direct support for business”** (Ministry of Economy and Lithuanian business support agency) for the modernisation of enterprises and innovation development, improvement of quality management and implementation of TQM, support for the internationalisation of companies, implementation of industry standards, etc., development of clusters, networks and partnerships, implementation of environmental measures in enterprises. All those measures should support development of entrepreneurship and business in Lithuania.

- A third grant scheme (Ministry of Economy and Lithuanian business support agency) for the direct support for enterprises to foster development of technological innovations in enterprises and R&D in business sector, and to strengthen co-operation between R&D and Business sectors.
• “Improvement of the quality of human resources for R&D and innovation” (The ministry of Education and Sciences), aims at improving quality of highly skilled human resources in the priority areas of Science and Technology development—biotechnology, agriculture and forestry, mechatronics, laser and optical technologies.

• “Development of labour force competencies and the ability to adapt to changes” (Ministry of Social Security and Labour), to increase the competitiveness of businesses by investing in training and skills development and in helping employees to adapt to labour market changes and the rapidly evolving skills needed by employers.

The calculations presented below are based on the allocation of Structural Fund budgets based on the intervention code classification. For practical purposes, the calculation of financial resources allocated to innovation and knowledge has been limited to the RTDI codes:

- 181 Research projects based in universities and research institutes
- 182 Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes
- 183 RTDI Infrastructure
- 184 Training for researchers

Additional calculations based on broader definitions of innovation are presented in Appendix D.

**Exhibit 8: Overall allocation of resources at an objective 1**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Total cost</th>
<th>SF Total</th>
<th>ERDF</th>
<th>ESF</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTDI INTERVENTIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective 1</td>
<td>75,256,711.45</td>
<td>56,724,564.99</td>
<td>36,280,565.31</td>
<td>20,443,999.68</td>
<td>18,532,146.46</td>
<td>0.00</td>
</tr>
</tbody>
</table>

| Objective 1 | 1,211,420,979.00 | 895,172,684.00 | 583,939,739.00 | 176,217,551.00 | 309,464,840.00 | 6,783,455.00 |

**TOTAL COHESION POLICY**

Source: programming documents and financial data provided by DG REGIO

RTDI specific measures roughly represent 6.7 % of the entire SF intervention in Lithuania during the 2004-2006 programming period. The relative importance of SF in Lithuania is high as it serves in many cases as a main instrument for innovation and knowledge support.

Lithuanian participation in Framework Programmes can not be evaluated as successful since it started taking part. Lack of capacities, skills, infrastructure, and networks of R&D and business communities restricts full integration of Lithuania in FP programmes. The SF are also expected to boost benefits from the FP programmes, especially in business R&D, therefore the funding for business R&D is given the priority if complemented with the FP funding.
4.1.2 Specific measures in favour of innovation and knowledge

The ERDF funds for knowledge and innovation are basically distributed via the SPD 3\textsuperscript{rd} priority “Development of the Industrial Sector”, and its measures 3.1 “Direct support for enterprises”, 3.2 “Improvement of Business conditions” and 3.3. “Development of IT infrastructure and services”. Measures 3.1. and 3.2. are implemented under the Ministry of Economy. The business support agency was established with the purpose of administrating direct and indirect business support measures.

The measure 3.1 “Direct support for business” covers the following intervention areas: modernisation of enterprises and innovation, quality management systems and new quality improvement methods, internationalization of enterprises, development of the image of products and services, reduction of production costs, standardization and certification of products and services, environmental measures in enterprises and development of tourism, conference and entertainment objects.

Measure 3.2 “Improvement of business conditions” covers interventions such as SMEs support system, innovation support system, science and technology parks, technology centers, industrial zones and plain field investments, associated business structures, clustering, environmental measures in business, and improvement of the image of Lithuanian products and services.

Measure 3.3 supports the development of IT infrastructure and services and is administrated by the Information Society development Committee to the Government of Lithuania.

In case of human resources development for innovation, the measures are administrated by the Ministry of Education and Science. The special measure 2.5 “Development of quality of human resources for R&D and innovation” under the priority 2 “Development of human resources” was launched with the aim to increase the quality of researchers, post – graduate studies, integration of R&D education with the business sector needs, etc.
### Exhibit 9: Key innovation & knowledge measures

<table>
<thead>
<tr>
<th>Policy area</th>
<th>Number of identified measures (all programmes)</th>
<th>Approximate share of total funding for innovation &amp; knowledge measures</th>
<th>Types of measures funded (possibly indicating importance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving governance of innovation and knowledge policies</td>
<td>0</td>
<td>%</td>
<td>Development of e-government and information infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Development of highly skilled human resources for R&amp;D and innovation in universities (post graduate level, training of researchers)</td>
</tr>
<tr>
<td>Innovation friendly environment</td>
<td>2</td>
<td>31.84%</td>
<td>Direct support for enterprises for technology transfer projects and new technology, or new product development; indirect support via funding of infrastructure and services of innovation centres, technology parks.</td>
</tr>
<tr>
<td>Knowledge transfer and technology diffusion to enterprises</td>
<td>2</td>
<td>49.31%</td>
<td>Direct support for the creation of new enterprises, improving innovation management, marketing and industrial design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indirect support trough funding of business support infrastructure and entrepreneurial/innovation training</td>
</tr>
<tr>
<td>Innovation poles and clusters</td>
<td>1</td>
<td>49.31%</td>
<td>Cluster and clusterisation initiatives from business associations – indirect support for clusters and enterprises</td>
</tr>
<tr>
<td>Support to creation and growth of innovative enterprises</td>
<td>2</td>
<td>49.31%</td>
<td>Grants for R&amp;D in enterprises</td>
</tr>
<tr>
<td>Boosting applied research and product development</td>
<td>1</td>
<td>5.79%</td>
<td>Grants for R&amp;D in enterprises</td>
</tr>
</tbody>
</table>

Nb: this table is a summary of the table in appendix D. The total of the percentage share per policy area may sum to more than 100 since certain measures fall into several categories.

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11 It is impossible to calculate exactly the total shares, since the funding is distributed across a large groups of measures whereas the funds could be allocated for different goals (i.e. form the same measure, the funds could go for the development of clusters, and for the growth of innovative enterprises via technology transfer, quality standards, etc.). So, only indicative percentages can be calculated.
4.2 Learning from experience: the Structural Funds and innovation since 2000

4.2.1 Management and coordination of innovation & knowledge measures

This section reviews the overall management of Structural Fund interventions in favour of innovation and knowledge during the current period. It examines the coherence the role of key organisations or partnerships in implementing Structural Funds measures for innovation and knowledge, the linkages between Structural Fund interventions and other Community policies (e.g. the RTD Framework Programme) and the financial absorption and additionality of the funds allocated to innovation and knowledge.

The overall management system consists of three level system – managing authority, paying authority, intermediate bodies and implementing agencies. The functions of the Managing Authority are performed by the EU Programme Management Department of the Ministry of Finance. Those of the Paying Authority are performed by the National Fund Department of the Ministry of Finance. Various line agencies are responsible for planning, implementation and monitoring of actual measures financed by the EU Structural Funds and national co-financing. Regarding RTDI, line agencies are the Lithuanian Business Support Agency and the Information Society Development Committee under the Government of the Republic of Lithuania. In addition to this three level management system, a specific independent monitoring committee has been set up 12.

The SPD management system in Lithuania was subsumed into existing public administration system. EU SF administration system is centralised with functions delegated to institutions at a central level. SPD management functions are relatively well defined in the Lithuanian legal acts; however, they are not clearly divided between different level institutions (intermediate and implementing institutions). This three-level SPD implementation system can be regarded as too hierarchical and too bureaucratic which slows down the decision making and implementation of SPD.

The insufficient administrative capacities of responsible institutions 13 further reduce the efficiency of SPD implementation. In some processes, intermediate bodies carry out rather technical tasks (e.g. preparing guidelines for applicants, concluding contracts) and in other cases, they duplicate tasks delegated to the implementing institutions (project evaluation, payments). This contributes to various delays and slows down the implementation processes. Management efficiency is further reduced.

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12 By the Government Resolution No. 1476 of 27 November 2003 on the establishment of the Temporary monitoring committee for monitoring of the SPD and the institutional composition of the Temporary monitoring committee has been approved by Order of the Minister of Finance No. 1K-302

13 For example, in the evaluation report the efficiency of administrative procedures was assessed. The biggest attention was paid to the project selection process. In the beginning of SPD implementation the efficiency of project selection process was reduced by prolonged evaluation and shortcomings in ensuring objectivity. During the programming stage a potential flow of applications under some SPD measures and activities was not estimated accurately, necessary human resources and capacities of implementing agencies were also underestimated.
by insufficient county level de-concentration of the functions performed by the implementing agencies.

Monitoring of project implementation has just started for the majority of measures and it is not yet sufficiently tested. These monitoring functions are seriously hampered by the lack of detailed and reliable monitoring data, especially on physical indicators and progress towards targets. Annual implementation reports are not very useful, due to their mediocre quality and the short period of SPD implementation. Monitoring is rather burdensome as a proportionality factor is not applied and there are no differences between monitoring large and small or “hard” and “soft” projects.

The transparency of SPD implementation (especially the project selection process) is reduced due to (1) the risk of politisation of the whole SF management system and with this issue closely related insufficient independency of certain implementing institutions; (2) insufficient and effective investigation system of applicants’ complaints; (3) insufficient publicity of project selection process. The involvement at this level of social and economic partners is optional and in most cases superficial.

It is worth mentioning that SPD implementation procedures pose disproportionately large administrative burden for the users (applicants). User-friendliness of the system is reduced due to high application costs, time consuming processes and a prolonged selection process. Number of submitted project applications and their quality indicate that while applicants’ have willingness to apply for funding their capacities are often insufficient. Complicated procedures for receiving support are an additional obstacle.

**Exhibit 10: absorption capacity of innovation & knowledge measures**

<table>
<thead>
<tr>
<th>CODES</th>
<th>ALLOCATED</th>
<th>DISBURSED</th>
<th>EXPENDITURE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>181 - Research projects based in universities and research institutes</td>
<td>5,242,051.20</td>
<td>7,648.26</td>
<td>0.1%</td>
</tr>
<tr>
<td>182 - Innovation and technology transfers, establishment of networks and partnerships between businesses and/or research institutes</td>
<td>18,183,070.59</td>
<td>448,005.56</td>
<td>2.5%</td>
</tr>
<tr>
<td>183 - RTDI infrastructure</td>
<td>25,436,366.40</td>
<td>444,605.48</td>
<td>1.7%</td>
</tr>
<tr>
<td>184 - Training for researchers</td>
<td>7,863,076.80</td>
<td>11,472.39</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>TOTAL OBJ. 1</strong></td>
<td><strong>56,724,564.99</strong></td>
<td><strong>911,731.69</strong></td>
<td><strong>1.6%</strong></td>
</tr>
</tbody>
</table>

Provided by ISMERI

The final numbers of applications from each county and projects funded are not available, but the first year of SPD implementation has shown large regional disparities in number of selected projects and an uneven distribution of funds. Official statistics on the Implementation of Single Programming Document (SPD) dated 31st July 2005 shows the following:

- From more than four bln LTL of EU and national funds allocated for all five SPD priorities for the period 2004-2006, only 3% was absorbed and declared to the European Commission.
- Absorption of SPD funds by priority axes does not depend on the number of applications. High proportions of rejected applications in all five programme axes...
may be related to three main reasons – i) applications do not meet requirements; ii) requirements and assessment rules are too contradictory and complicated and give room for arbitrary decisions; and iii) the national capacity is insufficient to evaluate applications and manage allocation and utilisation of EU Structural Funds at large.

• The vast majority of applications comes from the only Vilnius county. On average the difference between the Vilnius county and the most advanced Klaipeda and Kaunas county it tenfold.

This first round of project selection has generated a loss of trust by SMEs and county level authorities, which might negatively impact on the on-going second round of project selection for the 2004-2006 period.

Although, if there is a strong believe that the 2004 – 2006 period funds will be absorbed fully, the success in terms of the achievement of goals might be doubted, because of the uneven distribution of funds across regions, especially in knowledge and innovation related measures. Without a clear restructuring of SF allocation procedures, the negative side effect on county development within the country will continue. Additional risks arise for Lithuania since county performance indicators up to now are limited to basic macroeconomic and social indicators and statistics on innovation and knowledge economy is basically only available at the national level only.

4.2.2 Effects and added value of Structural Fund support for innovation and knowledge

This section of the report analyses the effects and added value of the Structural Fund interventions in favour of innovation and knowledge during the current programming period. The analysis is based on two main sources, namely: available evaluation reports or studies concerning Structural Fund interventions; b) interviews and additional research carried out for this study. Accordingly, this section does not pretend to provide an exhaustive overview of the effects or added value of Structural Fund interventions but rather is based on the examination of a limited number of cases of good practice. These good practice cases can may concern the influence of the Structural Funds on innovation and knowledge economy policies (introduction of new approaches, influence on policy development, etc.), integration of Structural Funds with national policy priorities, promoting innovative approaches to delivery (partnerships), or measures which have had a particularly important impact in terms of boosting innovation potential, jobs and growth.

The main results of Structural Fund interventions on innovation and knowledge economy performance at national and regional levels vary largely. Despite that economic cohesion stands as a national strategic goal, the major priority was given to

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14 see study of Transparency international
http://www.transparency.lt/up/1136449677_ES_paramos_skaidrumas_ESTEP_akimis.pdf

15 A good definition is “The economic and non-economic benefit derived from conducting interventions at the Community level rather than at the regional and/or national level”. See Evaluation of the Added Value and Costs of the European Structural Funds in the UK. December 2003. (Available at: www.dti.gov.uk/europe/structural.html)
the economic growth and competitiveness of the country. In this way, most developed cities and counties are further strengthened.

In the most developed county centers (Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys), and especially in the capital, new activities are developed, and services implemented. Beside the positive economic effects, it also increases the gap with other counties. This tendency is supported by the complementary flows of FDI, attracted by qualified human resources, infrastructure, and R&D opportunities. The country centers with a weaker economic potential are not as attractive. Their economic growth remains very weak and pure transport infrastructure will not allow the population to benefit from the job opportunities in the larger industrial centers. Weak capacity to submit to amplify applications, may well further restrict their access to SF aid benefits.

All other counties, especially those which the largest cities (Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys), present a dichotomy between a centre (having access to innovation and knowledge) and a periphery, dominated by low-tech low value added production profiles. Therefore the actual impact of the 2004-2006 SF can only be analysed in terms of those cities which were more or less actively involved in the first SPD implementation round.

Knowledge and innovation infrastructure in Lithuania still follows its first development stages. There are structural problems of separation of Science, development and business sectors, inherited from the former Soviet Science and production system. Building links among R&D and the innovation community remains the first priority for knowledge economy development and innovation based growth in the country. Therefore the first SPD implementation round was aimed at strengthening R&D and business links via developing innovation support skills and capacities of public institutions. However, the number of successful applications for the development of innovation support skills and of networks and clusters is close to zero up to now.

On the other hand direct R&D support to business was included in order to initiate R&D projects in enterprises, and in this way to increase business R&D, which is unacceptably low. This direct support has however restricted participation of Science institutions as project partners (no more than 30% of activities could be outsourced), and institutional contacts via this scheme can hardly be established.

The human resources development and implementation of life long learning strategy has its limitation as well. A large number of funds
were allocated through Labour market training services, aimed at the retraining of unemployed. However, a radical drop in unemployment suggests a need to rethink the human resources development strategy, and shift it to more on-the-job training and improvement of qualifications of employed persons in companies, but not the general training of unqualified labour.

Development of human resources for R&D and innovation was a special scheme aimed to develop highly skilled human resources for R&D in business and in academia. Business sector continuously suffers from extremely low R&D personnel numbers, and academia – from the rapid aging and inability to attract new human resources. The scope of each of the schemes is moderate, and their effects might be evaluated only ex ante. The first actual results will be achieved in the next years only, which will make evaluation possible.

These measure targets the major development gaps of Lithuanian national innovation system – very low business R&D. At ex ante, estimated impact should change the situation in R&D and R&D in business sector – total R&D expenditures should increase with 9%, and business R&D expenditures should increase up to 30%. The number of researchers should increase with 600 or 5% in total, but too much higher extent in business, which employ 6, 7% of total R&D personnel in the country only.

Although the financial impact of those measures is moderate if compared to total spending on industrial sector development under the SPD priority 3, and human resources development under the SPD priority 2, their specific orientation and targeting makes them highly important for future knowledge and innovation policy design. The highly skilled human resources are targeted for the first time directly, and R&D in business support was already tested in the Phare 2002 programme. The selected measures are implemented by different institutions. Understanding actual links and possible synergy areas (existing or not) between them would be crucial for the design of future interventions in knowledge and innovation areas.

4.3 Conclusions: Structural Funds interventions in favour of innovation and knowledge

Exhibit 11: main outcomes of innovation and knowledge measures

<table>
<thead>
<tr>
<th>Programme or measure</th>
<th>Capability</th>
<th>Added value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1.5. The development of infrastructure of labour market, education, science and study institutions and social services</td>
<td>• Good absorption capacity</td>
<td>• Due to the large number or target groups, the contribution to the development of science and education infrastructure is limited, but still focused on the most important areas – development of educational IT base, distant education points, etc.</td>
</tr>
<tr>
<td>Measure 2.1. Development of employment skills</td>
<td>• Problems due to limited eligible applicants and reduction of unemployment down to 4% due to emigration</td>
<td>• The new basic skills for changing economy should be gained in order to serve the needs of skilled blue collar labour</td>
</tr>
<tr>
<td>Programme or measure</td>
<td>Capability</td>
<td>Added value</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Measure 2.2. Development of the competencies and adaptability to changes of the employed labour</td>
<td>• Good absorption capacity, high regional disparities in absorption rates</td>
<td>• New skills for modern economy are developed – ICT, languages, and specialised skills in certain sectors. • Employers and SMEs should benefit from the better management</td>
</tr>
<tr>
<td>Measure 2.4. Development of conditions for life long learning</td>
<td>• Good absorption capacity, high regional disparities in absorption rates</td>
<td>• Up to date skills for economy and innovation, upgraded qualifications</td>
</tr>
<tr>
<td>Measure 2.5. Improvement of quality of human resources for R&amp;D and innovation</td>
<td>• Good absorption capacity, regional dimension limited to the cities with universities or university colleges</td>
<td>• Modern highly skilled human resources, encouraged mobility between science and business sector, development of interdisciplinary skills for knowledge economy</td>
</tr>
<tr>
<td>Measure 3.1. Direct support for business</td>
<td>• Good absorption capacity, implementation restricted via application of the same measure for SME’s and LSE’s which led to domination of large projects by large corporation with few benefits for SME’s</td>
<td>• Incremental, market, technology transfer, quality improvement oriented, and environmental innovations</td>
</tr>
<tr>
<td>Measure 3.1.7. R&amp;D in business sector</td>
<td>• High demand, low number of funded projects via limited project evaluation capacity and competence by the implementing body</td>
<td>• Boost of R&amp;D in business, which should lead to strategic, new knowledge based innovations</td>
</tr>
<tr>
<td>Measure 3.2. Improvement of business conditions</td>
<td>• Good absorption capacity</td>
<td>• Further development of business and innovation support infrastructure and its competencies</td>
</tr>
<tr>
<td>Measure 3.3. Development of IT infrastructure and services</td>
<td>• Good absorption capacity</td>
<td>• Development of IT infrastructure, e-government and e-services for business and citizens, further development of the information society</td>
</tr>
</tbody>
</table>

Effectiveness → significant results achieved; good absorption and management performance, etc. Added value of measures → reinforcement of national priorities, innovative approaches and solutions, institution building, etc.
5 Regional potential for innovation: a prospective analysis

This section of the report seeks to summarise and draw conclusions from the analysis of the proceeding sections, available studies and interviews and focus groups carried out for this study in order to provide an analysis of the regional innovation potential. In doing so, the aim is to provide a framework for orientations in terms of future Structural Fund investments in innovation and knowledge.

5.1 Factors influencing regional innovation potential

Lithuanian’s knowledge economy potential was recently assessed. Major recent studies are “Complex study on Lithuanian Economy growth and sources of competitiveness” (2006) and “Study on implementation of Innovation policy and development of recommendations” (2005). The major nationwide challenges in the fields of innovation and knowledge economy development highlighted in these reports are:

- S&T technology development is not sufficient to build up valuable inputs for knowledge economy developments. Inexistent strategic innovations and dominating adaptive innovation attitudes include the risk of remaining at the periphery of scientific and technological progress within the EU.
- Development of science is not clearly related to the growth of economic competitiveness. The dominating believe in the S&T policy is that science equals innovation and thus reinforces economic growth; this in turn restricts productive co-operation of science and business sectors.
- The critical mass of core competencies for knowledge economy is not yet established in the country. The numbers of highly qualified (master and PhD levels) – human resources remains below the critical level.
- The society suffers of not having general competencies for knowledge economy. Ability to learn by using innovative learning methods, - e-learning, networks, etc. is very low.
- Intellectual and knowledge based entrepreneurship, or ability to transfer knowledge into productive forms of innovation and intellectual capital does practically not exist in the country. Higher educational curricula do not address and include sufficient competencies for facilitating social and economic processes within a knowledge economy context.

The knowledge and innovation based growth potential first of all arises from the industrial sector. There are two basic types of needs for innovation in the Lithuanian industrial sector: i) on the one hand, there is a need to upgrade traditional mid-high tech industries; and ii) on the other to develop more value added activities within this sector.

Most prospective sectors today are chemistry, electronics, machinery and equipment, wood and furniture production. Food and textile sectors still keep their strong positions in the industrial fabric; however innovation and knowledge activities in both of them have been so far weakly addressed by SF supported interventions.
Lithuania has developed a number of high-tech industries, which have the potential to underpin the new technology wave for growth – like biotechnology, lasers, mechatronics, nanotechnologies and ICT.

Overall weakness of Lithuania’s industrial sector is the very low level of strategic innovations, and the strong domination of adaptive innovation. This mode of innovation activity is sufficient in the first development stages, but cannot lead the country to the stronger and leading positions in certain technology fields in the global world competition.

Business and industrial innovation knowledge needs should be basically served by the R&D infrastructure which is concentrated in the two largest cities – Vilnius and Kaunas, and regional needs complemented by appropriate R&D structures at county level. The high concentration of public knowledge and resources in the 4 largest Lithuanian cities has however not yielded the desired innovation impact, because of the very weak links between business and academia.

Agriculture remains an important sector in Lithuania’s economy and employment structure. However, the agricultural sector is still too weak for innovation activities. The industrial biotechnology development programme should contribute to spark a new growth potential for the agricultural sector, linking scientific achievements with industrial development, based on bio-resources (agriculture and forestry).

The growing importance of services is related to the innovation growth in certain fields – financial sector, tourism, professional services, etc. However, services are overlooked in the innovation related strategic documents, and the innovation activities and potential in these sectors are not at present fully addressed. The public service innovation is a must in order to improve their quality and quantity. The only current support for innovation in services is related to the development of electronic services for the tourism sector.

There is however a new potential, in the field of SPA and recreation tourism, which could push Lithuanian historical SPA centers to the world level. Lithuania has unique resources of mineral water and mud, which makes several cur-ort cities famous for sanatorium treatment not only in the country, but also abroad\textsuperscript{16}. Historical health resorts are Druskininkai and Birstonas; and two new Curort cities, Palanga and Neringa are emerging close to the Baltic sea. These resorts show potential to be developed into the wellness clusters, linking health promotion and treatment with health resort tourism.

\textsuperscript{16} Therefore the review of the status of health resorts and their localities together with their regulations in Lithuania, their development, specificity, the effects of the health resort natural factors (climatotherapy, balneotherapy, pelotherapy) on the healthy body and patients is needed.
Exhibit 12: factors influencing innovation potential by type of region

<table>
<thead>
<tr>
<th>Region / type of region</th>
<th>Main factors influencing future innovation potential</th>
</tr>
</thead>
</table>
| Vilnius – Kaunas as a leading knowledge and R&D region      | • Concentration of R&D and higher education resources.  
|                                                             |   • Highly qualified human capital, with a large number of S&T graduates  
|                                                             |   • Development of technology and innovation support infrastructure.  
|                                                             |   • Creation of modern R&D and industrial excellence centres, establishing links between business and R&D communities for the strategic innovations that are crucial for future success. |
| Industrial cities with local R&D infrastructure             | • Strongly developed industrial and physical infrastructure.  
| (Klaipėda, Šiauliai, and Panevezys)                         |   • Presence of an active business community and local R&D potential via universities and technology parks.  
|                                                             |   • Further development of knowledge infrastructure for the local business profile is crucial. Upgrade of industries via FDI would be an important tool towards higher value added activities. |
| Industrialised cities without original knowledge infrastructure | • Regional development related to sectoral strengths  
| (Alytus, Marijampolė, Utena, etc.)                         |   • Matching industry needs and qualifications of human capital  
|                                                             |   • Access to innovation support services and finances  
|                                                             |   • Development of competence networks and clusters that would link those cities to the country R&D infrastructure |
| Cur-ort cities with natural SPA resources                   | • There is a potential to develop a wellness cluster while linking natural resources, existing infrastructures and R&D knowledge of the Medical and Physical universities  
| (Druskininkai, Birstonas, Neringa, Palanga, etc.)           |   • Highly qualified human resources |
| Rural periphery of all counties                             | • Dominance of agriculture  
|                                                             |   • Low R&D potential  
|                                                             |   • Low educational level  
|                                                             |   • Weak entrepreneurial skills |

5.2 A prospective SWOT appraisal of regional innovation potential

The analysis of the county level innovation potential of Lithuania is restricted because of the lack of indicators and statistical data. However, the country cannot be taken as equally developed and certain types of counties are facing different types of knowledge and innovation related challenges.

Vilnius and Kaunas regions, building up a major urban area, manifest themselves as the knowledge and innovation bi-pole of Lithuania. The absolute concentration of public R&D resources between both cities, the existence of technology parks, both
public and private initiative based, business and innovation support infrastructure, concentration of highest qualifications, large numbers of S&T graduates, as well highly qualified human resources, create preconditions for knowledge economy development in these two cities. Although Kaunas is lagging behind in supporting public-private partnerships for knowledge and innovation, and loosing its position to Vilnius in competing for highly qualified young people, it still remains the city with the largest number of universities and the largest technology university in the Baltic.

The specific strengths of the cities are in the high R&D potential in specific high tech fields: i) biotechnology and lasers in case of Vilnius; ii) mechatronics and nanotechnologies in case of Kaunas; iii) ICT in both; and iv) a potential to generate spin-offs if specific complex support measures would be in place. Furthermore Kaunas logistics centre represents an important potential for transport and logistic innovative development.

**Exhibit 13: Innovation and Knowledge SWOT – Vilnius-Kaunas Cities**

<table>
<thead>
<tr>
<th><strong>Vilnius – Kaunas as a leading knowledge and R&amp;D cities</strong></th>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>• High level if concentration of public R&amp;D expenditure</td>
<td>• Large diversification and low prioritisation of science</td>
</tr>
<tr>
<td></td>
<td>• Strong clusters in high tech priority areas and opportunity for spin-off companies</td>
<td>• Weak intellectual entrepreneurship</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td>• Weak co-operation between R&amp;D and business sector, except of few high-tech areas</td>
<td>• Diversification and weak performance of R&amp;D efforts for business needs</td>
</tr>
</tbody>
</table>

Industrialised cities with local higher education and R&D infrastructure, such as Klaipeda, Siauliai, Panevezys, show sectoral innovation potential, which could be encouraged via building links between business and local R&D potential. The innovation needs are more related to the needs of local industries (which are dominated by machinery and equipment, food and beverage, furniture, and other traditional sectors), but not to the development of the new high tech areas. Potentially, they are core users and beneficiaries of new scientific developments for the innovation and upgrade of their traditional industries. Their specific characteristic today is inexistant business and R&D co-operation, which could keep them at the periphery of the knowledge economy, and further strengthening the brain drain towards Vilnius and Kaunas.

**Exhibit 14: Innovation and Knowledge SWOT – Industrial Cities with R&D infrastructure**

<table>
<thead>
<tr>
<th><strong>Cities with local R&amp;D</strong></th>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>• Public R&amp;D, technology transfer and innovation support infrastructure</td>
<td>• Strong position of Kaunas and Vilnius, internal “brain drain”</td>
</tr>
<tr>
<td></td>
<td>• Highly qualified human resources</td>
<td>• Weak intellectual entrepreneurship skills</td>
</tr>
</tbody>
</table>

17 The extensive study on regional industries and clusterisation potential will be performed by the initiative of Ministry of Economy in 2006. Regional innovation potential will be also estimated in the course of development of Regional Innovation Strategies.
### Cities with local R&D

<table>
<thead>
<tr>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Lack of highest qualifications, especially in technology areas</td>
<td>- Non-existing local innovative clusters</td>
</tr>
<tr>
<td></td>
<td>- Weak co-operation between R&amp;D and business sector</td>
<td></td>
</tr>
</tbody>
</table>

Industrialised cities without original R&D infrastructure share the strength of well developed industrial sectors, and the weakness of being apart from the major urban areas, which may lead to weaker knowledge inputs, negative migration of highly qualified people, and an inability to attract knowledge and innovation resources. The basic need for innovation is to develop competences networks and national clusters which would link industries of these cities with the national knowledge and innovation resources.

**Exhibit 15: Innovation and Knowledge SWOT – Industrial Cities without R&D infrastructure**

### Cities without local R&D

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Highly qualified sectoral human resources</td>
<td>- High degree of industrial specialisation</td>
</tr>
<tr>
<td></td>
<td>- Strong specialised industries</td>
<td></td>
</tr>
<tr>
<td>Weaknesses</td>
<td>- Lack of knowledge for local sectoral needs</td>
<td>- Weak co-operation with the knowledge and innovation creation centres</td>
</tr>
<tr>
<td></td>
<td>- Lack of qualified new human resources for innovation</td>
<td></td>
</tr>
</tbody>
</table>

The curort cities of Lithuania, benefiting of natural spa resources and long recreational tradition, could build up a potential for a wellness cluster. Highly qualified human resources, development of service infrastructure, growing domestic and international demand lead to positive expectations. The links with medical and physical R&D centers should be further strengthened by developing new services. Co-operation between wellness businesses, further development of tourism and hospitality qualifications and infrastructure are crucial for success.

**Exhibit 16: Innovation and Knowledge SWOT – Cur-ort cities**

### Curort cities with natural spa resources

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Highly qualified sectoral human resources</td>
<td>- Un-developed infrastructure</td>
</tr>
<tr>
<td></td>
<td>- Long-term recreation and SPA tradition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Wellness cluster</td>
<td></td>
</tr>
<tr>
<td>Weaknesses</td>
<td>- Lack of qualified new human resources for innovation</td>
<td>- Weak co-operation with the knowledge and innovation creation centres</td>
</tr>
</tbody>
</table>
5.3 Conclusions: regional innovation potential

Policy headline 1: Potential for development of the urban areas into research and innovation poles

- A unique combination of intellectual and research resources with a high concentration of universities, R&D institutes and research centres in both Vilnius and Kaunas cities provides a solid base for the development of cross-cutting technologies and innovations. Given their geographic proximity they could become a research and innovation dipole, capable of generating spill over effects to other counties with significant industrial capacity such as Klaipeda, Siauliai, Panevezys, Alytus, and Marijampole.
- However, low collaboration between research and business sector, especially in traditional industries, remains an obstacle. Further efforts for developing co-operation should be supported. In parallel, there is still a need to support R&D and development research infrastructure and basic and effective transport infrastructure and connections (railway and road).
- Relevant cities: Vilnius, Kaunas.

Policy headline 2: Potential for upgrading low-/mid, and mid-/high-tech industries in the value chain

- Productivity, environmental issues, energy consumption and the effective value added in production are major concerns of mid-/high-tech sectors. Low-tech industries are trapped by the competition from other low cost countries. Both types of industry could take advantage of the new technological trends and diversify towards more high-tech, higher added-value products. Converging technologies such as bio, nano and new materials that transcend the boundaries of sectors could allow industries in traditional sectors (textile, agro-food, furniture, etc) to base their competitive advantage on product characteristics and quality.
- Relevant cities: cities of Klaipeda, Panevezys, Siauliai, Marijampole, Alytus, but also Vilnius and Kaunas18.

Policy headline 3: Potential for creating a multifunctional peripheral agricultural space.

- Development of a multifunctional agricultural space by transiting from commodity production and family-based farm ownership to a set of professional knowledge-driven economic activities based in rural areas is a challenge for most of the rural areas. Linking the agricultural profile with the energetic needs of the country presents an interesting potential in the long-term. Lithuania has limited potential for renewable energy resources (wind, solar and water energy); therefore the development of bioenergetics, as one of

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18 Regions with strong or at least existing R&D capabilities i.e. Vilnius, Kaunas, Klaipeda, Siauliai could focus on R&D and product development while those with strong industry presence i.e., Marijampole, Alytus, Utena, Telsiai could focus on technology transfer, collaboration with research organisations, non-technological innovation, or clustering.
the alternatives to nuclear energy, is an important issue. Production of bio-fuel could give a synergy effects to the production of oil refining products in Mazeikiai.

- Relevant counties: all peripheral rural areas\(^{19}\), especially those more distant from the larger cities.

**Policy headline 4: Potential to develop high value added tourism and services sector**

- Tourism is a relatively new activity for Lithuania. Lithuania has a long historical tradition of SPA and health tourism in some well known cur-ort cities. These cities depend also on recreational tourism. Differently from other types of tourism, this niche is highly knowledge intensive, and generates high potential for added value. Knowledge production and diffusion should be facilitated from the existing HEIs and research infrastructures in medical and physical science, concentrated in Vilnius and Kaunas. The challenge is to link all these partners together and to develop high value-added activities.

- Relevant cities: Druskininkai, Birstonas, Palanga and Neringa, knowledge centres – Vilnius and Kaunas.

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\(^{19}\) Counties with sufficient agricultural potential (productivity of land, etc.) and potential for development of the linkages with national RTDI centres could combine research activities in areas such as agro-food, biotechnology, logistics, bio-energy with technology transfer to farms, cluster development, organisational and business innovations. Districts with no sufficient RTDI capacity and more distant from the urban areas should concentrate on the latter.
6 Future priorities for Structural Fund support for innovation and knowledge: options for intervention

The economic factors growth programme for the period 2007-2013 sets the new targets for innovation policy implementation, which should contribute to the main economic growth target: “secure economic growth in the long-term in order to reduce the development gap between Lithuania and the EU average” (as it is stated in National Reform Programme). Specific objectives related to innovation in this overall programme are:

♦ Increasing the share of high added-value businesses in the national economy
♦ Developing favourable conditions for business and innovations
♦ Improving the effectiveness of economic infrastructure (not directly impacting innovation per se)

Strengthening of R&D and technology innovation without effective co-operation between business and R&D sector might not lead to the expected results. Development of S&T parks should go hand in hand with the development of innovative clusters. Public-private partnerships should help to orient the development of S&T parks towards business innovation needs. The potential for innovation at county level still needs to be assessed, through designing regional innovation strategies. There is a strong need for innovation in each county, but not all of it should be R&D related.

On 14\textsuperscript{th} March 2006, the Government of Lithuania has approved the guidelines for the new EU Structural Funds Support and a preliminary allocation of fund between various investment areas for the period 2007-2013. It is agreed that the final allocation will be set after extensive discussions with the public partners. The preliminary version of Lithuanian SF support implementation strategy for 2007-2013 was approved on 15\textsuperscript{th} March 2006. The process of consultation is on-going, and the final allocation for intervention areas was to be approved on 16\textsuperscript{th} June 2006.

According to the current draft, the government plans to allocate to sectors that can impact on RTDI more or less: i) 18 % of all support for the development of human resources; ii) 7.8% for the direct support for R&D and innovation development in business; iii) 3.8% for the development of innovation and business support infrastructures; iv) 4% for information society development; and v) 0.9% for the development of industrial zones and investment zones.
6.1 Strategic orientations for Structural Fund investments in innovation and knowledge

Key conclusion 1: Lithuania is not able to convert its knowledge inputs into the knowledge outputs

Lithuania has a low knowledge and innovation based growth. This can be traced back to: a) wide diversification of S&T activities; b) separation of R&D and business sectors, manifesting itself in low business R&D investments in a mid-/high-tech, and high-tech industries; c) public R&D activities insufficiently corresponding to the needs of the industrial sector; and d) low levels of absorptive capacity for R&D and technological knowledge, resulting in the inability of the business sector to create strategic innovations.

Recommendation 1: Structural Funds interventions promoting development of R&D should focus on priority technology fields in the dipole cities of Vilnius and Kaunas. While other regions should be encouraged to build effective knowledge links with the R&D and innovation poles.

The cities with high R&D and innovation potential (Vilnius and Kaunas) need strong R&D and innovation related policies, that would support development of national S&T strengths and a breakthrough of competencies in selected areas. Cities with their own local knowledge infrastructure (Klaipeda and Siauliai, to a lesser extent Panevezys) need a strategy for the development of local knowledge centres linked to local industrial needs. Cities with strong industrial specialisation (Alytus, Marijampole) need to build up effective links with the established knowledge and excellence centres via the development of knowledge transfer infrastructures. In the cur-ort cities, specific recreation and health tourism competencies and excellence centres should be developed. Rural peripheral areas in all counties should successfully upgrade their value chain via closer involvement in the industrial biotechnology development of the country.

Relevant examples from other countries that could be relevant to the needs of the Lithuanian regions: (i) Finland’s TEKES technology programmes could serve as a good example for concentration of resources in priority fields; and three Danish initiatives could pave the way to improving business and research linkages: ii) Denmark Regional Technology Centres; iii) Denmark Innovation Consortiums; and iv) Denmark Large Cross-Disciplinary Research Groups.

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20 See http://trendchart.cordis.lu/te_policy_measures_search.cfm. Technology programmes are targeted entities of activation, funding and expert services that are directed on the basis of customers’ needs and focus areas that are strategically important to Finland.

21 See http://trendchart.cordis.lu/te_policy_measures_search.cfm. Their main objective is to strengthen knowledge based growth and development in the regions outside of the larger cities. Regional Technology Centres focus on regional competencies and act as intermediaries between regional research and SMEs.

22 See http://trendchart.cordis.lu/te_policy_measures_search.cfm. The aim of the Innovation Consortiums is to strengthen co-operation between companies, public research institutions and
**Key conclusion 2:** Lack of concentrated competencies for knowledge economy hampers effective business and R&D links

The development of human resources is crucial for the country’s long-term success. However, a too strong orientation towards unemployed and unqualified labour does not allow the building up of a critical mass of highly skilled resources which would actually strengthen the growth of knowledge economy. Most of the present qualifications are obsolete and do not lead to an innovation-based growth. The drop of structural unemployment indicates that the main target should be the development of qualifications and the upgrading of skills of the already employed skilled population. *Entrepreneurial and creative skills*, especially in knowledge-related population, including services, are also lacking in all sectors of the economy.

High numbers of S&T graduates are not sufficient to drive a knowledge and innovation economy growth. The highest level of modern science and technology competencies is lacking (in priority technology areas, and engineering). In addition to science and technology skills development, specific emphasis should be put on the development of specific S&T management and intellectual entrepreneurship competencies.

**Recommendation 2:** Critical mass of physical and intellectual R&D and strategic innovation resources should be developed in the country – in terms of development of the physical research base and building-up of a critical mass of highly competent people in science, R&D and science and innovation management, in both R&D and business.

A horizontal type of measures is needed, such as increasing the number of PhDs in the business sector (for example, 1000 researchers for the business sector), and academia as well, while encouraging mobility of researchers to the business sector and facilitating the development of R&D-based spin-offs. The development of competencies without a strong physical R&D base is impossible or irrelevant because it will only cause the brain drain of highly skilled people (presently happening in biotech, laser physics, and other high-tech fields). Therefore, the creation of excellence centres and physical R&D infrastructures in selected priority areas should be aligned with the projects developing the necessary human competencies.

It must be noted that the development of science and technology competencies without a strong innovation and intellectual property management component is meaningless, since all the developments will be outsourced to third parties having these competencies (foreign partners). Therefore, not only the establishment of a R&D base and competence centres is important, but also the development of technological service to develop new generic technology platforms for the coming 5-10 years product and service development in Denmark.

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23 See DK 14, [http://trendchart.cordis.lu/tc_policy_measures_search.cfm](http://trendchart.cordis.lu/tc_policy_measures_search.cfm). These research groups will co-operate across institutions and traditional technical and professional disciplines and be organised for joint management. The Research Groups are to be established in areas having large societal or industrial need of developing new knowledge and know-how.


25 Study on managerial competence development in higher education study programmes (2005). Institute of Business Strategy, Kaunas University of Technology.
intellectual property management support system (establishment of IPR consultancies, IP management centres, etc.)

**Key conclusion 3: Weak linkages between the various actors of the National Innovation System**

The linkages among the various actors of the national innovation system remain weak and without a strategic perspective, despite the efforts and the launching of a number of measures over the previous years aiming at increasing these collaborations.

**Recommendation 3: Promote networking, clustering and the development of innovation poles, across companies in major economic sectors.**

The recent programming period has shown that companies are not able by themselves to develop cluster initiatives and proposals. Therefore the responsibility for cluster development should be shared between business associations, businesses, consulting and intermediation companies from the private and public sectors.

Still, for the long-term success, strong public support is needed. Business initiatives, if not supported by public sector, usually fail in the first development stages because of the initial lack of interest to diversify and engage in cluster monitoring activities instead of the core business, although motivation exists.

**Relevant good practice examples are:** (i) Norway Industrial Gardens (Næringshager); ii) Austria: The Technology Transfer programme Protec 2002+; and iii) Austria Techno Kontakte.

**Key conclusion 4: Limited innovation governance capacity.**

A National Strategy for Innovation that could mobilise public administration at national and regional level is needed. R&D and business co-operation initiatives can only be fostered through measures that can target all actors generating knowledge. Funding single projects in not specified areas leads to inadequate use of resources without achieving synergetic effects in the NIS. Science base development, business

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26 There are only isolated cases of successful business associations initiatives in the development of innovative clusters (TECHNOPOLIS in Kaunas, SUNRISE Valley in Vilnius, ART FACTORY business incubator for creative industries)

27 See [http://trendchart.cordis.lu/tc_policy_measures_search.cfm](http://trendchart.cordis.lu/tc_policy_measures_search.cfm). An industrial garden is a group of knowledge intensive firms gathered under one roof. The objective of the industrial garden programme is to stimulate value creation, creating regional clusters of SMEs which offer attractive work opportunities for highly educated persons and can draw on each the competencies of each other

28 See [http://trendchart.cordis.lu/tc_policy_measures_search.cfm](http://trendchart.cordis.lu/tc_policy_measures_search.cfm). Protec 2002+ mainly concerns the following elements of the innovation processes: use external sources of knowledge in R&D, improvement of the innovation management of companies (especially of SMEs), creation of co-operation models and (sustainable) networks with the aim of raising the innovative potential among the SMEs involved

29 See [http://trendchart.cordis.lu/tc_policy_measures_search.cfm](http://trendchart.cordis.lu/tc_policy_measures_search.cfm). Improvement of the innovative and competitive performance of Austrian companies through the transfer of best practice experiences in the form of firm-to-firm visits.
R&D, competence development, and innovation support system development projects are only occasionally linked together. The development of innovation support infrastructure, and especially business R&D support (managed by the Ministry of Economy), only occasionally correspond with the R&D and innovation inputs development projects, administered by the Ministry of Education and Science.

**Recommendation 4:** Re-engineer the country’s governance systems for R&D and innovation and development of a National Strategy for Innovation and Research.

A National Strategy for Innovation and Research needs to be developed which will allow different ministries and county authorities to align their efforts towards common goals. Furthermore, training on innovation and R&D policy and provision of technical assistance to the county authorities are necessary.

In addition to this national strategy, the mobilisation of existing capacities outside the public administration (consultants, expertise in universities, intermediary bodies etc.) and the promotion of forward thinking of the Lithuanian society and of specific actors, especially in the counties, is essential. In doing so, more participatory and forward thinking methods for planning are necessary, including the uptake of foresight or technology road-mapping by a larger number of actors.

### 6.2 Operational guidelines to maximising effectiveness of Structural Fund interventions for innovation and knowledge

**Key conclusion 5:** The absorption capacity of SF varies between counties, leading to the bulk of support flowing to Vilnius

Existing knowledge, innovation and management competencies are concentrated in the larger cities, and especially in Vilnius. Not only businesses and NGOs, but also public authorities differ in their ability to develop comprehensive strategies, competitive projects, and maximise benefits from SF. Winning and losing counties in securing SF funds for knowledge and innovation absorption are emerging, which leads to further divide.

It is clear that not all regions have a potential to become knowledge and innovation driven in the near future. Disadvantaged, rural regions need higher public sector participation in facilitation of entrepreneurial and innovative processes, and are not ready for advanced measures (such as IPR support, R&D in business, development of technological incubators, etc.).

**Recommendation 5:** Regional dimension should be added to the administration of SF support, after the RIS exercise in completed (i.e at mid term of the 2007-2013 programming period)

Industrial cities without strong knowledge infrastructure still have a potential to develop industrial applied R&D centres in specified areas, which are still to be envisaged when drafting regional innovation strategies. Therefore, the main recommendation at this would be to include an option for reviewing programming measures relating to RTDI at mid-term evaluation of the programming period,
offering the opportunity to target specific regional objectives for knowledge and innovation after their regional innovation strategies have been developed.

**Key conclusion 6**: The absorption capacity of direct support for business is unequal between large size and small and medium size companies

**Recommendation 6**: Measures supporting LSEs (large-scale) and SMEs should be separated. LSEs are able to absorb fund for R&D and innovation individually, but SMEs due to their low absorption capacities should be provided with an opportunity to develop R&D incentives in innovative clusters.

This recommendation is related to the different R&D potentials and needs across the companies of the same sector but in different regions. Those LSEs that are operating in relatively R&D intensive regions should be able to build up their potential to create industrial knowledge though centres or technology platforms. While those companies (mostly SMEs) in other less R&D intensive regions might need to be get involved in Innovation developments through via clustering and network linkages. Innovation gardens, competence networks, multidimensional research groups and national clusters along the industrial sectors could also be a relevant tool for specific types of enterprises.
### Exhibit 17: Summary of recommendations on investment priorities

<table>
<thead>
<tr>
<th>Region or group of regions</th>
<th>Strategic focus</th>
<th>Priority measures</th>
<th>Indicative financial resources</th>
</tr>
</thead>
</table>
| Vilnius – Kaunas as a leading knowledge and R&D cities | Development of national knowledge economy and innovation pole | ▪ Creating and strengthening national R&D centers in the priority technology areas  
▪ Developing R&D and business co-operation platforms  
▪ Strengthening existing R&D and higher education infrastructure  
▪ Strengthening technology based business support infrastructure  
▪ Developing a critical mass of competencies for knowledge economy  
▪ Strengthening innovation and intellectual property management support system  
▪ Increase substantially the R&D funding both in applied and basic research and promote participation in 7th FP.  
▪ Support interdisciplinary R&D and exploit emerging technological fields (i.e. bio, nano) and their convergence with technologies in traditional sectors. Measures should foresee a wide spectrum of activities from R&D to product and process development.  
▪ Creation of mechanisms for networking and alignment of companies in international value chains and empower networking between firms and PROs through collaborative research.  
▪ Support lifelong learning.  
▪ Promote market driven financing mechanisms.  
▪ Promote foresight and forward thinking planning | ▪ 30% - 40% of SF funding in the counties |
| Industrial cities with local R&D infrastructure (Klaipėda, Šiauliai, Panevėžys) | Development of industry related sectoral knowledge centers and innovative clusters | ▪ Establishment of Industrial gardens  
▪ Creation of regional industry related excellence centres  
▪ Development of innovation and intellectual property management support system  
▪ Strengthening PRO’s links with local industry through development of product and process innovations, demonstration or problem solving projects.  
▪ Creation of mechanisms for networking and alignment of companies in international value chains.  
▪ Support spin-offs and existing technology park and incubators.  
▪ Promote product and process innovation in mid-tech sectors as well as organisational and business innovations.  
▪ Promote market driven financing mechanisms (micro credit etc.).  
▪ Support lifelong learning.  
▪ Promote foresight and forward thinking planning | ▪ 20% of the SF funding in the region |
| Industrialised cities without | Development of innovative clusters | ▪ Establishment of Industrial gardens  
▪ Creation of regional industry related excellence networks | ▪ 5-10% SF funding in the region |
<table>
<thead>
<tr>
<th>Region or group of regions</th>
<th>Strategic focus</th>
<th>Priority measures</th>
<th>Indicative financial resources</th>
</tr>
</thead>
</table>
| original knowledge infrastructure (Alytus, Marijampolė, Utena, etc.) | and competence networks, linked to the national R&D infrastructure | - Development of innovation and intellectual property management support system  
- Creation of mechanisms for networking and alignment of companies in international value chains.  
- Support life long learning.  
- Balance between R&D funding in universities and technology transfer with emphasis on revitalising traditional industries.  
- Promote market driven financing mechanisms (CV, micro credit etc.).  
- Promote product and process innovation in low-tech and mid – high sectors, as well as organisational and business innovations by exploiting emerging technological fields (i.e. bio, nano) and their convergence with technologies in traditional sectors.  
- Promote foresight and forward thinking planning. |  |
| Cur-ort cities with natural SPA resources (Druskininkai, Birstonas, Neringa, Palanga, etc.) | ▪ Development of national wellness cluster | ▪ Development of SPA and wellness, rehabilitation and recreation excellence centres, linking medical and physical science know how to natural SPA resources  
▪ Establishment of wellness cluster initiatives, linking tourism, recreation and rehabilitation, and sanatorium treatment services  
▪ Development of modern tourism and wellness infrastructure (both, public and private sectors).  
▪ Development of tourism clusters with links to recreational activities (culture industry).  
▪ Development of new firms that provide novel services in tourism, culture and other services (e - services). | ▪ 25-35% of the SF for the regions |
| Rural periphery of all counties | ▪ Development of basic innovation and entrepreneurship knowledge | ▪ Establishment of local learning networks, linked to other networks and excellence centres  
▪ Increasing general knowledge on entrepreneurship and innovation perspective business sectors- tourism, crafts, rural industries, etc.  
▪ Promote multifunctional agricultural space.  
▪ Technology transfer for exploiting renewable energy potential. | ▪ 10 – 15% of SF funding for the region |
Appendix A  Methodological annex

A.1 Quantitative analysis of key knowledge economy indicators

A.1.1 Factor analysis

Table 1. Reduction of the dataset (215 EU-25 regions) into four factors by means of factor analysis

<table>
<thead>
<tr>
<th>The 4 factors</th>
<th>F1 'Public Knowledge'</th>
<th>F2 'Urban Services'</th>
<th>F3 'Private Technology'</th>
<th>F4 'Learning Families'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher education (HRSTE), 2003</td>
<td>.839</td>
<td>.151</td>
<td>.190</td>
<td>.184</td>
</tr>
<tr>
<td>Knowledge workers (HRSTC, core), 2003</td>
<td>.831</td>
<td>.164</td>
<td>.267</td>
<td>.327</td>
</tr>
<tr>
<td>High-tech services employment, 2003</td>
<td>.575</td>
<td>.367</td>
<td>.428</td>
<td>.323</td>
</tr>
<tr>
<td>Public R&amp;D expenditures (HERD+GOVERD), 2002</td>
<td>.543</td>
<td>.431</td>
<td>.275</td>
<td>-.195</td>
</tr>
<tr>
<td>Value-added share services, 2002</td>
<td>.323</td>
<td>.669</td>
<td>.002</td>
<td>.121</td>
</tr>
<tr>
<td>Value-added share industry, 2002</td>
<td>-.265</td>
<td>-.814</td>
<td>.386</td>
<td>-.061</td>
</tr>
<tr>
<td>Employment government administration, 2003</td>
<td>-.217</td>
<td>.745</td>
<td>.124</td>
<td>-.175</td>
</tr>
<tr>
<td>Population density, 2002</td>
<td>.380</td>
<td>.402</td>
<td>.043</td>
<td>.038</td>
</tr>
<tr>
<td>High and Medium/high-tech manufacturing employment, 2003</td>
<td>-.073</td>
<td>-.331</td>
<td>.873</td>
<td>-.089</td>
</tr>
<tr>
<td>Value-added share agriculture, 2002</td>
<td>-.222</td>
<td>-.350</td>
<td>-.672</td>
<td>-.198</td>
</tr>
<tr>
<td>Business R&amp;D expenditures, 2002</td>
<td>.335</td>
<td>-.050</td>
<td>.664</td>
<td>.267</td>
</tr>
<tr>
<td>S&amp;T workers (HRSTO, occupation), 2003</td>
<td>.560</td>
<td>.178</td>
<td>.589</td>
<td>.382</td>
</tr>
<tr>
<td>Population share under 10 years of age, 2001</td>
<td>-.237</td>
<td>.060</td>
<td>-.015</td>
<td>.868</td>
</tr>
<tr>
<td>Life-long learning, 2003</td>
<td>.472</td>
<td>-.009</td>
<td>.165</td>
<td>.703</td>
</tr>
<tr>
<td>Activity rate females, 2003</td>
<td>.418</td>
<td>-.227</td>
<td>.281</td>
<td>.620</td>
</tr>
</tbody>
</table>

Note: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization, a Rotation converged in 9 iterations. Main factor loadings are highlighted in bold. Source: MERIT, based on Eurostat data, mostly referring to 2002 or 2003

Based on the variable with the highest factor loadings we can characterise and interpret the four factors and give them a short symbolic name:

Public Knowledge (F1)
Human resources in Science and Technology (education as well as core) combined with public R&D expenditures and employment in knowledge intensive services is the most important or common factor hidden in the dataset. The most important variables in Public Knowledge are the education and human resource variables (HR S&T education and core). Cities with large universities will rank high on this factor. One interesting conclusion is that public and private knowledge are two different factors (F1 and F3 respectively), which for instance has implications for policy issues regarding Science-Industry linkages. Public R&D and higher education seems especially related to high-tech services, whereas Business R&D especially serves high- and medium-high-tech manufacturing.
Urban Services (F2)
This second factor contains information on the structure of the economy. It is well known that industrial economies are quite different from services based economies. It is not a matter of development per se, because in the European regions the variety of economic structure is very large and for a large part based on endowments and path dependent developments like the extent to which government administration is located in a region or not. This factor takes into account the differences between an industrial area and a service based area including the public administration services of the government. Another observation is that there are two different ‘urban’ factors, indicating that academic centres not necessary co-locate with administration centres. What may not be surprising is that the Urban Services factor is not associated with R&D, since R&D is more relevant for innovation in manufacturing than for service industries.

Private Technology (F3)
This factor contains business R&D, occupation in S&T activities, and employment in high- and medium-high-tech manufacturing industries. A countervailing power is the existence of agriculture in the region. One interpretation could be that agricultural land-use goes at the cost of possibilities of production sites. Another interpretation is that agriculture is not an R&D intensive sector.

Learning Families (F4)
The most important variable in this factor is the share of the population below the age of 10. Locations with relatively large shares of children are places that are attractive to start a family. Possibilities for Life Long Learning in a region seems associated with the lively labour participation of the mothers of these youngsters. The Learning Families factor could also be interpreted as an institutional factor indicating a child-, learning- and participation- friendly environment, or even a ‘knowledge-society-lifestyle’ based on behavioural norms and values that are beneficial to a knowledge economy.
1. Learning
The Learning regions are first of all characterised by the high score on the factor ‘Learning Families’, and the three main components of this factor: life-long-learning, youth and female activity rate. On the other factors the regions are close to the regional average. Unemployment is on average the lowest compared to the other EU regions. Employment in the government sector is limited. GDP per capita is rather high. The regions are located in Austria, Ireland, the Netherlands, Sweden and the UK. There are many similarities with the Nordic High-tech Learning regions, but the business sector in the Nordic version invest more in R&D.

2. Central Techno
This is a rather large group of regions located mostly in Germany and France with close to average characteristic, but the share of High-tech manufacturing is rather
high. The factor-scores as well as GDP-per head is slightly above the regional average, except for the Public Knowledge factor which is slightly lower.

3 Local Science & Services
This group of regions with diverse nationality consist mainly of capital cities, such as Madrid, Warsaw, Lisbon, Budapest and Athens. These urban area’s serve as national centres for business services, government administration, public research institutes and universities. Urban Services and Public knowledge are therefore the strongest factors for this type of region. GDP per capita is on average slightly below the EU25 average, but growing. The low score on life-long-learning is a weakness in most Local Science & Services regions, especially compared to the more wealthy and advanced Science & Service Centres.

4 High Techno
The High Techno regions host many high-tech manufacturing industries. They are mostly located in Germany (e.g. Bayern and Baden-Wurtemberg), some in Italy (e.g. Lombardia and Veneto) and two French regions. This type is very strong in Private Technology and has a high level of GDP per capita. The factors Public Knowledge and especially the Learning Family factor shows a relative weakness, e.g. in life-long-learning. Growth in terms of GDP per capita has been low and unemployment didn’t improve much in the previous years.

5 Aging Academia
This group of regions is mostly located in east-Germany and Spain and also includes the capital regions of Bulgaria and Romania. The strength in the Public Knowledge factor is mostly based on the high share of people with tertiary education. The low score on the Learning Family factor is due to little life-long-learning and hosting relatively few children. The unemployment situation has improved, but is still very high.

6 Services Cohesion
Services cohesion regions are located in Southern Europe, consisting of many Greek, some Spanish and two Portuguese regions. The low score on the Private Technology factor is striking. There is hardly any high-tech manufacturing nor business R&D. Services is the most important sector, but also agriculture is still a rather large sector. The share of manufacturing industry in value added is very limited. Population density is low, but on average it has been increasing.

7 Manufacturing Cohesion
Manufacturing industries is the dominant sector, whereas services and agriculture are rather small sectors. This type of region is mostly located in Poland, Czech Republic, Hungary and Slovak Republic. Two Portuguese regions are also included. The Public Knowledge factor is the main weakness of this type of regions. However, the score on the Private Technology factor is close to average, which means that it is much stronger in this respect than the Services Cohesion regions. Unemployment is high, even compared to Rural Industries and Services Cohesion regions.

8 Rural Industries
Besides a low per capita GDP, Rural Industries regions have in common a low score on both the factors Urban Services and Private Technology. Population density is
very low. The service sector is often very small. Especially agriculture but also manufacturing industries are relatively large sectors. Besides regions in Bulgaria and Romania

9 Low-tech Government
This type of region, mostly located in southern Italy is characterised by a very low score on Public Knowledge combined with a high share of employment in the Government sector. Unemployment is severe, on average comparable to Manufacturing cohesion regions. GDP per capita is however close to the regional average.

10 Nordic High-tech Learning
The Nordic version of the learning regions are typically strong in the Learning Family factor, but this type also has by far the highest business R&D intensity. In contrast with the popular characterisation of Nordic societies, the size of the government administration is the lowest of all the types. The low score on Urban Services is also due to the low population density. A rather unique feature of this type of regional knowledge economy is the combined strength in both the Public Knowledge and the Private Technology factor.

11 Science & Service Centre
The main characteristics of this urban group of regions are the high scores on the Public Knowledge and Urban Services factors. Population density is very high. This type also has the highest GDP per capita and productivity. The variables that are captured by the factor Learning Families also show a score above the regional average, but disappointing is the relatively low presence of high and medium-high-tech manufacturing and the business R&D intensity.
A.2 Qualitative analysis and preparation of country reports

In summary, the country reports were prepared in the following stages:

A first country document was prepared by the core study team in the form of a **template country report**. It contained overall guidance to the country experts and included a number of pre-filled tables, graphs and analysis sections based on information available at EU level.

Next, the core team members and the national experts who were involved in the pilot phase of the project commented completed elements of the templates. Drafted elements and templates were completed and compiled into **first country briefings (draft pilot reports)** by the national experts involved in the pilot phase of the project. These pilot country reports were prepared by experts for Belgium, Greece, Italy, France, and Poland.

Once the five first country briefings were completed, a **final set of guidelines** was prepared by the core team. These guidelines were agreed with the Commission services responsible for this evaluation. Prior to this, all first country briefings were reviewed during the January 2006 and presented to a first meeting of the scientific committee.

The work during the **country analysis phase** included:
- Undertaking a series of key interviews (KI) with policy decision makers;
- Organising a focus group (FG) with key national or regional RDTI stakeholders;
- Collecting additional information and finalising short case studies; and
- Preparing the synthesis notes of these various activities.

The above-mentioned work served as qualitative data and allowed the national experts to compile the draft **country reports**. All reports were subsequently reviewed, checked and finalised by the core team and the consortium members. Once this first check was completed, the core team organised a final peer reading of the document to verify its overall consistency and to ensure a final English language editing of the document. The core team then completed the final editing and layout of the document with a view to publication.

An overall synthesis report of all has been prepared and will be published by the European Commission providing an overview of the issues addressed in each of the 27 country reports produced by the evaluation team.
Appendix B   Statistical tables and regional scorecards

B.1 Overall quantitative analysis per region Lithuania

Exhibit 2: recent trends per region in key indicators

<table>
<thead>
<tr>
<th></th>
<th>Unemployment (inverse)</th>
<th>GDP per capita</th>
<th>GDP per capita growth</th>
<th>Productivity</th>
<th>High tech services</th>
<th>Higher education services</th>
<th>Knowledge workers</th>
<th>Public R&amp;D</th>
<th>Population density</th>
<th>% Value added industry</th>
<th>% Value added services</th>
<th>Government sector</th>
<th>% Value added manufacturing industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithuania</td>
<td>12.4</td>
<td>8977.0</td>
<td>8.0</td>
<td>960.0</td>
<td>1.7</td>
<td>23.2</td>
<td>11.3</td>
<td>0.5</td>
<td>53.1</td>
<td>29.9</td>
<td>63.1</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Lithuania (LT)</td>
<td>12.4</td>
<td>8977.0</td>
<td>8.0</td>
<td>960.0</td>
<td>1.7</td>
<td>23.2</td>
<td>11.3</td>
<td>0.5</td>
<td>53.1</td>
<td>29.9</td>
<td>63.1</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Cluster (Rural Industry)</td>
<td>10.3</td>
<td>8204.4</td>
<td>5.6</td>
<td>1119.9</td>
<td>1.6</td>
<td>14.8</td>
<td>7.8</td>
<td>0.2</td>
<td>61.8</td>
<td>33.6</td>
<td>52.0</td>
<td>6.0</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Source: MERIT based on Eurostat data for period indicated
B.2 Regional Scorecards
## Appendix C Categories used for policy-mix analysis

### C.1 Classification of policy areas

<table>
<thead>
<tr>
<th>Policy area</th>
<th>Short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving governance capacities for innovation and knowledge policies</td>
<td>Technical assistance type funding used by public authorities, regional agencies and public-private partnerships in developing and improving policies and strategies in support of innovation and knowledge. This could include past ERDF innovative action programmes as well as support for instance for regional foresight, etc.</td>
</tr>
<tr>
<td>Innovation friendly environment;</td>
<td>This category covers a range of actions which seek to improve the overall environment in which enterprises innovate, and notably three sub groups: innovation financing (in terms of establishing financial engineering schemes, etc.); regulatory improvements and innovative approaches to public services and procurement (this category could notably capture certain e-government investments related to provision of services to enterprises); Developing human capital for the knowledge economy. This category will be limited to projects in higher education aimed at developing industry orientated courses and post-graduate courses; training of researchers in enterprises or research centres.</td>
</tr>
<tr>
<td>Knowledge transfer and technology diffusion to enterprises</td>
<td>Direct or indirect support for knowledge and technology transfer: direct support: aid scheme for utilising technology-related services or for implementing technology transfer projects, notably environmentally friendly technologies and ITC; indirect support: delivered through funding of infrastructure and services of technology parks, innovation centres, university liaison and transfer offices, etc.</td>
</tr>
<tr>
<td>Innovation poles and clusters</td>
<td>Direct or indirect support for creation of poles (involving public and non-profit organisations as well as enterprises) and clusters of companies direct support: funding for enterprise level cluster activities, etc. indirect support through funding for regrouping R&amp;D infrastructure in poles, infrastructure for clusters, etc.</td>
</tr>
<tr>
<td>Support to creation and growth of innovative enterprises</td>
<td>Direct or indirect support for creation and growth of innovative firms: direct support: specific financial schemes for spin-offs and innovative start-ups, grants to SMEs related to improving innovation management, marketing, industrial design, etc.; indirect support through funding of incubators, training related to entrepreneurship, etc.</td>
</tr>
<tr>
<td>Boosting applied research and product development</td>
<td>Funding of “Pre-competitive development” and “Industrial research” projects and related infrastructure. Policy instruments include: aid schemes for single beneficiary or groups of beneficiaries (including IPR protection and exploitation); research infrastructures for non-profit/public organisations and higher education sector directly related to universities.</td>
</tr>
</tbody>
</table>

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30 This is part of the wider area of in-house training, but in the present study only the interventions targeted to researchers or research functions will be analysed.
### C.2 Classification of Beneficiaries:

<table>
<thead>
<tr>
<th>Beneficiaries</th>
<th>Short description</th>
</tr>
</thead>
</table>
| **Public sectors** | Universities  
  National research institutions and other national and local public bodies (innovation agencies, BIC, Chambers of Commerce, etc.)  
  Public companies |
| **Private sectors** | Enterprises  
  Private research centres |
| **Networks**     | cooperation between research, universities and businesses  
  cooperation between businesses (*clusters of SMEs*)  
  other forms of cooperation among different actors |

### C.3 Classification of instruments:

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Short description</th>
</tr>
</thead>
</table>
| **Infrastructures and facilities** | Building and equipment for laboratories or facilities for university or research centres,  
  Telecommunication infrastructures,  
  Building and equipment for incubators and parks for innovative enterprises |
| **Aid schemes**                  | Grants and loans for RTDI projects  
  Innovative finance (venture capital, equity finance, special bonds, etc.) for innovative enterprises |
| **Education and training**       | Graduate and post-graduate University courses  
  Training of researchers |
### Appendix D  Financial and policy measure tables

#### D.1 Additional financial tables

**D.1.1 RTDI plus business (innovation technology) support**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Total cost</th>
<th>SF Total</th>
<th>ERDF</th>
<th>ESF</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RTDI INTERVENTIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective 1</td>
<td>92,840,689.60</td>
<td>69,878,791.18</td>
<td>49,434,791.50</td>
<td>20,443,999.68</td>
<td>22,961,898.43</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>TOTAL COHESION POLICY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Objective 1</td>
<td>1,211,420,979.00</td>
<td>895,172,684.00</td>
<td>583,939,739.00</td>
<td>176,217,551.00</td>
<td>309,464,840.00</td>
<td>6,783,455.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>ALLOCATED</th>
<th>DISBURSED TOTAL SF</th>
<th>EXPENDITURE CAPACITY</th>
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</thead>
<tbody>
<tr>
<td>Objective 1</td>
<td>69,878,791.18</td>
<td>1,247,974.07</td>
<td>1.8%</td>
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<table>
<thead>
<tr>
<th>CODES</th>
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<th>DISBURSED</th>
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<tbody>
<tr>
<td>OBJECTIVE 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>152 - Environment-friendly technologies, clean and economical energy technologies (only for large enterprises)</td>
<td>662,804.64</td>
<td>14,934.41</td>
<td>2.3%</td>
</tr>
<tr>
<td>153 - Business advisory services (including internationalisation, exporting and environmental management, purchase of technology) (only for large enterprises)</td>
<td>736,647.62</td>
<td>35,474.28</td>
<td>4.8%</td>
</tr>
<tr>
<td>162 - Environment-friendly technologies, clean and economical energy technologies (only for SMEs)</td>
<td>994,206.96</td>
<td>22,401.62</td>
<td>2.3%</td>
</tr>
<tr>
<td>163 - Business advisory services (information, business planning, consultancy services, marketing, management, design, internationalisation, exporting, environmental management, purchase of technology) (only for SMEs)</td>
<td>818,497.36</td>
<td>39,415.86</td>
<td>4.8%</td>
</tr>
<tr>
<td>Objective</td>
<td>Total cost</td>
<td>SF</td>
<td>ERDF</td>
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<tr>
<td>-----------</td>
<td>------------</td>
<td>----</td>
<td>------</td>
</tr>
<tr>
<td><strong>RTDI INTERVENTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective 1</td>
<td>97,969,778.11</td>
<td>73,643,879.03</td>
<td>53,199,879.35</td>
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<td><strong>TOTAL COHESION POLICY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective 1</td>
<td>1,211,420,979.00</td>
<td>895,172,684.00</td>
<td>583,939,739.00</td>
</tr>
</tbody>
</table>

**D 1.2 Broad innovation and knowledge economy funding**

<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>ALLOCATED</th>
<th>DISBURSED TOTAL SF</th>
<th>EXPENDITURE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1</td>
<td>73,643,879.03</td>
<td>1,429,287.03</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

Categories 181 to 184 plus:
152 Environment-friendly technologies, clean and economical energy technologies
153 Business organisation advisory service (including internationalisation, exporting and environmental management, purchase of technology)
155 Financial engineering
162 Environment-friendly technologies, clean and economical energy technologies
163 Enterprise advisory service (information, business planning, consultancy services, marketing, management, design, internationalisation, exporting, environmental management, purchase of technology)
164 Shared business services (business estates, incubator units, stimulation, promotional services, networking, conferences, trade fairs)
165 Financial engineering
<table>
<thead>
<tr>
<th>CODES</th>
<th>ALLOCATED</th>
<th>DISBURSED</th>
<th>EXPENDITURE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>152</td>
<td>662,804.64</td>
<td>14,934.41</td>
<td>2.3%</td>
</tr>
<tr>
<td>153</td>
<td>736,647.62</td>
<td>35,474.28</td>
<td>4.8%</td>
</tr>
<tr>
<td>162</td>
<td>994,206.96</td>
<td>22,401.62</td>
<td>2.3%</td>
</tr>
<tr>
<td>163</td>
<td>818,497.36</td>
<td>39,415.86</td>
<td>4.8%</td>
</tr>
<tr>
<td>164</td>
<td>9,942,069.60</td>
<td>224,016.20</td>
<td>2.3%</td>
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<tr>
<td>181</td>
<td>5,242,051.20</td>
<td>7,648.26</td>
<td>0.1%</td>
</tr>
<tr>
<td>182</td>
<td>18,183,070.59</td>
<td>448,005.56</td>
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<tr>
<td>183</td>
<td>25,436,366.40</td>
<td>444,605.48</td>
<td>1.7%</td>
</tr>
<tr>
<td>164</td>
<td>7,863,076.80</td>
<td>11,472.39</td>
<td>0.1%</td>
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<tr>
<td>324</td>
<td>3,765,087.86</td>
<td>181,312.97</td>
<td>4.8%</td>
</tr>
<tr>
<td><strong>TOTAL OBJ. 1</strong></td>
<td><strong>73,643,879.03</strong></td>
<td><strong>1,429,287.03</strong></td>
<td><strong>1.9%</strong></td>
</tr>
</tbody>
</table>

This third calculation adds RTDI plus business (innovation & technology) support plus information society. As D.1.1 plus:
322 Information and Communication Technology (including security and safe transmission measures)
324 Services and applications for SMEs (electronic commerce and transactions, education and training, networking)
### D.2 Summary of key policy measures per programme

**Exhibit 4: main measures in favour of innovation and knowledge**

<table>
<thead>
<tr>
<th>Identified RTDI measure or major project</th>
<th>Focus of intervention (policy areas classification)*</th>
<th>Main Instruments**</th>
<th>Main beneficiaries***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1.5. The development of infrastructure of labour market, education, science and study institutions and social services</td>
<td>Innovation friendly environment</td>
<td>Infrastructures and facilities;</td>
<td>Public sector</td>
</tr>
<tr>
<td>Measure 2.2. Development of the competencies and adaptability to changes of the employed labour</td>
<td>Innovation friendly environment</td>
<td>Education and training.</td>
<td>Private sector; Public sectors;</td>
</tr>
<tr>
<td>Measure 2.4. Development of conditions for life long learning</td>
<td>Innovation friendly environment</td>
<td>Education and training.</td>
<td>Public sectors;</td>
</tr>
<tr>
<td>Measure 2.5. Improvement of quality of human resources for R&amp;D and innovation</td>
<td>Innovation friendly environment</td>
<td>Education and training.</td>
<td>Public sector</td>
</tr>
<tr>
<td>Measure 3.1. Direct support for business</td>
<td>Knowledge transfer and technology diffusion enterprises; Innovation poles and clusters; Support to creation and growth of innovative enterprises;</td>
<td>Aid schemes;</td>
<td>Private sectors; Networks</td>
</tr>
<tr>
<td>Measure 3.1.7. R&amp;D in business sector</td>
<td>Boosting applied research and product development</td>
<td>Aid schemes;</td>
<td>Private sectors; Networks</td>
</tr>
<tr>
<td>Measure 3.2. Improvement of business conditions</td>
<td>Knowledge transfer and technology diffusion enterprises; Innovation poles and clusters; Support to creation and growth of innovative enterprises;</td>
<td>Aid schemes; Infrastructures and facilities;</td>
<td>Public sectors; Networks</td>
</tr>
<tr>
<td>Measure 3.3. Development of IT infrastructure and services</td>
<td>Innovation friendly environment</td>
<td>Infrastructures and facilities;</td>
<td>Public sectors</td>
</tr>
</tbody>
</table>

* Classification of RTDI interventions: Improving governance capacities for innovation and knowledge policies; Innovation friendly environment; Knowledge transfer and technology diffusion enterprises; Innovation poles and clusters; Support to creation and growth of innovative enterprises; Boosting applied research and product development (see appendix).

**Classification of instruments: Infrastructures and facilities; Aid schemes; Education and training.

***Classification of Beneficiaries: Public sectors; Private sectors; Networks
### Appendix E  Case studies

#### Support for Research and development activity in enterprises.

- **Description**: Business R&D comprises only 0.15% of GDP and is one of the lowest among EU. In order to lay the foundations for a long-term competitiveness of Lithuanian enterprises, it is planned to support such activities that enable enterprises to create and sell in foreign markets new unique products and services and to ensure the source of revenues for development and research: creation of new products and services, introduction of new technologies and innovations, R&D activities for industry and business (activities performed by enterprises or outsourced). Support given to enterprises will encourage faster formation of links between industry and business and scientific research institutions and re-orientation of research towards business needs. In this way, the activities of science institutions will be faster orientated towards overall business needs (not only to the needs of particular enterprise). The measure aims to increase research and development activities (industrial research and pre-competitive development) for the industry and business (activities carried on by companies and contracting works), formation of links between the industry and business entities and scientific research institutions in order to achieve higher shares of R&D investment in business, and in higher education sector. To develop corporate R&D activities in order to develop strategic innovations in business.

- **Zone**: Objective 1
- **Policy framework**: Single programming document 2004 - 2006, development of production sector, knowledge and innovation initiatives

#### Brief history and main features

- **What policy area does the initiative belong to?**
  - Strengthening superiority and competitiveness of national industry. Development of production sector, knowledge and innovation initiatives

- **What are the main instruments characterising the initiative?**
  - The initiative aimed at direct support for R&D in business, where co-operation in R&D links with other firms or public R&D institutions also could be supported.
  - Distinguished feature – the initiative has to come from the business enterprise, and 70% of R&D activities must be carried out by the applying enterprise. In this way, the measure restricted basic outsourcing opportunity, and fostered enterprises to strengthen its own research capacities.

- **What are the main beneficiaries characterising the initiative?**
  - Main beneficiary of the measure – business sector aimed at R&D activities and development of high values added R&D based innovation.

- **Was the intervention inspired by a previous experience? Which one?**
  - Phare 2002 programme has offered enterprises with the opportunity of innovation activities in co-operation with R&D sector, support. Some joint business and public R&D institutions research projects were also supported by Lithuanian Science and Study foundation.

- **Which organisations have been involved? What was their role?**
  - Administrating organisation – Lithuanian Business Support agency. Design of the measure was supported by Lithuanian Innovation Centre.

- **What was the structure of the initiative (operational phases, length...)?**
  - The initiative was implemented in the period 2004 – 2006, will be prolonged in...
the next programming period 2007 – 2013.

- **Crucial milestones and criticalities?**
- The implementation of the measure has revealed weaknesses not only in business R&D potential, but also in SF administration capacities of the measures, related to R&D and innovation. The same financial selection criteria were applied as for investment and technology transfer projects, i.e., - risk of innovation related R&D was not fully taken into account. Therefore many applications, especially coming form SME’s sector, failed.

- **What is the degree of novelty of the initiative?**
- **New**

### Main results

**What are the main outcomes (financial and physical)?**

Since the measure is still under the implementation, interim results only can be estimated. Expected outcome - Number of enterprises having received assistance for R&D (number: 15-20), financial aid provided – 53,4 MLTL (exchange rate 1 EUR=3,45 LTL). The second call for proposals was recently closed. As in the previous round, most of the applications were received from Vilnius (32) and Kaunas (18) and only few from other cities (3 from Siauliai, 1 from Klaipeda, and 1 from Alytus). Currently 7 projects are under implementation – 4 in Vilnius, 3 in Kaunas.

**What are the main evaluation results?**

Evaluation still is ongoing. The current implementation stage shows that only Vilnius and Kaunas have a potential for business R&D. The fields of implementation are related to the high tech priority areas – mechatronics (medical technologies), lasers, electronic equipment, etc.

**Have all the objectives been fulfilled?**

Too early to evaluate.

**What is the current state in terms of execution? What are the expected prospects?**

There are few promising business R&D projects that potentially will lead to the creation of new patentable solutions in specialised areas.

### Reasons of success and conditions for repeatability

**Why has the initiative been considered a best practice?**

The initiative has allowed companies taking risks in possible break trough R&D areas, and at least partially replaced not existing R&D and innovation related venture capital funds in Lithuania. It also has promoted innovative thinking in companies and consideration of R&D as an opportunity to increase competitiveness. It also has shown that not all regions can compete successfully, and other than Kaunas and Vilnius regions needs more complex measures for business R&D facilitations. It also has revealed weaknesses of applying companies, which forms the base for proposing development of industrial excellence centres and innovative clusters.

**What are the main socio-economic and institutional conditions that contributed to the success? How?**

The success of the measure is only relative. Main condition – also fragmented, but existing competence in business R&D and innovation management in priority areas.

**What were the main socio-economic and institutional obstacles?**

Low number of business R&D performing companies, that came up with competitive proposals. Administrative capacities and competencies of public authorities in evaluation and evaluation of R&D and innovation projects.

**What are the main lessons?**

The measure should be continued, selection criteria refined and more focused.

**Did the case inspire new initiatives in either the same or different contexts?**
The initiative will be continued, and promoted. But also it opens opportunity for large focus on both – technological and regional dimensions (high technologies in priority fields (lasers, biotech, nano, mechatronics, ICT), high tech applications in traditional industries, Kaunas and Vilnius).

**What are the main aspects of the initiative which are susceptible to be transferred?**

Direct support for business R&D in priority fields is crucial for the reshaping of the industrial profile of the catching up country in a long term period.

**Are there constraints to transferability?**

Small size of the country indicates a manageable number of possible alternatives. Although the prioritisation of science is low, and even the measure was not specific field targeted, the actual implementation process shows existing strengths in certain technological areas – lasers, mechatronics, material sciences, etc. Large number of alternatives would lead to the waste of resources, although impacting R&D, but without cumulative effects.
Appendix F  Further reading

Literature


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## Appendix G  Stakeholders consulted

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Žilvinas Gelgota</td>
<td>Chairman of Lithuanian association of Business information centres, Director of Business information and tourism centre</td>
<td>Business information centre</td>
</tr>
<tr>
<td>Donatas Žiogas</td>
<td>Head</td>
<td>NGO „Business mans house“</td>
</tr>
<tr>
<td>Antanas Januška</td>
<td>Head</td>
<td>Marijampolė business information centre</td>
</tr>
<tr>
<td>Rimantas Nugaras</td>
<td>Head</td>
<td>Ukmerge business information centre</td>
</tr>
<tr>
<td>Snieguolė Benikiene</td>
<td>Head</td>
<td>Kretinga business information centre</td>
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<tr>
<td>Sigutė Meškytė</td>
<td>Head</td>
<td>Akmenė business information centre</td>
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<tr>
<td>Gaiva Mačiulaitienė</td>
<td>Head</td>
<td>Jurbarkas business information centre</td>
</tr>
<tr>
<td>Rima Aukštakalnienė</td>
<td>Head</td>
<td>Kupiškis business information centre</td>
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<tr>
<td>Ligita Smagurauskienė</td>
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<td>Ignalina business information centre</td>
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<tr>
<td>Birutė Buzienė</td>
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<td>Lazdijai business information centre</td>
</tr>
<tr>
<td>Laima Dockevičienė</td>
<td>Head</td>
<td>Rietavas business information centre</td>
</tr>
</tbody>
</table>
## Participants to focus group

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr., Habil. Arūnas Lukoševičius</td>
<td>Professor and Science laboratory head at Kaunas University of Technology. Member of Lithuanian Science Council, deputy head of Science prioritisation and evaluation commission</td>
<td>Lithuanian Science Council, Kaunas University of Technology</td>
</tr>
<tr>
<td>Dr. Albinas Bačiliūnas</td>
<td>Chairman of Science and Technology Park “Technopolis”, Vice president of Kaunas Chambers of Industry, Commerce and Crafts, director of private technology based enterprise</td>
<td>Science and technology park, Chambers of Industry, Commerce and Crafts</td>
</tr>
<tr>
<td>Edita Karpavičienė, PhD candidate</td>
<td>Chairwoman of the Board of the bank</td>
<td>“Ukio bankas”</td>
</tr>
<tr>
<td>Dr. Kastytis Gečas</td>
<td>Director</td>
<td>Lithuanian Innovation Centre</td>
</tr>
<tr>
<td>Dr. Bernardas Milius</td>
<td>Director</td>
<td>Kaunas Regional Technological Business Incubator</td>
</tr>
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