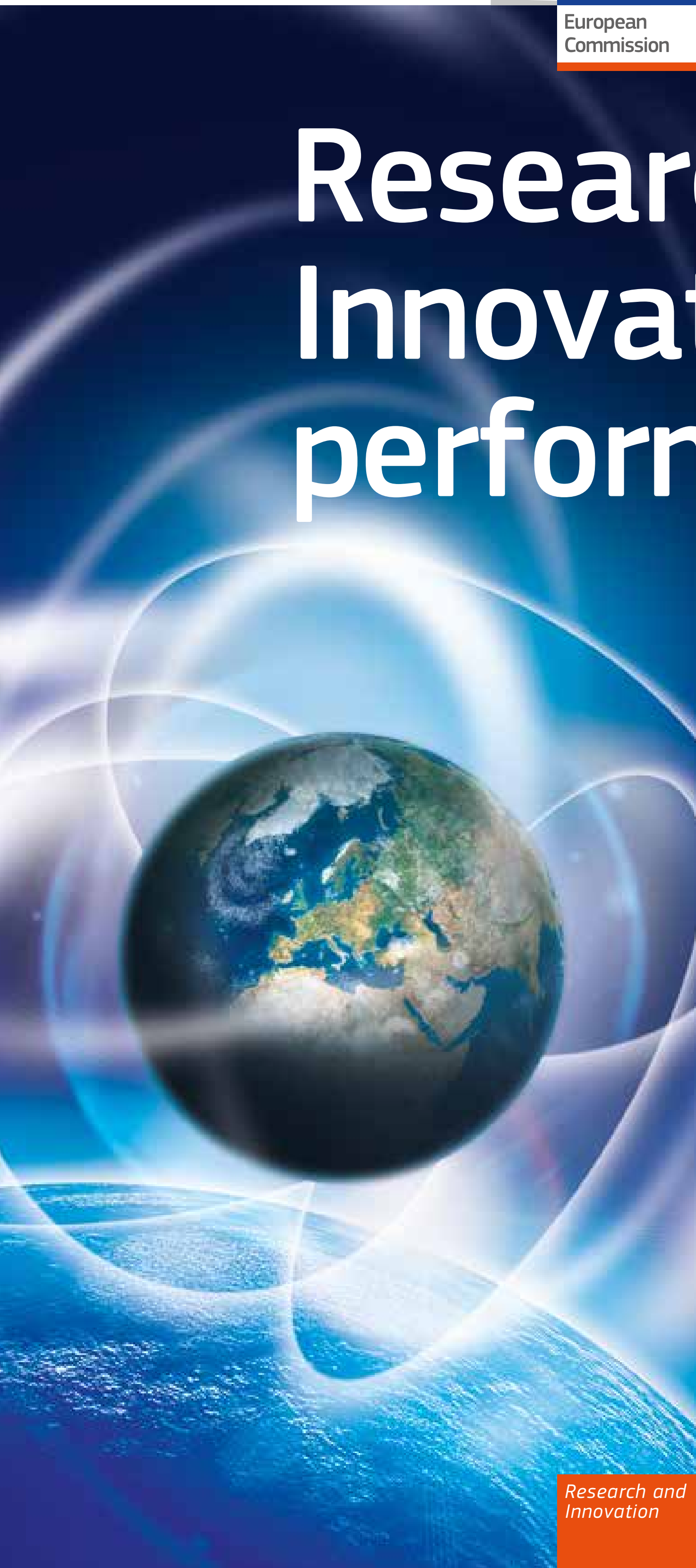
European Commission

Research and Innovation performance in

Lithuania

Country Profile

2014



Research and Innovation

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Lithuania

Developing a stronger and thematically focused science base

Summary: Performance in research and innovation

The indicators in the table below present a synthesis of research and innovation (R&I) performance in Lithuania. They relate knowledge investment and input to performance and economic output throughout the innovation cycle. They show thematic strengths in key technologies and also the high-tech and medium-tech contribution to the trade balance. The indicator on excellence in science and technology takes into consideration the quality of scientific production as well as technological development. The Innovation Output Indicator covers technological innovation, skills in knowledge-intensive activities, the competitiveness of knowledge-intensive goods and services, and the innovativeness of fast-growing enterprises, focusing on innovation output. The indicator on knowledge-intensity of the economy focuses on the economy's sectoral composition and specialisation and shows the evolution of the weight of knowledge-intensive sectors and products.

Key indicators of research and innovation performance	
R&D intensity 2012: **0.90%** (EU: 2.07 %; US: 2.79 %) 2007-2012: **+2.2 %** (EU: 2.4 %; US: 1.2 %)	***Excellence in S&T***[1] 2012: **14.1** (EU: 47.8; US: 58.1) 2007-2012: **+1.2 %** (EU: +2.9 %; US: -0.2)
Innovation Output Indicator 2012: **57.9** (EU: 101.6)	***Knowledge-intensity of the economy***[2] 2012: **32.7** (EU: 51.2; US: 59.9) 2007-2012: **+1.7 %** (EU: +1.0 %; US: +0.5 %)
Areas of marked S&T specialisations: Other transport technologies (other than automobiles and aeronautics), construction technologies, energy, and food	***HT + MT contribution to the trade balance*** 2012: **-0.8 %** (EU: 4.23 %; US: 1.02 %) 2007-2012: **n.a.** (EU: +4.8 %; US: -32.3 %)

The main strengths of Lithuania's research and innovation system remain the size of its public research sector and the good supply of new graduates. The weaknesses reveal scarce private and public R&D investments undertaken in a dispersed way and currently not linked to a smart specialisation strategy.

The country remains well below its 2020 R&D intensity target of 1.9 % of GDP, at least half of which is planned to come from private investments. R&D intensity is very limited in the business sector: almost three-quarters of all R&D expenditure in Lithuania is performed by the public sector. The low share of medium-tech and high-tech industries, low numbers of knowledge-intensive start-ups and the low rate of entrepreneurship have made it difficult for the private sector to reach the national commitment to the R&D target. Public R&D intensity has grown in recent years and, at 0.66 % in 2012, is no longer far from the EU average (0.74 %).

However, this is due to several major programmes funded by the Structural Funds, while the allocation to R&D from the national budget has declined significantly since 2007. Public R&D funding has become excessively dependent on the Structural Funds and it will not be possible to consolidate and further develop the public research system without increased national support for the basic functioning of the scientific institutions. Lithuania's science base is insufficiently competitive and is not well connected to European networks. There is an overall lack of knowledge transfer and the country's business environment is not geared towards facilitating innovation and entrepreneurship. Business investment in R&D will only improve if the quality, relevance and openness to the private sector of both the science base and higher education in Lithuania increase.

Reforms linked to the European Research Area agenda have been driven towards removing

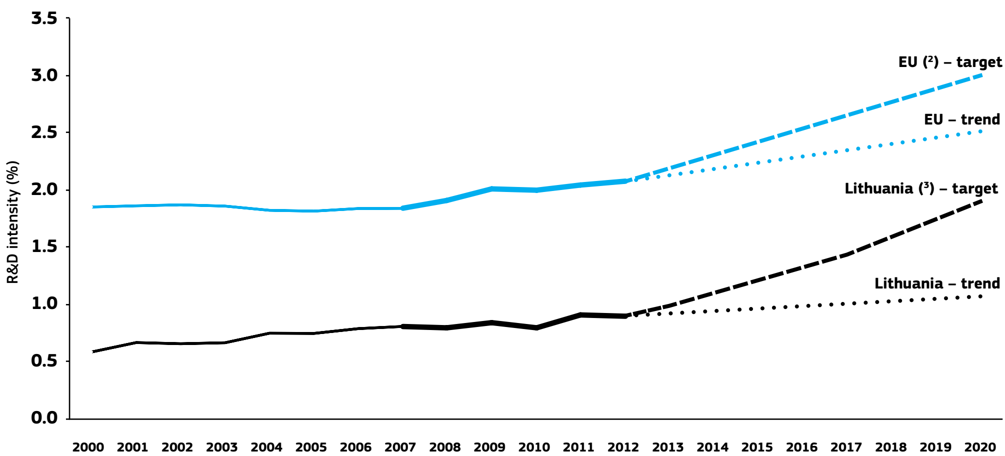
[1] Composite indicator that includes PCT per population, ERC grants per public R&D, top universities and research institutes per GERD and highly cited publications per total publications.

[2] Composite indicator that includes R&D, skills, sectoral specialization, international specialization and internationalization sub-indicators.

obstacles in relation to the transnational collaboration of R&D teams, fostering the competitive allocation of research funding based on peer review, a more open and merit-based market for hiring researchers, notably in the public sector, as well as ensuring support to those public research organisations putting gender equality strategies in place. Nonetheless, strong weaknesses remain to be addressed. Lithuania needs to ensure the effective use, management and financing of large research infrastructures and the relevance of focusing the country's science and technology strengths in those areas linked to the societal challenges where Lithuania has the greatest potential to increase its economic impact. Improving the country's capacity to exploit R&I results commercially will not just require developing a business environment prone to innovation but will also need a better skills base in higher education with the right incentives for researchers in the public sector to engage in knowledge transfer and commercialisation activities.

Investing in knowledge

Lithuania – R&D intensity projections: 2000–2020 (1)



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: DG Research and Innovation, Eurostat, Member State
Notes: (1) The R&D intensity projections based on trends are derived from the average annual growth in R&D intensity for 2007–2012.
(2) EU: The projection is based on the R&D intensity target of 3.0 % for 2020.
(3) LT: The projection is based on a tentative R&D intensity target of 1.9 % for 2020.

Following a substantial increase in Lithuania's R&D intensity in 2011, progress slowed in 2012 and the country remains well below its 2020 target. In 2012, R&D intensity reached 0.9 % of GDP, which is less than half of Lithuania's R&D intensity target of 1.9 % for 2020. Most of R&D intensity continued in the public sector and is due to progress in implementing R&D-related projects financed with EU Structural Funds. The business sector finances only about 26 % of total R&D expenditure, which is one of the lowest shares of business funding in the EU. The economic crisis hit the national R&D budget, which was cut by around 20 % between 2007 (LTL 503.1 million) and 2010 (LTL 407.5 million). It increased slightly in 2011 (LTL 435.6 million) and fell again in 2012 (LTL 412.6 million). Overall, the share of the R&D budget in total government expenditure fell back from 1.07 % in 2004 to 1.01 % in 2012. Lithuanian R&D intensity is planned to reach 1.9 % by 2020, at least half of which should be contributed by business investments.

Continuity in public funding of R&D has been ensured by Structural Funds and with a good absorption rate. Of the EUR 6.8 billion of Structural Funds allocated to Lithuania over the 2007-2013 programming period, around EUR 1 billion (14.6 % of the total) related to RTDI[3]. In 2011-2012, Lithuania simplified the

[3] RTDI includes the following sectors: (01) RTD activities in research centres, (02) RTD infrastructures and centres of competence, (03) Technology transfer and improvement of cooperation of networks, (04) Assistance to RTD, particularly in SMEs (and RTD services in research centres), (06) Assistance to SMEs for the promotion of environmentally friendly products and processes, (07) Investment in firms directly linked to research and innovation, (09) Other methods to stimulate research and innovation and entrepreneurship in SMEs, and (74) Developing human potential in the field of research and innovation.

use of Structural Funds in favour of RTDI. The forecast of R&D intensity for 2014-2020 is maintaining the same trend – i.e. to keep the EU Structural funds as the key funding source across a large set of schemes and instruments.

Lithuania also benefited by about EUR 55 million from the EU's Seventh Framework Programme (FP7). In the period 2007-2013, 410 participants received funding from FP7 which indicates a good success rate for Lithuanian applicants (20.19 % vs. 21.89 % for the EU average). This success rate places Lithuania 15th among the EU-28. In terms of requested EC financial contribution, the success rate is 14.75 %, putting Lithuania in 16th place. Additional government support for investment in R&D and in new technologies is being provided through R&D tax incentives, which have been in place since 2008.

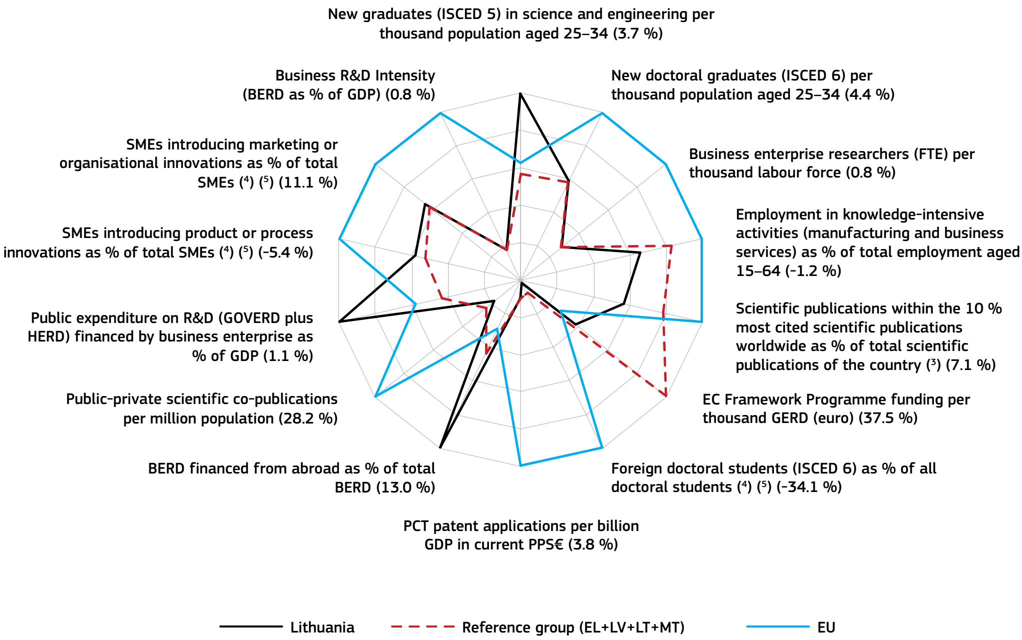
In 2012, business R&D as a percentage of total GDP amounted to only 18 % of the EU-28 average. Following some progress in the early 2000s, business R&D intensity hardly changed between 2006 (0.22 %) and 2012 (0.24 %). It was seriously affected by the economic crisis, hitting the lowest point of 0.19 % in 2008, but started to rise slowly in 2009 and is currently at 0.24 % for the second consecutive year. Business R&D intensity has been most affected in the services sector with a fall of 19 % in nominal terms between 2008 and 2009. On the other hand, it increased in the manufacturing sector by 13.5 % in the same period[4].

An effective research and innovation system building on the European Research Area

The graph below illustrates the strengths and weaknesses of Lithuania's R&I system. Reading clockwise, it provides information on human resources, scientific production, technology valorisation and innovation. Average annual growth rates from 2007 to the latest available year are given in brackets.

Lithuania, 2012 (1)

In brackets: average annual growth for Lithuania, 2007–2012 (2)



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: DG Research and Innovation, Eurostat, OECD, Science-Metrix/Scopus (Elsevier), Innovation Union Scoreboard.
Notes: (1) The values refer to 2012 or to the latest available year.
(2) Growth rates which do not refer to 2007–2012 refer to growth between the earliest available year and the latest available year for which comparable data are available over the period 2007–2012.
(3) Fractional counting method.
(4) EU does not include EL.
(5) EL is not included in the reference group.

4 Data from Eurostat, Business R&D expenditure (BERD) by economic activity based on the company's 'main activity'.

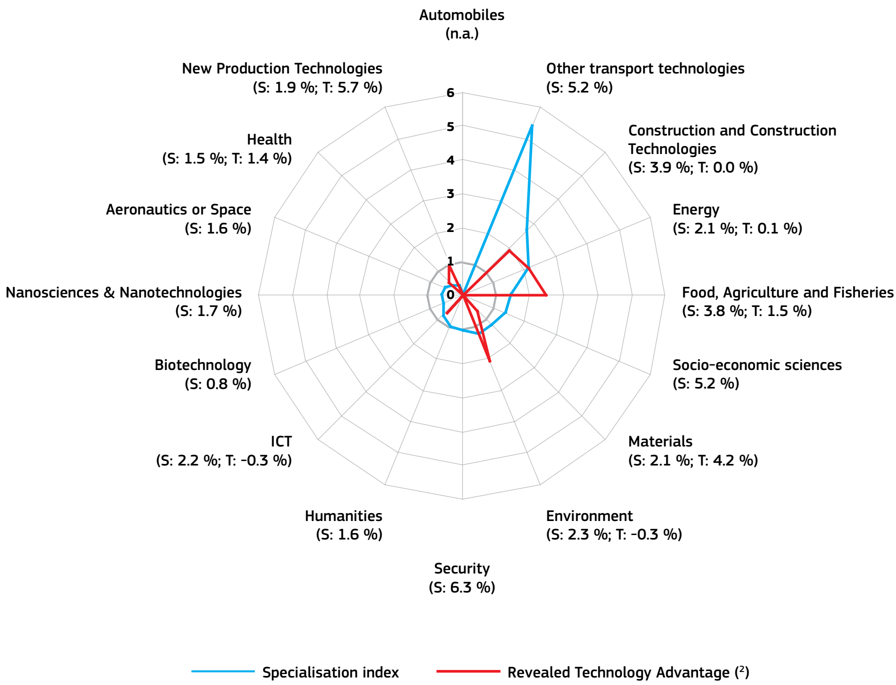
Lithuania's performance faces challenges in all four dimensions (human resources, scientific production, technology development, and innovation), for most of the main R&I indicators. Particular strengths are the number of new graduates in science and engineering (S&E) per population aged 25-34 years, public expenditure on R&D financed by business enterprises, and the financing of business R&D expenditure from abroad (mainly EU Structural Funds). The level of patenting activities and public-private collaboration are both very low and require improvement. Although business financing of university research appears to be relatively strong, the number of researchers employed by business remains low with only a small increase over the period 2007-2012.

This leads to two observations: (i) Lithuania's R&D relies to a larger extent than the EU average on EU funds, be it Structural Funds or FP7 funding; (ii) a large share of the young population receives tertiary education in S&E in Lithuania, which is also reflected in the good share of total knowledge-intensive activities in total employment in the country. However, at the doctoral level, the number of new doctoral graduates per thousand population aged 25-34 years is considerably below the EU average, indicating that doctoral studies and Lithuania's research system are less attractive to students.

Lithuania's scientific and technological strengths

The graph below illustrates the areas, based on the Framework Programme thematic priorities, where Lithuania shows scientific and technological specialisations. Both the specialisation index (SI, based on the number of publications) and the revealed technological advantage (RTA, based on the number of patents) measure the country's scientific (SI) and technological (RTA) capacity compared to that at the world level. For each specialisation field it provides information on the growth rate in the number of publications and patents.

Lithuania – S&T National Specialisation (1) in thematic priorities, 2000–2010
in brackets: growth rate in number of publications (3) (S) and in number of patents (4) (T)



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: Science-Metrix Canada; Bocconi University, Italy
Notes: (1) Values over 1 show specialisation; values under 1 show a lack of specialisation.
(2) The Revealed Technology Advantage (RTA) is calculated based on the data corresponding to the WIPO-PCT number of patent applications by country of inventors. For the thematic priorities with fewer than 5 patent applications over 2000–2010, the RTA is not taken into account. Patent applications in 'Aeronautics or Space' refer only to 'Aeronautics' data.
(3) The growth rate index of the publications (S) refers to the periods 2000–2004 and 2005–2009.
(4) The growth rate in number of patents (T) refers to the periods 2000–2002 and 2003–2006.

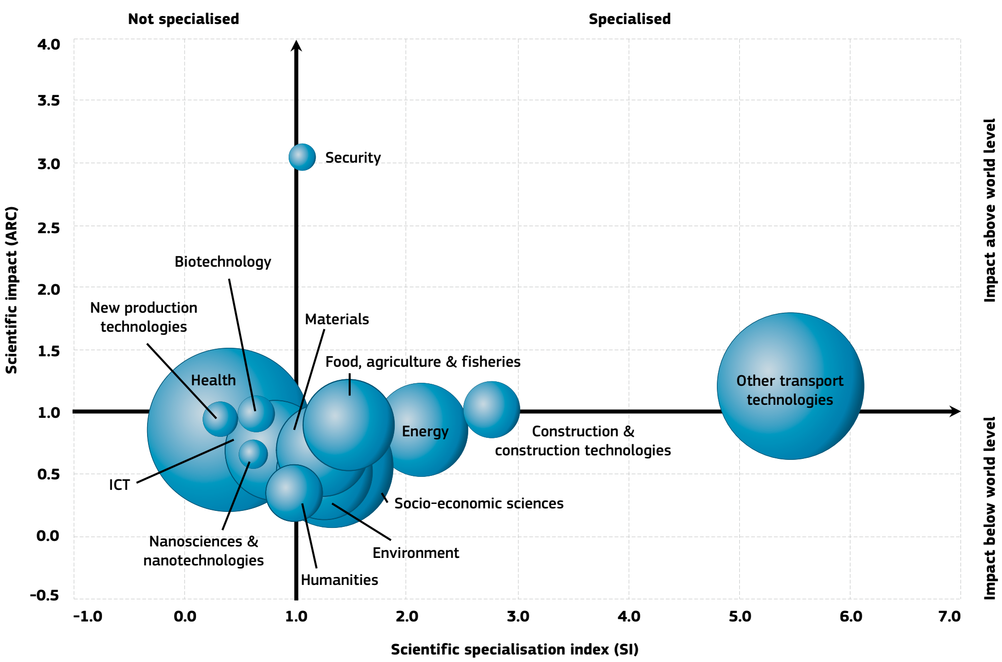
Lithuania, together with Greece, Latvia and Malta, is classified as a medium-knowledge-capacity system with a strong role being played by agriculture and low knowledge-intensive services[5]. In general, there is no sound correlation between science and technology specialisation for Lithuania, and overall the issue of critical mass remains vital in identifying priority areas. Patenting activity in the country is generally extremely low and does not show any statistically significant technological specialisation.

Comparison of the scientific and technological specialisation in selected thematic priorities reveals a mixed situation with some co-specialisations as well as some mismatches. In terms of volume of scientific publications, Lithuania performs best in other transport technologies (i.e. transport other than automobiles and aeronautics), but the field is not supported by patenting activity. The scientific co-specialisation exists in some sectors, such as construction and construction technologies, energy, food, agriculture and fisheries, and the environment. The recently defined Lithuanian R&I priorities for smart specialisation identify six broader priority areas, each with two to four specialisations – specific priorities, which include sectors with important innovation potential: energy and sustainable environment, health technologies and biotechnologies, agro-innovation and food technologies, new processes, materials and technologies, transport, logistics and ICT, and creative society.

Relative growth in technology fields has been recorded in new production technologies and materials. However, the figures should be considered carefully because of the small number of patent applications. Policy decisions at national level could consider further supporting science in these fields in order to match the technology developments. Overall, scientific activity shows a positive dynamic as measured by growing numbers of publications, with significant improvements in the fields of security and other transport technologies[6].

The graph below illustrates the positional analysis of Lithuanian publications showing the country's situation in terms of scientific specialisation and scientific impact over the period 2000-2010. The scientific production of the country is reflected by the size of bubbles, which corresponds to the share of scientific publications from a science field in the country's total publications.

Lithuania – Positional analysis of publications in Scopus (specialisation versus impact), 2000–2010



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: Science-Metrix Canada, based on Scopus
Note: Scientific specialisation includes 2000–2010 data; the impact is calculated for publications of 2000–2006, citation window 2007–2009.

5 Innovation Union Competitiveness report, 2013

6 Innovation Union Competitiveness report, 2013

In terms of the quality of scientific results, Lithuania is below the world level in almost all specialisations related to the thematic priorities. Exceptions to this are the security and other transport technologies. The security field indicates scientific results of high quality with a low number of publications. In the case of other transport technologies, the quality of science is slightly above the world level but scientific production is much larger, being the second biggest in the country (after health). Therefore, there is room for improvement in the scientific quality of results in Lithuania. The food, agriculture and fisheries sectors lead the country's technological specialisation index list while, at the same time, occupying a modest position in scientific specialisation and scientific impact dimensions. Lithuania could probably benefit from fostering a scientific specialisation in the latter.

Policies and reforms for research and innovation

Lithuania has been carrying out reforms in its R&I system since the end of the last decade. These ongoing reforms are far-reaching and on the whole drive the research system towards what is accepted as international good practice. A number of reforms have been geared towards strengthening public-private R&D collaboration and commercialisation (e.g. setting up innovation vouchers and backing industrial PhDs). Furthermore, recent initiatives have been implemented to strengthen knowledge transfer (e.g. consultancy support for knowledge and technology transfer). These are boosting the exploitation of research results, and encouraging the use of new financial instruments, including debt and equity finance, with a series of business accelerators and seed and venture capital funds to support the creation and growth of innovative firms, although their contribution remains very modest. Measures have been taken to both facilitate and lower the costs of starting new businesses. These include, in particular, a very successful business voucher scheme and a legal entity called 'small partnership'.

Autonomy and a new mode of governance have been given to universities. The network of public research institutions has been reorganised and rationalised. The share of project-based funding has risen considerably and institutional funding is increasingly being allocated in relation to the performance of research institutions. Researchers' salaries have increased and dedicated schemes to attract local and international talent are now being implemented.

The creation and development of five clusters (called 'valleys') integrating higher-education institutions, research institutions and businesses around a number of scientific and technological areas is intended to strengthen links between higher education, science and businesses and improve knowledge transfer and the valorisation of research results in the country. However, these clusters have still to be used efficiently and with the necessary scale and scope to support scientists and business innovation activities.

Recently, three main programmes were adopted with the overall aim of enhancing the country's R&I potential:

- The Programme for the Development of Studies, Research and Experimental (social and cultural) Development for 2013–2020 aims to encourage the sustainable development of people and society, thereby improving the country's competitiveness and creating conditions for innovation by developing higher education and implementing studies, and R&D development;

- The Innovation Development Programme for 2014-2020 aims to promote the development and implementation of innovative products and technologies, the creation and internationalisation of value chains, and to foster public-sector innovation;

- The Programme for the Development of Priority Areas of Research and Experimental (social and cultural) Development and Innovation (smart specialisation) and Implementation of Priorities will develop the priority fields of R&D&I and implement their specialisations with the aim of achieving structural changes in the Lithuanian economy. This will determine the impact of the growth of high-value-added, knowledge and highly skilled labour-intensive economic activities on the country's GDP. During implementation of this programme, 20 action plans will be launched in close cooperation with adequate ministries and services.

Since public R&D funding has become excessively dependent on Structural Funds, it will not be possible to foster consolidation and further development of the public research system without increasing national support for the basic functioning of scientific institutions. The forecast for 2014-2020 relies on the same trend to maintain the EU Structural Funds as the key funding source through a large set of schemes and instruments. Such excessive dependency is not in line with the principles of the Structural Funds.

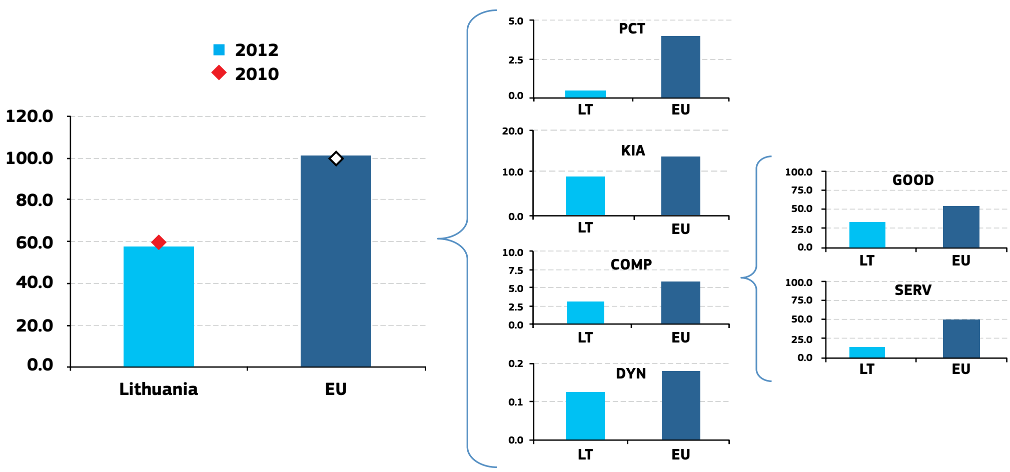
In addition to the existing innovative public procurement scheme, initial steps are being taken to facilitate the pre-commercial procurement of R&D. The plan is to develop a legal basis model towards the end of 2014 which should allow public authorities to use up to 5 % of their procurement budgets to purchase R&D-related products and services.

Government policy towards transnational collaboration, the internationalisation of science, and opening the national research system to researchers from other countries is still underdeveloped. The lack of strategic R&I internationalisation policy is impeding the internationalisation of quality Lithuanian research. The absence of policy relating to opening up the national research system stems from the need to first address the national problems related to unattractive career paths for researchers and limited research capacity. ERA priorities are only formally addressed and attention must be paid to the objectives of transnational collaboration, an open market for researchers, gender equality and mainstreaming.

Innovation Output Indicator

The Innovation Output Indicator, launched by the European Commission in 2013, was developed at the request of the European Council to benchmark national innovation policies and to monitor the EU's performance against its main trading partners. It measures the extent to which ideas stemming from innovative sectors are capable of reaching the market, providing better jobs and making Europe more competitive. The indicator on innovation focuses on four policy axes: growth via technology – (patents); jobs (knowledge-intensive employment); long-term global competitiveness (trade in mid/high-tech commodities); and future business opportunities (jobs in innovative fast-growing firms). The graph below enables a comprehensive comparison of Lithuania's position regarding the indicator's different components.

Lithuania – Innovation Output Indicator



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: Eurostat, OECD, Innovation Union Scoreboard 2014, DG JRC
Notes: All data refer to 2012 except PCT data, which refer to 2010.
PCT = Number of PCT patent applications per billion GDP, PPS.
KIA = Employment in knowledge-intensive activities in business industries as % of total employment.
DYN = Innovativeness of high-growth enterprises (employment-weighted average).
COMP = Combination of sub-components GOOD and SERV, using equal weights.
GOOD = High-tech and medium-high-tech products exports as % total exports. EU value refers to EU-28 average (extra-EU = 59.7 %).
SERV = Knowledge-intensive services exports as % of total service exports. EU value refers to EU-28 average (extra-EU = 56 %).

Lithuania is a low performer in the European innovation indicator, resulting from its low performance in all components. Furthermore, the country's performance is not improving.

The low performance in patents is linked to its economic structure with a lack of large manufacturing companies in technology-intensive sectors which, in certain fields, typically show high patenting activities. This structure, the lack of a sizeable car, pharmaceutical or machinery industry, and the high export share of agricultural products and food all explain the low score as regards the export share of medium-high/high-tech goods.

Relatively high employment in agriculture, construction, and transport is contributing to a low share of employment in knowledge-intensive activities.

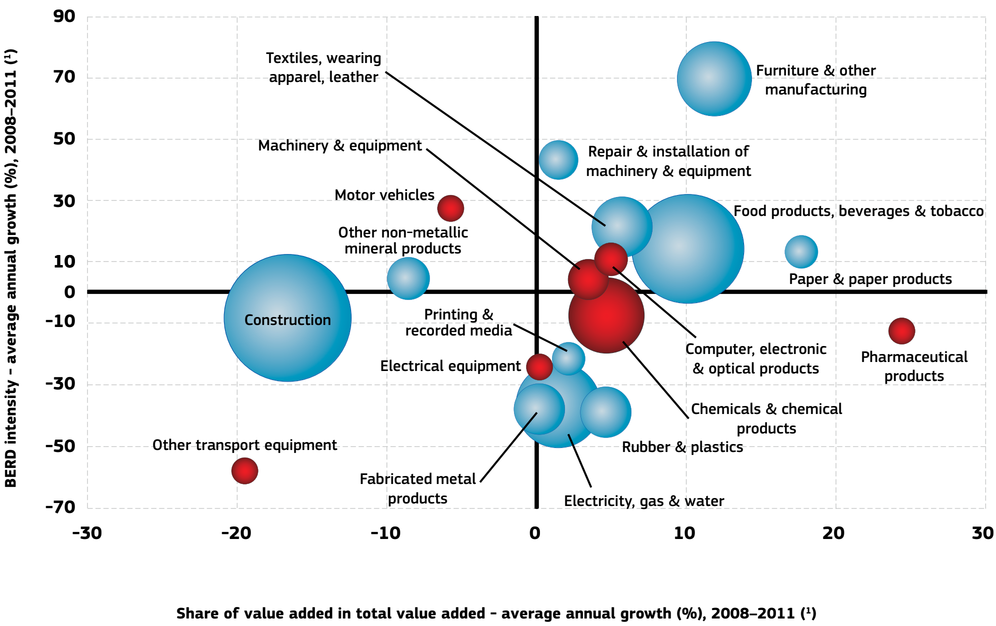
Lithuania has one of the lowest shares of knowledge-intensive service exports among EU countries. This is explained both by the low volume of KIS exports and by the high level of non-KIS transport services exports (road transport, rail transport, and auxiliary transport services).

Lithuania performs at a low level regarding the innovativeness of fast-growing firms. This is the result of a high share of employment in low-tech manufacturing, transportation, and construction companies among fast-growing enterprises.

Upgrading the manufacturing sector through research and technologies

The graph below illustrates the upgrading of knowledge in different manufacturing industries for the period of 2008-2011. The position on the horizontal axis illustrates the changing weight of each industry sector in value added over the period. The general trend to the left-hand side reflects the decline of manufacturing in the overall economy. The sectors above the x-axis are those where research intensity has increased over time. The size of the bubble represents the sector share (in value added) in manufacturing (for all sectors presented on the graph). The red sectors are high-tech or medium-high-tech sectors.

Lithuania – Share of value added versus BERD intensity: average annual growth, 2008–2011 (1)



Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: Eurostat
Notes: (1) 'Furniture and other manufacturing': 2009–2011.
(2) High-tech and medium-high-tech sectors (NACE Rev. 2 – two-digit level) are shown in red.

The graph above shows that Lithuania's manufacturing industry is dominated by low-tech and medium-low-tech sectors, which are intrinsically less research intensive than high-tech and medium-high-tech sectors (coloured in red). The only sizeable medium-high-tech sector is chemicals although in recent years it has received fewer business R&D investments and now accounts for less weight in the economy. All other high-tech and medium-high-tech sectors in Lithuania are small and import and re-export comprises a large part of the activity for some of them. As a result, the structure of this sector limits the overall level of business R&D intensity in the country. The graph includes data on the crisis in 2009-2010 which affected some sectors – notably, the construction sector has declined significantly since that period. Two sizeable sectors enjoyed positive growth trends during 2008-2011: food products, beverages and tobacco, and furniture and other manufacturing.

Structural change towards a more research-intensive economy is being driven mainly by high-tech and medium-high-tech manufacturing sectors. In Lithuania, no clear trend emerged for these sectors for the period 2000-2011: in the economy, the weight of some of these sectors increased (machinery and equipment, pharmaceutical products, and computer, electronic and optical products), while others decreased (motor vehicles). In the case of the other transport equipment sector, in the period 2008-2011, the share of both business investments and value added showed a significant declining trend. In the high-tech and medium-high-tech sectors, the research intensity has increased in the sectors of motor vehicles, computer, electronic and optical products, and machinery and equipment, but has fallen in the remaining sectors (chemicals and chemical products, pharmaceutical products, and electrical equipment).

The total effect of the evolution of the high-tech and medium-high-tech manufacturing sectors on overall business R&D intensity in Lithuania has been limited. The chemical sector is clearly the most important medium-high-tech/high-tech sector in Lithuania in terms of size, although in terms of evolution its importance has decreased (positive evolution in economic weight and fluctuating research intensity).

Key indicators for Lithuania

LITHUANIA	2000	2005	2006	2007	2008	2009	2010	2011	2012	Average annual growth 2007–2012 (1) (%)	EU average (2)	Rank within EU
ENABLERS												
Investment in knowledge												
New doctoral graduates (ISCED 6) per thousand population aged 25–34	0.87	0.71	0.75	0.86	0.88	0.96	1.00	0.92	1.07	4.4	*1.81*	20
Performance in mathematics of 15-year-old students: mean score (PISA study)	:	:	486	:	:	477	:	:	479	-7.6 (3)	495 (4)	20 (4)
Business enterprise expenditure on R&D (BERD) as % of GDP	0.13	0.15	0.22	0.23	0.19	0.20	0.23	0.24	*0.24*	*0.8*	1.31	24
Public expenditure on R&D (GOVERD + HERD) as % of GDP	0.46	0.60	0.57	0.58	0.61	0.63	0.56	0.67	*0.66*	*2.7*	*0.74*	12
Venture capital as % of GDP	:	:	:	:	:	:	:	:	:	:	:	:
S&T excellence and cooperation												
Composite indicator on research excellence	:	:	:	13.3	:	:	:	:	14.1	1.2	47.8	27
Scientific publications within the 10% most cited scientific publications worldwide as % of total scientific publications of the country	:	3.3	4.9	5.4	6.1	6.2	:	:	:	7.1	11.0	19
International scientific co-publications per million population	:	168	181	202	228	238	236	290	304	8.5	343	24
Public–private scientific co-publications per million population	:	:	:	4	5	7	8	10	:	28.2	53	23
FIRM ACTIVITIES AND IMPACT												
Innovation contributing to international competitiveness												
PCT patent applications per billion GDP in current PPS (EUR)	0.2	0.4	0.3	0.4	0.6	0.3	0.4	:	:	3.8	3.9	24
License and patent revenues from abroad as % of GDP	0.000	0.01	0.002	0.0004	0.002	0.001	0.002	0.002	0.009	83.1	0.59	26
Community trademark (CTM) applications per million population	0.3	11	21	21	34	35	31	46	69	27.4	152	20
Community design (CD) applications per million population	:	2	1	1	3	3	5	5	11	55.2	29	22
Sales of new-to-market and new-to-firm innovations as % of turnover	:	:	12.4	:	9.6	:	6.6	:	:	-16.8	14.4	27
Knowledge-intensive services exports as % total service exports	:	14.3	12.3	11.8	12.2	15.6	13.8	12.5	:	1.5	45.3	27
Contribution of high-tech and medium-tech products to the trade balance as % of total exports plus imports of products	-5.87	-5.79	-5.83	-5.11	-2.30	-1.62	-1.10	-1.27	-0.85	-	4.23 (5)	22
Growth of total factor productivity (total economy): 2007 = 100	76	96	98	100	99	86	93	97	98	-2 (6)	97	9
Factors for structural change and addressing societal challenges												
Composite indicator on structural change	:	:	:	30.1	:	:	:	:	32.7	1.7	51.2	25
Employment in knowledge-intensive activities (manufacturing and business services) as % of total employment aged 15–64	:	:	:	:	7.5	8.1	9.4 (7)	8.9	9.2	-1.2	13.9	25
SMEs introducing product or process innovations as % of SMEs	:	:	19.7	:	21.9	:	19.6	:	:	-5.4	33.8	23
Environment-related technologies: patent applications to the EPO per billion GDP in current PPS (EUR)	0.03	0.00	0.00	0.01	0.00	0.02	:	:	:	32.0	0.44	27
Health-related technologies: patent applications to the EPO per billion GDP in current PPS (EUR)	0.01	0.03	0.02	0.06	0.04	0.08	:	:	:	15.9	0.53	21
EUROPE 2020 OBJECTIVES FOR GROWTH, JOBS AND SOCIETAL CHALLENGES												
Employment rate of the population aged 20–64 (%)	65.6	70.6	71.6	72.9	72.0	67.2	64.3 (7)	66.9	68.5	3.2	68.4	13
R&D intensity (GERD as % of GDP)	0.59	0.75	0.79	0.81	0.80	0.84	0.79	0.91	*0.90*	*2.2*	*2.07*	19
Greenhouse gas emissions: 1990 = 100	40	48	49	54	51	42	43	44	:	-9 (8)	83	1 (9)
Share of renewable energy in gross final energy consumption (%)	:	17.0	17.0	16.7	18.0	20.0	19.8	20.3	:	5.0	13.0	9
Share of population aged 30–34 who have successfully completed tertiary education (%)	42.6	37.9	39.4	38.0	39.9	40.6	43.8	45.7	48.6	5.0	35.7	4
Share of population aged 18–24 with at most lower secondary education and not in further education or training (%)	16.5	8.1	8.2	7.4	7.4	8.7	7.9	7.4	6.5	-2.6	12.7	6 (9)
Share of population at risk of poverty or social exclusion (%)	:	41.0	35.9	28.7	27.6	29.5	33.4	33.1	32.5	2.5	24.8	24 (9)

Source: DG Research and Innovation – Unit for the Analysis and Monitoring of National Research Policies
Data: Eurostat, DG JRC – Ispra, DG ECFIN, OECD, Science Metrix / Scopus (Elsevier), Innovation Union Scoreboard
Notes: (1) Average annual growth refers to growth between the earliest available year and the latest available year for which compatible data are available over the period 2007–2012.
(2) EU average for the latest available year.
(3) The value is the difference between 2012 and 2006.
(4) PISA (Programme for Internatonal Student Assessment) score for EU does not include CY and MT. These Member States were not included in the EU ranking.
(5) EU is the weighted average of the values for the Member States.
(6) The value is the difference between 2012 and 2007.
(7) Break in series between 2010 and the previous years. Average annual growth refers to 2010–2012.
(8) The value is the difference between 2011 and 2007. A negative value means lower emissions.
(9) The values for this indicator were ranked from lowest to highest.
(10) Values in italics are estimated or provisional.

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