Support to SMEs - Increasing Research and Innovation in SMEs and SME Development

Work Package 2

Lithuania

Operational Programme ERDF 2007-2013 Economic Growth

Case Study

Ex post evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF)

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This report is part of a study carried out by a Team selected by the Evaluation Unit, DG Regional and Urban Policy of the European Commission, through a call for tenders by open procedure No 2014CE16BAT002.

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LIST OF ABBREVIATIONS

AIR	Annual Implementation Report
BERD	Intramural R&D expenditure of the business enterprise sector
BIF	Baltic Innovation Fund
CAPEX	Capital Expenditure
CD	Compact Disc
CPVA	Central Project Management Agency
DG	Directorate General
ERDF	European Regional development Fund
ESF	European Social Fund
ESFA	European Social Fund Agency
ESIF	European Structural & Investment Funds
EU	European Union
EU27	European Union (27 Member States)
EU28	European Union (28 Member States)
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GVA	Gross Value Added
HEI	High Education Institution
ICT	Information and Communication Technology
INVEGA	Investment and Business Guarantees Agency
IPR	Intellectual Property Rights
IUS	Innovation Union Scoreboard
KET	Key Enabling Technologies
LMT	Lithuanian Research Council
LT VCA	Lithuanian Private Equity and Venture Capital Association
LVPA	Lithuanian Business Support Agency
MA	Managing Authority
MITA	Agency for Science, Innovation, and Technology
NOP	National Operational Programme
OP	Operational Programme
PI	Policy Instrument
PRO	Public Research Organization
R&D	Research and Development
R&I	Research and Innovation
RDI	Research development and Innovation
RTDI	Research, Technological Development and Innovation
SFMIS	Structural Funds Management Information System
WIPO	World Intellectual Property Organisation

1. EXECUTIVE SUMMARY

1.1. Objective and methodology

The objective of this case study is to perform an ex-post evaluation of the measures implemented by the ERDF-funded Economy Growth Operational Programme Lithuania 2007-2013 addressed to SME growth and innovation. The scope of the analysis is those instruments of the OP specifically targeted at SMEs (19 in total) and orientated to supporting innovation and/or growth.

Following the realist paradigm of theory-based impact evaluation, the methodology focuses on exploring the underpinnings of the intervention logic of the strategy, assessing its appropriateness and effectiveness, describing the main achievements and developing an in-depth understanding of the mechanisms and conditions facilitating or hampering them. Data collection has included an examination of data and information coming from strategic and programming documents, project implementation reporting, statistical data, indicators from the monitoring system, complemented by a number of interviews (mainly face to face) with responsible authorities, beneficiaries and other stakeholders, as well as the results from available interim and ex post evaluation results, including counterfactual evaluation. The method of analysis consists of a development of a narrative. Field data were collected during November 2014-May 2015.

1.2. Context

Lithuania can be considered as a lower income country with specialisation in labour intensive traditional industries, facing the need for upgrading. During the last decade, there has been a strong appreciation of the real effective exchange rate indicating a loss in cost and price competitiveness, forcing to increase productivity and find new sources for competitiveness and growth. The Lithuanian economy structure has been disadvantageous for high value added activities development. The R&D effort is predominantly ensured by the public sector. At the same time there have been serious obstacles for public R&D commercialization and systemic collaboration (reflections of path-dependency): overdependence on basic science, outdated public R&D base and unattractive research careers, confrontation between high- and low-tech industries, lack of social capital and network failures, weak innovation diffusion system, and low motivation to learn. The number of existing research and innovation (R&I) performers is rather limited, therefore it is logical to focus on newcomers (start-ups, spin-offs, knowledge-based foreign investments), and encourage previously non-innovative companies to transform their businesses towards higher value added activities.

Lithuania does not have a strong track record of R&D-based innovation, and private sector, in its current specialisation, does not perceive innovation as a critical factor to long-term competitiveness. This leads to limited capacities to absorb public R&D investments without simultaneously dealing with the pipeline creation through capacity building. Considering the level of competences at the majority of Lithuanian enterprises, there is high demand for technology upgrading helping them to increase efficiency and prepare for moving up in the value chain. Non-R&D innovation (organisational, managerial, process innovation, leading to a change of business model) is another important target.

The country's economy experienced the European Union's (EU) second-worst recession in 2009, when real GDP per capita fell by 14% compared to 2008 and stood almost 70% below the EU's average. The crisis slowed Lithuania's structural change towards technology-driven industries, and has led to reprogramming of enterprise policies with greater focus on generic access to finance.

1.3. Policy framework and the OP's intervention logic

The strategic objective of the Operational Programme for Economic Growth 2007-2013 (OP) was to speed up long term economic growth in order to reduce the development discrepancy between Lithuania and the EU. Targeted efforts under the two priority axes assessed by this case study were addressed at changing the economy structure, with a focus on development of high and medium-high technology sector and restructuring of

traditional sectors towards higher value added. Firstly, the key focus of the OP (EUR 528.38 million) was put on providing access to finance for business development, facilitation of non-R&D innovations and productivity in business. Funding for technology absorption was mainly allocated through loans and business guarantees (38% of total ERDF funding after the infusion of additional EUR 150 million, mainly from innovation promotion instruments, during the economic crisis). At the same time, grants for upgrading of production technology and process as well as export promotion were available (30% of total funds).

The second set of enterprise policies (EUR 207.4 million, or 30% of total funds) aimed at leveraging business R&D investments with the specific aim to facilitate the development of innovative products and services, and improving the innovation ecosystem by strengthening intermediary organisations (science and technology parks, incubators, clusters). 9% of total ERDF funds were allocated for direct funding of business R&D. The same share of funds was allocated for the business R&D infrastructure upgrade.

Key findings

ERDF assisted around 6,600[1] SMEs (8.5% of total No. of Lithuanian SMEs in 2015, see Annex VI). Direct funding provided by "more selective" instruments reached 270 SMEs, while the remaining SMEs were funded by "more general" policy instruments.[2] The majority (83%) of supported SMEs were micro or small.

Was the designed strategy appropriate to clearly address the most relevant barriers to innovation and growth faced by the regional/national SMEs?

Overall, the policy mix was largely appropriate given the needs of indigenous SMEs' and policy challenges on the SME development side. A mix of grants and loans aiming at technology and process upgrade responded well to business challenges discussed above. Importantly, *grants did not crowd out the financial engineering instruments (FI)*. Lithuania is among the Member States that employed FI to a relatively high extent. A key success factor was their relatively easy administration. ERDF policies reinforced a general systemic tendency to favour technology absorption through capital investment over innovation. More focus on investments into upgrading was justified given that the economic competitiveness is based on large traditional sectors still relying on basic technologies and skills. However, there remains a mismatch between ambitious strategic targets related to business R&I[3] and share of funds allocated to innovation related policies at national level. The appropriateness of the policy mix on business innovation side has a number of limitations:

- First, the business-science collaboration objectives and related policy challenges were not transformed into more substantial policy instruments. Large investments in public R&D infrastructure (EUR 364 million from the ERDF, outside the scope of this assessment) were necessary considering the worn out state of the research base. However, this approach has proven weak in leveraging private sector investments into R&I and fostering public research commercialisation. Despite the huge potential, weak capacity to commercialise and exploit public research for economic benefits becomes more evident after heavier investments in research production. University-led investments into the science "valleys" so far have not led to opening of the

[1] This figure results from an informal calculation of the ERDF beneficiaries, eliminating the duplications (i.e. cases when the same company has benefitted from several instruments or several projects of the same policy instrument). The cases of duplication were eliminated based on company code and company name.
[2] The analysed policy instruments are grouped in "more general" and "more selective" policy instruments. "More selective" policy instruments are those that use a more sophisticated set of criteria for selecting the applications, such as the sector in which an SME operates, collaboration with public research organisations or other enterprises, R&D intensity, etc. "More general" policy instruments used a less selective approach and did not target specific sectors or types of SMEs. It has to be borne in mind that SMEs benefitting from "more general instruments" often benefitted from more than one instrument or more than one project funded by the same instrument.
[3] For example, the Lithuanian Progress Strategy 2030 foresees that Lithuania should be 15th in the EU according to BERD/GDP figures by 2020, and 10th – by 2030.

research laboratories to business. The share of other ERDF funds allocated to knowledge and technology transfer was residual (less than 3%).

- A second weakness lies in *overdependence on intermediaries* and focus on infrastructure instead of "soft" support (brokers, consultants, mentors, and acceleration services). Lack of business R&D capacity building, seed capital funding and business acceleration created a vicious circle, largely leaving possible newcomers in the form of start-ups, spin-offs and potential innovators from traditional industries with their development needs out of the scope. The existing target group in Lithuania for the excellence-based competitive R&D measures are rather limited. Raising the allocations for direct R&D measures without simultaneously dealing with the pipeline creation through capacity building was doomed to result in problems with absorption.

Is there evidence that the OP was effective in addressing SMEs key barriers to growth and innovation?

Key positive effects are seen on the SMEs' development side[4]:

- Investments into technology absorption (grants and loans) helped the Lithuanian economy withstand the global financial and economic crisis in better shape than its regional peers (the *anticyclical role*) and both had a positive effect on firm viability. Investment credits had the highest positive effect on jobs, SMEs' profitability and turnover.

- Grants for technology upgrading (Leader LT) had the highest and lasting effect on firm performance compared to other grant-based policy instruments. This impact is hardly separated from the effect of other instruments. The highest effect is achieved when the support from technology upgrade and upgrade of processes (managerial innovation) is combined.

The effects on business R&D and economic innovation outputs are less visible. First, *it is unlikely that ERDF policies had a significant effect on the development of high technology sectors in Lithuania*[5]. Direct support for business R&D reached merely 157 high / medium high technology firms[6]. Second, *it is also unlikely that direct support for business R&D had a significant effect on overall business R&D indicators*, mainly because of (1) a lack of concentration of funds and (2) a high administrative load that facilitated the substitution effect. The policy additionality has been achieved in about 30-40% of the funded projects. However, there is a consensus that private R&D investments would have decreased drastically without the support during the economic downturn.

Third, there is no evidence of significant economic impact of the clusterisation promotion measures or the investments in the innovation promotion infrastructures. Innovation promotion intermediaries had limited effect on the SMEs' collaborative behaviour due to the focus on infrastructure, fragmentation, dubious quality and lack of scale. The clusterisation is at an early stage - the financial incentives have triggered both imitative "collaborations" as well as good practice examples. A warning sign is that there are now more than 40 clusters in Lithuania as a direct response to the instruments. In a country with extremely low social capital, this can be viewed as a first step towards more effective collaboration. The next period's challenge is thus to create incentives for merging the clusters working in similar sub-sectors and/or technology fields. The effects

[4] If available, most results are based on the counterfactual evaluation results: BGI Consulting, 2014; Visionary Analytics et al., 2015. For the purpose of this Study, the results of ex post counterfactual evaluations are only available on some of the Holding fund (INVEGA fund) actions - the State guarantee fund and micro credits, as well as for Leader LT, New Opportunities LT, and Intellect LT (in the latter case - only on employment effects). Other conclusions in this Study are based on weak(er) evidence – surveys of beneficiaries, monitoring data, interviews etc.

[5] The conclusion is based on the results of ex post (incl. counterfactual) evaluations of direct support for business R&D as well as data on the share of supported high tech businesses, see sub-chapter 4.2.

[6] On the other hand, there is a need to abandon the statistical sector-based approach impeding cross-sectoral collaboration and to view innovation development as opportunity to speed up the transformation of various economy sectors towards higher value added.

are also limited due to the overall non-systemic governance, characterised by limited synergies and high fragmentation, for example, failure to re-align the science "valleys", science and technology parks (STP) and industry clusters.

Which are the lessons learnt on the mechanisms and conditions for behavioural change?

Key lessons learnt are listed below:

- The policy mix has to acknowledge the different maturity of existing R&I performers and potential innovators, especially from traditional industries. This suggests different types of policy interventions and different pace. For example, some R&D based companies or clusters could start with R&D / collaboration projects immediately, but others from „traditional" industry sectors with focus on trans-sectoral innovations, but with limited collaboration experience, would need a longer preparation process and specific instruments for entrepreneurial search (technology platforms, capacity building for cluster development, industry foresight, etc.).
- In the new period the policy spotlight has to move from infrastructure development to capacity building. Innovation promotion services, innovation brokering/scouting, mentoring and pipeline facilitation via technical assistance and support are necessary preconditions for higher absorptive capacities of potential innovators. Lack of skilled specialists is an emerging challenge for innovation development in SMEs that needs to be addressed.
- In order to achieve economies of scale by using funding of various state institutions, it is advisable to focus on larger rather than small-scale projects and the combined use of policy instruments, when it comes to public private cooperation and mature R&D-based innovators[7]. While the potential innovators (e.g. companies in traditional industries looking for new business models) would benefit from soft innovation support and smaller experimentation projects, mature innovators (larger R&D based SMEs, e.g. biotech or laser tech companies) could immediately start with larger and more long term innovation projects combining various funding sources.
- Innovation policies need to open for newcomers through start-ups, spin-offs acceleration, mentoring and start-up/seed funding as well as targeted FDI attraction.
- Finally, good governance and programme management matters. High administrative load reduces the number of riskier innovation projects with a potentially higher impact and thus has a negative effect on the effectiveness of the funding. Also, size of different instruments needs to be balanced – currently, there are many small instruments (e.g. Inogeb LT group) versus very large ones (e.g. the Holding fund).

[7] The explanation is provided by Table 4 „Competence stairway and the different needs of innovators", sub-chapter 4.4.1.

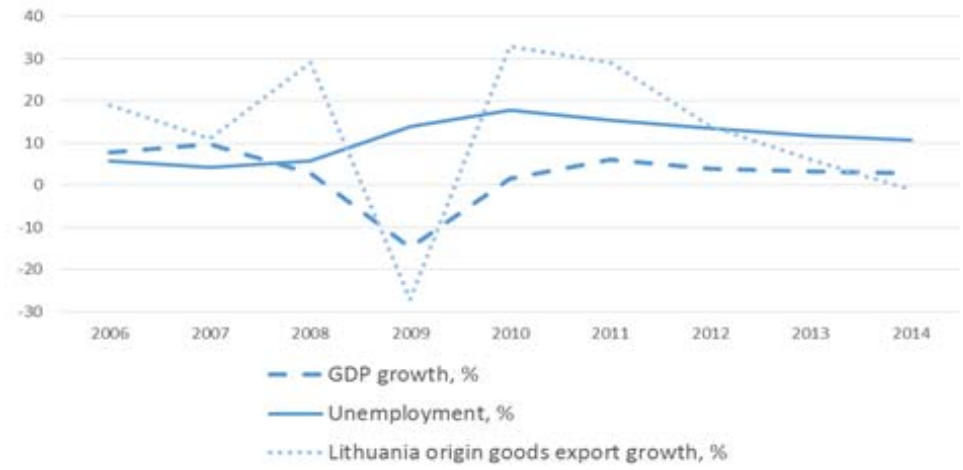
2. CONTEXT AND BACKGROUND

2.1. Socio economic context

Lithuania with a population of approximately 3 million is the seventh smallest country in the EU[8]. By 2007 the annual Lithuanian GDP growth rate was one of the largest in the EU (about 8%). Unemployment was stable at about 5%. However, the GDP per inhabitant had only reached 32.4% of the EU's average. Key challenges to be addressed by the time when the Economy Growth OP was designed were:

- The unfavourable structure of the Lithuanian economy dominated by sectors characterised by low value added and labour-intensive technologies and building their competitive advantage on relatively cheaper operating costs (including lower wages) rather than on knowledge and innovation. In 2007, same as in 2004, Lithuania's high tech and medium-high tech manufacturing sectors[9] created 4% of total value added (7% on average in the EU).
- Low indicators of new business creation, i.e. overall business entrepreneurship and foreign direct investments, also constrained by the limited access to finance (seed and venture capital).
- Low levels of labour productivity. In 2007 labour productivity in EUR per hour worked was more than 3 times below the EU average (EUR 8.7 vs EUR 31.3). This proportion was even higher in 2003 as Lithuania's labour productivity was more than 4 times below the EU average (EUR 7.1 vs EUR 29.3).

Figure 1. Key Lithuanian Socio Economic Indicators 2006-2014.



Source: Eurostat, 2015; Statistics Lithuania, 2015.

The country's economy experienced the European Union's second-worst recession in 2009, when real GDP per capita fell by 14% compared to 2008 and stood almost 70% below the EU28 average (EUR 6,900 per inhabitant). The economic crisis inevitably had an effect on the enterprise and ERDF policies (see sub-chapter 3.5.2 on reprogramming). During 2010-2014 the Lithuania's economy was recovering: the real GDP on average grew by 3%. The economic recovery, however, is not sufficiently large to spur job creation and the level of unemployment remained at about 11% in 2014. The crisis clearly slowed Lithuania's structural change towards technology-driven industries, while favouring capital and labour intensive industries. Due to capital shortage industry was reluctant in investing. Export contributed the most to economic growth up until 2014, when significant growth of domestic demand was stimulated by the recovering labour market and increasing wages. However, risks to sustainable economic development have noticeably increased during 2014. Economic development will be negatively affected by

[8] If not indicated otherwise, the source is Eurostat [04-2015].

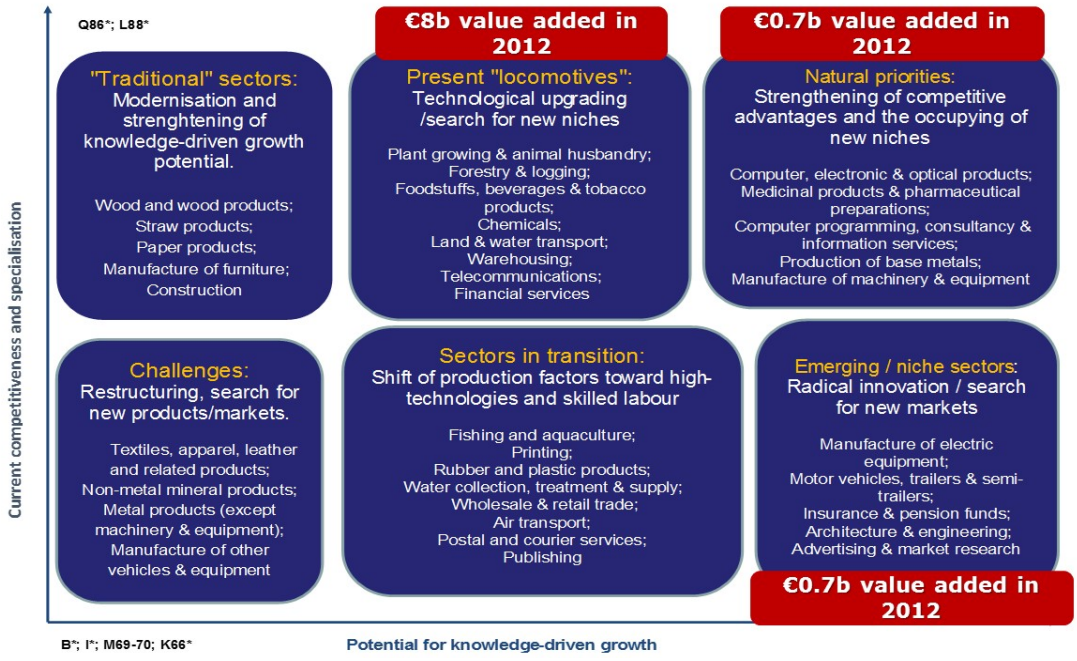
[9] Based on Eurostat High-tech aggregation by NACE Rev. 2.

trade restrictions with Russia, enforced in August 2014. Other negative factors relate to the stagnating key Lithuania's export markets in the EU, the mismatch of skills supply and demand, and the ageing society. The negative demographic tendencies (with an increase by more than 67% since 1990 of the share of the population aged above 64 years) and high economic migration are putting at risk future economic growth, by steadily reducing the supply of labour.

2.2. Regional industrial fabric and SMEs

Lithuania can be considered as a lower income country with specialisation in labour intensive industries. During the last decade, there has been a strong appreciation of the real effective exchange rate (35%, compared to 21% in the EU27) indicating a loss in cost and price competitiveness. Nominal unit labour costs have increased by 26% between 2000 and 2010, compared to an increase of 14% in the EU27 and 20% in the Euro area. While labour productivity per hour worked has gradually increased over the last decade, it is still about 45 percentage points below the EU27 average. This forces to increase productivity and find new sources for competitiveness and growth.

Figure 2. The map of economic competitiveness



Source: Martinaitis et al. (2013)[10]

The growth experienced so far in Lithuania cannot be considered as knowledge based. It has been driven by other factors than R&D, innovation and business sophistication. The Lithuanian economy structure remains disadvantageous for high value added activities development. Lithuania does not have a strong track record of innovation. Export and competitiveness in Lithuania are highly dependent on relatively large (total share in value added and employment —up to 40% in 2013) traditional sectors such as transport and logistics, retail, agriculture, construction, manufacture of food products, beverages and tobacco products and manufacture of furniture, which come under the titles "current locomotives" and "sectors in transition". First, despite current success in international markets, most of the "current locomotives" depend on natural resources and cheap labour. Shifts in regulatory regime and rising prices of natural resources and labour in

[10] The analysis of current sectors' competitiveness relies on a) export performance, b) demonstrated growth in value added, c) intensity of high tech and/or skilled labour in production, d) increasing productivity and high quality jobs, e) substantial investments of Lithuanian and foreign investors, f) created critical mass in the economy and g) priorities in previous public R&D funding decisions. The analysis of potential for knowledge driven sectors' growth is based on a) high proportion of innovative enterprises; b) development of new to market products, c) allocation of considerable funds to R&D; d) investments in intramural or extramural R&D; e) participation in international networks for innovations. (Martinaitis et al, 2013)

the future could undermine their competitiveness. For the time being, the majority of enterprises in these sectors is consumers rather than creators of innovation. To sustain current competitiveness, these sectors are in need of further technological upgrading, investments into productivity, and strengthening of potential for innovations.

Second, sectors that are characterized as potential creators of future innovations ("natural priorities" and "emerging sectors") are typically medium and high-technology sectors. Several small high tech sectors are sprouting from the research base, namely the biotechnologies, IT and laser technologies. The majority of production is exported and many companies have managed to successfully attract FDI. However, these sectors are small and fragmented.

The majority of Lithuanian SMEs (89%) are micro enterprises, and only 2% are medium sized. This structure has not changed significantly from 2007 to 2013, but the number of total enterprises decreased by more than 2,000 as an immediate effect of economic crisis. A typical Lithuanian R&D performer is a high or medium high tech SME, but in general R&D performers are scattered around different sectors, in contrast to other peers (e.g. Hungary) where a small number of relatively big performers make the majority of BERD. Most of business R&D investments are made by companies having less than 250 employees, while about 20% are made by companies having 500 employees and above. This highlights key bottlenecks related to the structure of Lithuanian SMEs – their lack of critical mass to produce high impact innovations and /or innovations new to the market, and limited capacities to absorb larger public R&D investments.

Lithuanian economy is in between the efficiency based and knowledge based growth mode. According to the assessment of the Innovation Union Scoreboard (IUS) 2014, Lithuania's aggregate innovation index stands at 0.289 in 2013, considerably below the EU average (0.554). Over the eight-year period 2006-2013, Lithuania advanced from 'modest' to 'moderate' innovators group, mainly due to increased spending on non-R&D based innovation (improvement of design, brand creation or process optimization). Businesses in Lithuania still rely more heavily on the acquisition of machinery as one of the most important mechanisms for knowledge acquisition. Lithuanian firms spend more than 70% of their innovation expenditure on acquiring machinery.

In Lithuania the R&D effort is predominantly ensured by the public sector. Public R&D investments are close to the EU average (0.71% of GDP in 2013). The public sector is also the key knowledge producer. Business R&D investments remain sharply below the EU average and there are no signs of convergence (BERD/GDP made only 18.6% of the EU28 average in 2013, similar to 2006). Despite relatively high public R&D inputs, Lithuania suffers from low economic R&D-based outputs. The productivity in preparing the highest quality research is low due to the lack of incentives, unattractive research careers, and the outdated R&D infrastructure. The research output achieved using the same human and financial resources are substantially weaker than the most EU Member States. For example, in terms international co-publications, Lithuania is 24th in the EU (324 international co-publications per million, according to IUS 2015. In terms of scientific publications among the top 10% of the most cited publications worldwide as % of total scientific publications of the country, Lithuania is 19th in the EU28. The number of EPO patent applications per million of inhabitants (6.09) was almost 18 times below the EU28 average (108.05) in 2012. Furthermore, according to WIPO, in 2013 Lithuania was 22nd in EU28 by the PCT patent applications per million of inhabitants (46.1). Moreover, according to the innovation output indicator scores in 2010 and 2011, Lithuania has a second lowest score in EU-27 and is just above Bulgaria. It is unlikely that Lithuania will bridge this gap in the short or medium term. Summing up, Lithuania is a catching-up economy with a specific national context related to innovation and cooperation:

- First, the OECD (2010) and Barca and McCann (2011) suggest that the interactions between innovation, R&D and growth are specific to the types of regions (knowledge hubs, industrial production zones and peripheral regions). The "regional innovation paradox" refers to the apparent contradiction between the comparatively greater need to spend on innovation in peripheral regions and their relatively low capacity to absorb public funds earmarked for the promotion of innovation and to invest in innovation related activities, compared to more advanced regions (Oughton et al,

2002). The existing target group in Lithuania for the excellence-based competitive R&D measures consist mainly of the limited number of top-tier research groups and few knowledge-based companies. Raising the allocations for direct R&D measures without simultaneously dealing with the pipeline creation through capacity building might result in problems with absorption of available funding.

- Second, innovation policies may want to foster the process of creation, financing, support, organization, growth of new firms, or rather consolidate and expand the activities of established firms. The goals, instruments and tools differ significantly in the two cases. The number of existing R&I performers is rather limited in Lithuania. Moreover, these performers are small and lack critical mass. In this case the country's efforts should be based on increasing the number of innovators by focusing on (a) newcomers, such as start-ups, spin-offs, knowledge-based FDI, and (b) encouraging previously non-innovative companies (potential innovators) to transform their businesses towards more innovative activities.
- Third, R&D innovation is pursued by firms in those industries or market niches where technological opportunities are larger, the knowledge base is more closely linked to natural or engineering sciences, and the returns from private investment can be, at least partially, appropriated. In Lithuania, this is the case only in a small number of niche industries (biopharmaceuticals, lasers). In other industries firms invest much less in the "R" and focus more on the „D", or innovate either by acquiring new technology produced by others, modifying products or using industrial design. Considering that the majority of Lithuanian companies doesn't have R&D capacity, there is high demand for technology upgrading helping them to increase efficiency in the context of decreasing labour-cost competitiveness and to upgrade competences required for moving up in the value chain. Non-R&D innovation also remains an important target.
- Finally, the majority of the overall modest R&D efforts in Lithuania is funded by the public sector and carried out by public research institutions, in contrast to more mature innovation systems. The research groups at the universities and institutes have limited motivation to commercialize their R&D results. The system of knowledge and technology transfer (including spin-offs) is at initial stage of development. There are serious obstacles for systemic innovation efforts: confrontation between high- and low-tech industries, lack of social capital and network failures, weak innovation diffusion system and low motivation to learn. Targeted efforts are thus required to facilitate R&D commercialisation, for example through spin-offs and technology transfer through dedicated R&D services.

3. ERDF STRATEGY ON SMES

3.1. Policy Mix

The 2007-2013 policy mix comprised a vast variety of financial, fiscal and regulatory policy initiatives that may have a bearing on SME performance – development and innovation (depicted in Table 1).

Table 1. The 2007-2014 policy mix targeting SMEs development and Innovation

Group	Measure	Group	Measure
1. Indirect R&D support	1.1 Tax incentives for R&D	6. Direct support for collaborative R&D / systemic collaboration	6.1. Innovation vouchers
	1.2. State guarantees		6.2. Clusters
2. Direct funding for business R&D (grants)	2.1. Competitive business R&D grants		6.3. Co-location measures (research parks and zones, technology incubators)
	2.2. Financial support for start-ups and "gazelles"	7. Commerciali-sation and brokerage support	7.1 Support for IPR protection
3. Financial engineering	3.1. Risk capital, venture capital funds		7.2. Knowledge transfer structures between academia and industry
	3.2. Business angels		7.3. Innovation awareness-raising
	3.3. Reimbursable loans		7.4. Third-party brokering
	3.4. Seed capital, business acceleration		7.5. Innovation management and advisory services
4. Private sector R&I capacity building	4.1. Support for recruitment of researchers in business	8. Business productivity and growth promotion	8.1. Internationalisation and visibility (export promotion)
	4.2. Support for participation in international programmes		8.2. Business processes, incl. e-commerce
	4.3. Co-financing of business R&D infrastructure		8.3. Production technology upgrading
5. Public sector R&I capacity building	5.1. International mobility of researchers, incl. PhD students		8.4.Targeted FDI attraction and industry parks
	5.2. Competitive funding for research performed by PROs	9. Regulation and policy documents	9.1. Regulation of public research funding and research careers
	5.3. Public sector research infrastructures (21 open access centres)		9.2. IPR regulation
			9.3. R&I Strategies

NB: **green** marks ERDF investments, **yellow** – ESF investments, **white** – other funds (national funds, international funds such European Investment Fund, also regulatory or fiscal measures).

Cohesion policy funding was the main source of funding for SME innovation and growth during 2007-2013, constituting approximately 80-90% of all funds available for enterprise and R&I policies in Lithuania during that period. ERDF funding played a substantial role in the policy mix, following three main routes.

First, the key focus of enterprise policies (EUR 528.38 million from the ERDF) was put on providing access to finance for business development, facilitation of non-R&D innovations and productivity in business. Funding for technology absorption in business was mainly allocated through loans and business guarantees. At the same time, grants for technology absorption were also available. The focus on absorption has thus far been largely appropriate given the current level of Lithuanian economic development and enterprise needs. Next to the ERDF, a number of venture capital funds were also launched by the European Investment Fund under the JEREMIE umbrella over 2010-2013, aiming to boost investments in early stage companies (see Figure 10). In terms of the overall business environment, a number of regulatory reforms were launched to make the environment more favourable for starting and accelerating business in Lithuania. For example, in 2013-2014 Lithuania made starting a business easier by eliminating the need to have a company seal and speeding up the value added tax registration at the State Tax Inspectorate.

Second, policies targeting specifically R&I, adopted a linear approach to innovation, supporting precompetitive research through investment in research infrastructure at public R&D institutes and universities (EUR 364 million from ERDF) with a subsequent effort to encourage R&D commercialisation and business-science collaboration. The investments in R&D infrastructure were necessary considering the worn out state of the research base. However, this approach has proven relatively weak in leveraging private sector investments into R&I and fostering public research commercialisation, and tended to reinforce the existing trend of low investment in R&D and innovation by business sector. The objective of facilitating business and science collaboration highlighted by the SF strategic documents was not translated into specific funding instruments. Despite the huge potential, weak capacity to commercialise and exploit public research for economic benefits becomes more evident after heavier investments in research production. Next to the ERDF funds, complementary ESF funds were available for public sector R&D capacity building (see sub-chapter 3.4 on synergies and links). The knowledge transfer between science and industry was also strengthened by the non-financial measures introduced by the Ministry of Education and Science, e.g. the results-based university funding model (more value is attributed to R&D contracts with industry) and the Recommendations on IPR management in universities (2009).

A limited number of R&D programmes and financial incentives for R&I were funded solely from the national budget. For example, financial support from MITA was ensured for legal entities aiming to protect intellectual property rights. Also, support is provided for facilitating Lithuanian participation in FP7, e.g. compensation of application preparation costs, compensation of international events costs etc. Transnational/trans-regional funding was applied to a very limited extent. For example the Eurostars and other programmes promoting transnational cooperation, five bilateral/multilateral research programmes are implemented (the annual budget of the five programmes is no more than EUR 1 million).

The third set of enterprise policies (EUR 207.44 million from the ERDF) aimed at leveraging business R&D investments with the specific aim to facilitate the development of innovative products and services to be later introduced into the market. A substantial share of funding from this set was allocated for creating or strengthening of intermediary organisations (science and technology parks, incubators, clusters), particularly their infrastructure. Next to the direct funding for business R&D tax incentives are available for companies performing R&D since 2009. The use of these incentives is increasingly limited (from 226 companies in 2009 to 181 companies in 2013).

To sum up, the policy mix has improved significantly in the context of the National Strategic Reference Framework (NSRF) 2007-2013. Many of the policy instruments designed by the Economic Growth Operational Programme were implemented for the first time. Also, new implementing/funding agencies were set up or strengthened substantially (LVPA, MITA, see Figure 2). The enterprise and innovation policies were relatively weak in terms of financial assistance to SMEs before 2007. Hence, a lot of learning by doing and ongoing adjustments took place while implementing the planned objectives. Key adjustments are discussed in sub-chapter 3.5.2 (reprogramming).

However, there remains a mismatch between the ambitious targets related to business R&I[11] and the actual priorities according to the concentration of allocated funding and the existing business capacities (see sub-chapter 1.2). Since 2007, innovation policy has rapidly grown in importance, which resulted in a number of strategies and institutional changes. The Lithuanian Innovation Strategy was adopted in 2010, extending the definition of innovation by including social, customer-oriented, non-technological, demand-oriented, and public innovation. The Strategy was updated in December 2013 into the Lithuanian Innovation Development Programme 2014-2020. A number of other strategic R&I policy documents were adopted during 2012-2013. In April 2010, the Government established the Agency for Innovation, Science and Technology (MITA). The

[11] For example, the Lithuanian Progress Strategy 2030 foresees that Lithuania should be 15th in the EU according to BERD/GDP figures by 2020, and 10th – by 2030.

ambitious targets of new innovation strategies have not facilitated real changes in the policy mix; hence the ambition remains largely "on paper". On the one hand, ambitions to expand or re-align the innovation policy mix or to strengthen the institutional capacity to implement policy (starting with newly established MITA) were constrained by the financial crisis. On the other hand, overdependence on the Cohesion support for business R&I highlights both lack of political will and the risk to sustainability of innovation funding after 2020.

3.2. Objectives and priorities of the OP

The strategic objective of the Operational Programme for Economic Growth is to speed up long term economic growth in order to reduce the development discrepancy between Lithuania and the EU. The key problem it intends to tackle is the unfavourable structure of the Lithuanian economy dominated by sectors characterised by low value added and labour-intensive technologies and building their competitive advantage on relatively cheaper operating costs (incl. lower wages) rather than on knowledge and innovations. Targeted efforts are addressed at changing the structure of the economy, with a focus on development of a high and medium-high technology sector and on strengthening of traditional sectors that are high value added. Out of six priority axes, the OP support to SME growth and innovation is structured along two axes as depicted below.

Table 2. Priority axes and objectives

Priority axis	Relevant objectives	Initial allocation (2007)	After reprogramming (2015)
Axis I: Research and development (R&D) for competitiveness and growth of the economy (further on referred to as *more selective policy instruments*)[12]	• Objective 3: Intensify R&D by the private sector. • Objective 4: Improve the environment for the diffusion of R&D results and promote science-business cooperation.	EUR 313 million (excluding approx. EUR 100 million allocated for constructing public R&D infrastructures).	EUR 207.4 million (about 30% of the EUR 735.8 million allocated for the two priority axes, excluding support for public R&D infrastructures)
Axis II: Increasing business productivity and improving the environment for business (further on referred to as *more general policy instruments*)	• Objective 1: Increase business productivity. • Objective 2: Increase the viability of businesses and promote entrepreneurship. • Objective 3: Improve access to financing sources for SMEs.	EUR 380.8 million[13]	EUR 528.3 million (about 70% of total funds allocated for the two priority axes)

Source: compiled by authors

3.3. The intervention logic

The restructured intervention logic is depicted in Figure 3 below. This Figure shows that the ERDF intervention logic was quite complex and relied on many assumptions, especially on the SMEs' innovation side. For example, among the key assumptions were that (a) large investments into public R&D infrastructure will lead to enhanced business-science links, commercialisation and knowledge transfer, through enhanced access to business, and (b) indirect support through strengthened intermediaries (science and technology parks, incubators and clusters) will lead to more innovative start-ups, pooled R&D resources and better innovation outputs.

The selected 19 ERDF policy instruments (excluding investments into public R&D infrastructure) that seek to overcome barriers hindering SMEs development and innovation are grouped in categories as presented in Table 3. Three most common modes of delivery assistance were:

[12] Notes: Some PIs of this axis were directed to public research infrastructure (science 'valleys'). Hence these measures are not included here. Source: www.esparama.lt database; Lithuanian Government resolution „On the Approval of the Annexes to the Human Resources, Economic Growth and Cohesion Facilitation Operational Programmes", 2007. http://www3.lrs.lt/pls/inter3/oldsearch.preps2?a=312824&b

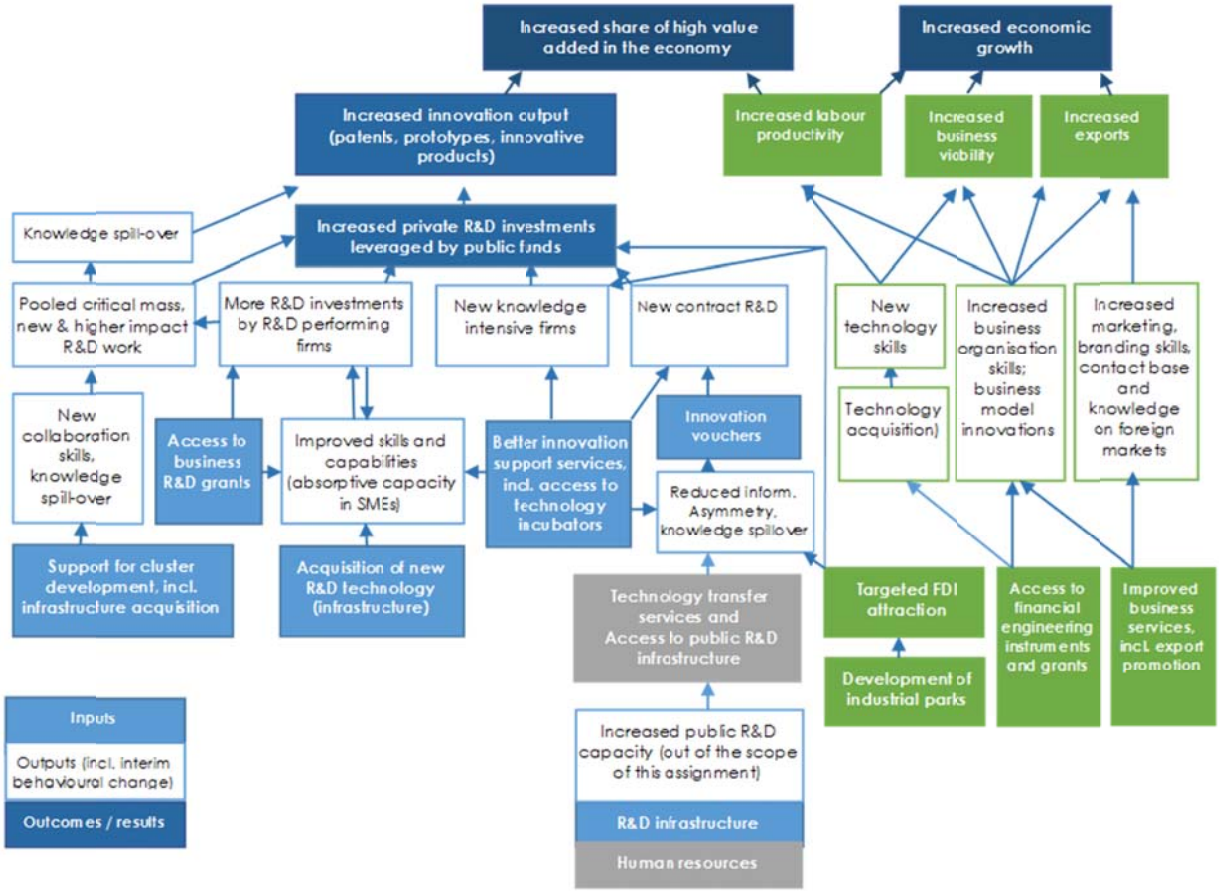
[13] Ibid

- **Direct grants** for SMEs (8 policy instruments), constituting largest share of total funds allocated (48%);

- Financial engineering instruments, such as **loans, State guarantees** (3 policy instruments and a number of actions, constituting 38% of total investments, see Figure 10);

- Indirect support - **grants for intermediaries**, such as cluster facilitators, science and technology parks, incubators, when as a result assistance to SMEs is indirect, through following consulting services etc. and this way, creating a better business environment for SMEs (7 policy instruments, 14% of total funds).

Figure 3. Reconstructed intervention logic of the SF-funded strategy on SMEs innovation and growth in Lithuania over 2007-2013



Source: compiled by Visionary Analytics. **Blue** – ERDF Priority Axis I, **green** – ERDF Priority Axis II, **grey**– ESF.

The 19 policy instruments are also grouped in "more general" and "more selective" policy instruments (see Table 3 below). "More selective" policy instruments are those that used a more sophisticated set of criteria for selecting the applications, such as the sector in which an SME operates, collaboration with public research organisations or other enterprises, R&D intensity, etc.

Table 3. Policy instruments funded by the 'Economic Growth' OP 2007-2013

General PI category	Specific PI category	Policy instrument	Mode of delivery	Target beneficiaries	Barrier / Intervention logic
Business development and productivity (appr. 30% of total allocated funds after reprogramming)	Internationalisation and visibility	New opportunities	Grants	Individual SMEs	Intends to increase business skills and capabilities by providing financial incentives for upgrading of technology and business processes that subsequently trigger higher productivity and business growth. New Opportunities Lt provides access to the international markets that could not be previously accessed due to limited skills or information.
	Business processes	E-business Lt			
		Process LT			
	Access to infrastructure and technology upgrading	Leader LT			
		Invest LT-2	Grant	Individual enterprises	Creates incentives for choice of location for investment.
Generic access to finance (38%)	Financial instruments for business development	Holding fund*	Equity finance + Repayable financial support		Addresses traditional market failure strengthened by the economic and financial crisis. Intends to trigger business restructuring (incl. by better management capabilities) and growth.
		Compensation of credit interests	Repayable financial support		
		Guarantee fund			
Innovation promotion infrastructure and related services (11%)	Infrastructure	Inogeb LT-2	Consulting, advice, technical assistance (intermediaries)	Individual SMEs or groups of SMEs or entrepreneurs or students	Under-provision of infrastructures and institutions / Imperfect information on innovation opportunities. Aim to develop an effective knowledge and technology transfer environment (technology incubators, science parks), which would in turn support R&I in business and facilitate business and science partnership. The majority of funds (74%) was focused on constructing infrastructure.
		Assistant - 2			
	Services provision	Inogeb LT-1			
		Inogeb LT-3			
		Assistant - 1			
Support for networking, knowledge and technology transfer (3%)	Clusterisation promotion	Inocluster LT	Grants + Consulting, advice, technical assistance + Information campaign, seminars	Group of enterprises in partnership with university/ research institutions	These instruments target network and institutional failures, e.g. information asymmetry. They intend to create a critical mass, to foster linkages and achieve behavioural additionalities. For example, the first collaborative efforts (inno-voucher) trigger new collaborative behaviour; new and better collaborations; better governance of clusters; critical mass allows larger R&D projects with higher impact.
		Inocluster LT+			
	Knowledge transfer	Ino-vouchers LT	Grants		
Support for R&D projects (grants) (18%)	Direct funding for business R&D (9%)	Idea LT	Grants	Individual SMEs	This instrument addresses traditional market failure (uncertainty and an adjudged imbalance between risk and reward). It intends to trigger more business R&D.
		Intellect LT			
	Business R&D infrastructure	Intellect LT +			

Source: developed by authors. **More selective** and **more general** policy instruments marked in different colours. * - Venture capital funds and Business Angel fund under JEREMIE umbrella and INVEGA fund are within the Holding fund instrument, see Figure 10.

Overall, the diverse 2007-2013 **policy mix was largely appropriate** given the SMEs' needs and policy challenges, **especially on the SME development side (Priority Axis II)**. A mix of grants and loans, aiming at technology and process upgrade (non-R&D innovation) as well as export promotion responded well to the business challenges outlined in the Context chapter.

However, given the allocation of funds (about 70% are allocated to more general policy instruments and most of the innovation promotion funds, another 10%, allocated for construction of incubators and parks), the set of PIs reinforced a general systemic tendency to favour technology absorption through capital investment over innovation. This has tended to reinforce the existing trend of low investment in R&D and innovation by business sector and passive adoption of technologies developed elsewhere. A few key weaknesses of the mix of policy instruments and their intervention logic (especially on business innovation side, Priority Axis I) are discussed further in the case study, for example:

- First, the business-science collaboration objective and related policy challenges were not translated into more substantial policy instruments. The share of other ERDF funds allocated to knowledge and technology transfer is residual (only 3%). University-led investments into science "valleys" should be considered as competence centres projects.
- Second, overdependence on intermediaries, especially science and technology parks, and focus on their infrastructure instead of development of human resources (brokers, consultants, mentors etc.) and qualified one-on-one service provision for SMEs', in order to increase the pipeline of innovative business projects. The same logic (focus on awareness-raising and other indirect support) applied to the creation of start-ups, leaving the gap of seed capital funding and business acceleration largely unfilled.
- Third, limited attention to business R&D absorptive capacities and comparatively limited scale of funds allocated for business R&D created a vicious circle (see also sub-chapter on reprogramming).

3.4. Synergies and links

The OP for Economic Growth 1 and 2 priorities contribute to the objectives of **other Lithuanian OPs** (and vice versa):

- "Human Resource Development" OP's first priority "Quality employment and social inclusion", which funded investments in firms' capabilities via training programmes, facilitation of entrepreneurship,
- "Human Resource Development" OP's third priority "Strengthening researchers' abilities", which funded public sector R&D and mobility of researchers, as well as researchers' placement from academia to industry programme.
- Also, OP for Economic Growth contributes to the goals of "Promotion of Cohesion" OP's priority "Quality and accessibility of public services: health, education and social infrastructure", which funded the development of the higher education infrastructure (buildings, equipment).

The synergies with **the EU's international programmes,** such as the 7th Framework Programme were not clearly emphasized. It was indicated neither in the OP, nor in its specific instruments. Some measures fostered synergies indirectly (e.g. the "Promotion of high level international research" funded by the Economy Growth OP, but not included in the selected 19 PIs) by funding research with international partners or the participation in international events, where potential partners can be found. However, these measures were targeted to the PROs. The only exception is measure "Intellect LT" which was partially used for co-financing the EUREKA projects coordinated by the Lithuanian SMEs. Also, the specific rules of measure "Intellect LT", which gives direct funding for business R&D (grants) provided that the applicants could apply with partners (companies or research institutions) registered in Lithuania or *abroad.* Hence, in theory this could contribute to enhanced international networking and trust and indirectly lead to further

international collaboration. However, in practice Lithuanian SMEs applied without partners (the administrative load precluded foreign SMEs in participating).

3.5. Implementation and reprogramming

3.5.1. Role of partnership and consultation

The structure of potential social-economic partners and business service providers has expanded since 2007. Regionally 10 science and technology parks (STP) offer infrastructure for the establishment of new innovative businesses in Lithuania and serve as a platform for business enterprises, scientists and students to combine their knowledge, experience and ideas. Such collaboration leads to the development of innovations as well as initiating and implementing numerous business projects. National technology platforms which existed in 2006-2007, have responded to the available policy instruments and evolved to ~45 clusters and 21 open access centres at the five "valleys" of science, studies and business.

At the time when the OP for Economic Growth was designed (2005-2006), the target groups were mainly represented by groups of scientists and technology platforms (which were better organised and more active) and various less organised business associations as well as influential business society leaders. These stakeholders were involved in the OP design process through working groups and public discussions:

- Each priority formed a working group. Key stakeholders, who showed interest in participating, had representatives in these working groups. The structure of the working group for priority axes I and II was comprised of 65% of representatives from government institutions and 35% of sectorial and national partner organizations (including business associations, confederations, etc.). The outputs prepared by working groups were summarised by the Ministry of Finance and finalized by the special Commission formed for EU structural assistance funds Strategy and OPs project preparation.
- The results were presented publicly and discussed with the main stakeholders. The comments and opinions of stakeholders were taken into account while preparing the final version of the OP. More than 200 social and economic partners participated in this process (OP for Economic Growth, 2007).

The process described above is a typical formal consultation process applied in Lithuania when drafting strategic policy documents (the focus is on involving representatives of ministries and relevant agencies). Consensus-based approach to decision making is not supported by prevalent policymaking styles. Since the start of the EU accession negotiations, considerable efforts have been made to increase transparency in public funding decisions. Large political discretion to allocate funds and shady lobbying efforts of interested parties were perceived as the main challenges to transparency. As a result the last decade witnessed the development of systems for the allocation of public funds that rely on quantitative indicators and/or judgment of external independent experts. Thus the idea of wide involvement of stakeholders in setting of priorities (that will guide further public funding) runs counter to the efforts to date (Paliokaitė et al, 2015). The recent process of identifying the national R&I priorities and drafting the Smart Specialisation Strategy for 2014-2020[14] and the process of designing the strategy "Lithuania 2030" are the two exceptions that mark progress in this area.

3.5.2. Reprogramming

The Economy Growth OP has experienced two major changes since its approval in 2007. First, in 2009 Lithuania suffered 2nd worst recession in the EU due to the global economic and financial crisis. As an immediate response, in 2009 the Lithuanian Government launched the EUR 1.65 billion Economic Recovery Plan aimed at restoring market stability and providing greater access to capital for business in 2009-2011. This plan **re-**

[14] More at: http://www.mosta.lt/en/reports-and-analyses

allocated about EUR 100 million from the Economic Growth OP Priority Axis I (see Table below) to financial instruments, mainly the Holding fund. On the one hand, reprogramming was justified given low absorptive capacities of the Lithuanian companies (especially for R&D related infrastructure) and a high need for access to finance during the credit crunch crisis. This is a prevailing view of the interviewed authorities.

As could be expected, there were many smaller changes and iterations during 2008-2015. For example, new policy instruments were launched, such as Ino-vouchers LT (first piloted in 2012, funding mainstreamed from the ERDF since 2014). Also new measures Invest LT-2 and Inogeb LT-3 were launched.

Second, one of the objectives under the Priority Axis I, namely the Objective 2 "Increase efficiency of R&D by the public sector as well as its accessibility to businesses" was not translated into specific policy instruments and was later on abolished. Its specific indicators were transferred to Objective 1 "Strengthening of public and private R&D infrastructure". This reflects one of the key failures of the NSRF 2007-2013 – inability to facilitate commercialisation of public R&D and its access to business. Over the past few years there was a substantial political focus on the circulation of knowledge, particularly in the context of fostering cooperation between public research and private enterprises. "Integrated science, studies and business centres – valleys" constitute the most important instrument (worth around EUR 400 million allocated by Priority Axis I) for fostering open innovation and transfer of knowledge between public research and private enterprises. 21 open access centres (R&D laboratories, which should provide R&D services for business and other interested applicants for a particular price) have been constructed in the "valleys". However, to date the involvement of enterprises in these projects has been limited and the investments resulted in the modernisation of public research infrastructures rather than research-enterprise collaboration. Due to the lack of effective programme management mechanisms and capacities the "valleys" development took place in an uncoordinated manner and essentially depended on the universities' interests.

3.5.3. Implementation and efficiency

Participation rate in the open calls for tender (see Annex IV) was highly influenced by the type of instrument – more general instruments were most popular as a result of the credit crunch. Despite there were some delays in implementing the more selective instruments such as Intellect LT/LT+ and Inocluster LT/LT+, the interviewed authorities are confident that there will be **no major problems with the absorption of funds** by the end of the programming period (also due to the reprogramming discussed above). On average, SMEs participating in the *grant based PIs* faced more difficulties (BGI Consulting, 2014). For example, administration of grants required 3-4 times higher resources of time compared to administration of repayable loans or other support from the financial engineering instruments. Only 6% of SMEs participating in *a financial instrument based PIs* (the Holding fund etc.) faced major difficulties compared to 40% of grant based PIs participants. Because of administrative difficulties (public procurement rules, lack of flexibility, long lasting response from implementing agency) 25% of grant-based projects were delayed, 10% - only partly implemented. The key weaknesses are discussed below.

First, the efficiency of public support and the absorptive capacities were reduced **by high administrative load** to the beneficiaries, for example: strict requirements/restrictions that are unnecessary and do not add value to the project[15]; long taking evaluation

[15] The majority of complaints conveyed through interviews relate to the formalistic approach towards consultation of applicants, excessive bureaucracy and public procurement in particular, which lessens the possibilities to obtain the required research equipment. Other examples: Idea LT beneficiaries could not obtain support for prototyping/testing activities; the beneficiaries of the Inogeb LT-1 measure have been made subject to restrictions with regard to their partners and activities pursued.

procedures[16]; limited flexibility to address any changes in the project design. The above-mentioned weaknesses create a high administrative load for beneficiaries and reduce experimentation. Moreover, only those companies that are implementing projects that are anyway in the pipeline are encouraged to apply. Hence, public support may be replacing, rather than complementing, private expenditures on innovation and R&D.

Second, according to the interviewees, the implementing agencies in Lithuania are somewhat **reluctant to use public resources to finance the innovation projects associated with high(er) risks.** This happens as it cannot be warranted that the R&D sponsored by the state will translate into commercially viable products. Therefore, there is a marked tendency in the system to finance low-risk technology projects, with tangible and guaranteed outcomes.

Third, the efficacy of public support is also reduced by the **formal, technical and 'desk-top' selection procedure**. The 'paper-based' application procedure provides incentive for firms to hire consulting companies to draft grant applications that appeal to the reviewers, but favour form over substance (Paliokaitė and Kubo, 2013). Such obstacles can be overcome in an efficient institutional environment, for instance by engaging professional programme managers.

Fourth, one of the reasons behind lower take-up (see Table 3) of funding for more selective policy instruments has been **the simultaneous organisation of calls for proposals under different measures**, which, in the opinion of the beneficiaries and experts, has led to competition between the measures at the very peak of the crisis, when companies chose very carefully where to co-invest, given also the high administrative load.

Finally, the **potential applicants were not 'ready' for more complex instruments** (such as Inocluster LT/LT+), hence the implementation was delayed. The demand for complex policy instruments having many restrictions and requirements (to have partners, joint strategies, to register special legal body – a facilitator) was especially low at the peak of the crisis. The open calls of these PIs did not differ significantly from traditional business state aid measures, and strict requirements and restrictions placed constraints on the operation and development of a cluster. The measure design followed a top-down approach. The calls did not consider that clusters have various integration levels, which correspond to different stages of maturity and therefore require a step by step approach.

[16] In some cases, companies received funding for the project after 2 years have passed since submitting the application. During this time the cost of equipment can increase, new ideas occur, some ideas can become irrelevant.

4. EVIDENCE ON ACHIEVEMENTS

4.1. Measuring achievements

In Lithuania, a detailed monitoring system (SFMIS)[17] is available at the policy instrument level (product, results and many context indicators measuring characteristics of beneficiaries). The SFMIS is centrally administered by the Managing Authority and filled by implementing agencies, which allows for effective monitoring:

- In particular, the policy instruments are already defined in the OP, indicators of implementation and results are monitored by the Managing Authority at the level of policy instruments and are available for almost all the identified instruments;
- Reported indicators refer both to ex-ante estimations and achievement indicators (for finished projects) based on declarations made by beneficiaries[18];
- Output and result indicators are suitable to assess the capacity of the instrument to achieve its intended objectives;
- Also, SFMIS collects so called "national level" additional indicators from the beneficiaries up to 3 years after the project (on turnover, exports etc.) which allows creating data sets for ex post evaluation.
- The evidence offered by the monitoring system is complemented by an independent (including counterfactual) interim and impact evaluations, which are planned by the ministries in advance and centrally coordinated by the Ministry of Finance, its Evaluation coordination unit.
- The majority of policy instruments was already at a good stage of implementation, therefore an assessment of their effectiveness, even if preliminary, is possible.

Hence, the system is comprehensive and fully operational. However, when considering the quality of the existing system and its usefulness for strategic and operational policy decisions, there is a list of weaknesses (based on PPMI, 2010; Paliokaitė, 2015; Paliokaitė and Kubo, 2013; Visionary Analytics, 2015; and expert interviews), to be addressed in the future. First, the system of objectives established in the Operational Programme and its instruments lacked causal (logical) relations. Due to the lack of a clear intervention logic, the indicators of a different level often lack causal relations as well. Furthermore, the risk of mixing monitoring indicators and attributing them to an inappropriate level was not avoided and in many situations the attainment of the policy instrument's aims was measured on the basis of result indicators which actually measure long-term impact. Therefore, some policy instruments appeared over-ambitious (e.g. the ones funding the construction of the public R&D infrastructure in the science "valleys").

Second, the evaluation of indicators (PPMI, 2010) concluded limited reliability of nearly 88 percent of all the monitoring indicators since methodologies for their calculation differed depending on a policy instrument or Programme objective. The examples are differing methodologies for the calculation of private investment attracted due to interventions or jobs created. The methodologies for calculation of the indicators have improved considerably since 2010. However the interviewees at the implementing agencies still reported various issues regarding the calculation of specific output/result indicators and their reliability.

Third, some factors mitigate the risk of not achieving the performance targets, such as (a) unambitious planning of the performance targets in some cases (e.g. the measure Intellect LT that funded 260 business projects, has set the target to submit only five

[17] Source: http://www.finmin.lt/sfmis

[18] SFMIS provides data on each project application (data on unsuccessful projects is limited): company name, company code, NACE code, contact details (phone, email, fax, name, surname of the person responsible for the project), values of output/result indicators indicated in the contract, values of output/result indicators achieved by the end of project, financial data (total project value, private investments, ERDF investments, of which – EU and national investments).

patent applications to the EPO or WIPO); and (b) the possibility of changing performance targets during the programme implementation. Hence, there is a mismatch in some cases - there is a great achievement of targets reported, but the *ex post* evaluation results indicate that there might be no significant impact (for example, see Figure 9 in sub-chapter 4.3, effects on business R&D and innovation).

Fourth, there was a lack of synergies with other important monitoring frameworks at a national level (e.g. the "valleys" and "complex research programmes" had their own monitoring system). It is an important lesson on the monitoring of the implementation of smart specialisation during the new period (systems need to be aligned).

Finally, although there is a centrally coordinated system of evaluations and efforts are concentrated on improving the evaluation capacities at the ministries and implementing agencies, there are serious weaknesses related to the evaluation capacities, the application of rigorous methodologies and the use of evaluation results for decision making. Particularly, the usage of ex post evaluation can be further improved. *Ex post* evaluation is fragmented, and the results are not available to all policy instruments at the time when a new programme for 2014-2020 is being designed. Especially, the use of counterfactual evaluation is limited. Hence, there is a mismatch and the same mistakes may be repeated because the policy makers are planning new programmes while not being aware of what has worked previously and why. The Lithuanian authorities have not yet upgraded the impact evaluation mechanisms from monitoring inputs and outputs to assessing outcomes. Often the scope of evaluations is too broad and the resources of time too short to be able to apply rigorous methodologies. Most importantly, even the conclusions of otherwise useful evaluation studies have not received sufficient attention from policy makers, making the whole exercise largely futile (Paliokaite and Kubo, 2013). According to the public officials' survey carried out by Visionary Analytics (2015), only 18% of surveyed officials could indicate an evaluation that has had an impact on policy objectives. The existing practices of policy evaluations are mostly used for policy accountability purposes as opposed to policy learning.

4.2. Characteristics of the assisted SMEs

Overall, the ERDF assisted from around 6,600[19] SMEs (8.5% of total No. of Lithuanian SMEs in 2015, see Annex VI). Among those, direct support to business R&D was only provided to 270 SMEs, while the remaining SMEs were funded by more general policy instruments. The majority of beneficiary SMEs s were micro or small (83%). Small (43%) and medium (38%) enterprises took mostly advantage of measures offering grants. However, micro (47%) and small (39%) SMEs were most active in the financial engineering instruments. There were just few medium-sized SMEs (14%), which resorted to these measures.

[19] This figure results from an informal calculation of the ERDF beneficiaries, eliminating the duplications (i.e. cases when the same company has benefitted from several instruments or several projects of the same policy instrument). The cases of duplication were eliminated based on company code and company name. Detailed information on supported SMEs is available only for PIs which provided direct support to SMEs.

Figure 4. Total population of direct beneficiaries by sector

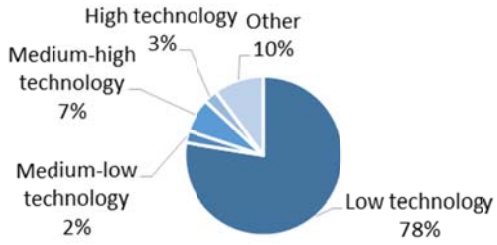


Figure 5. Total population of direct beneficiaries by size

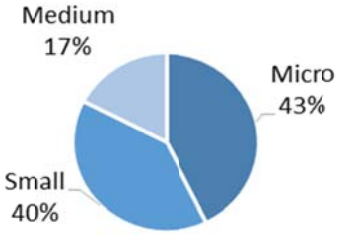


Figure 6. Direct beneficiaries by sector, more selective instruments

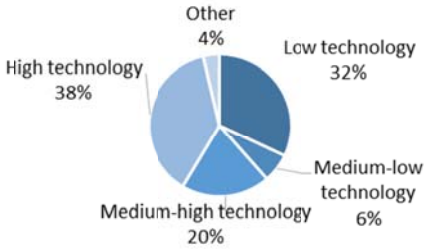
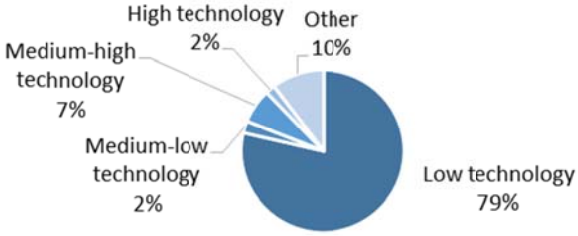
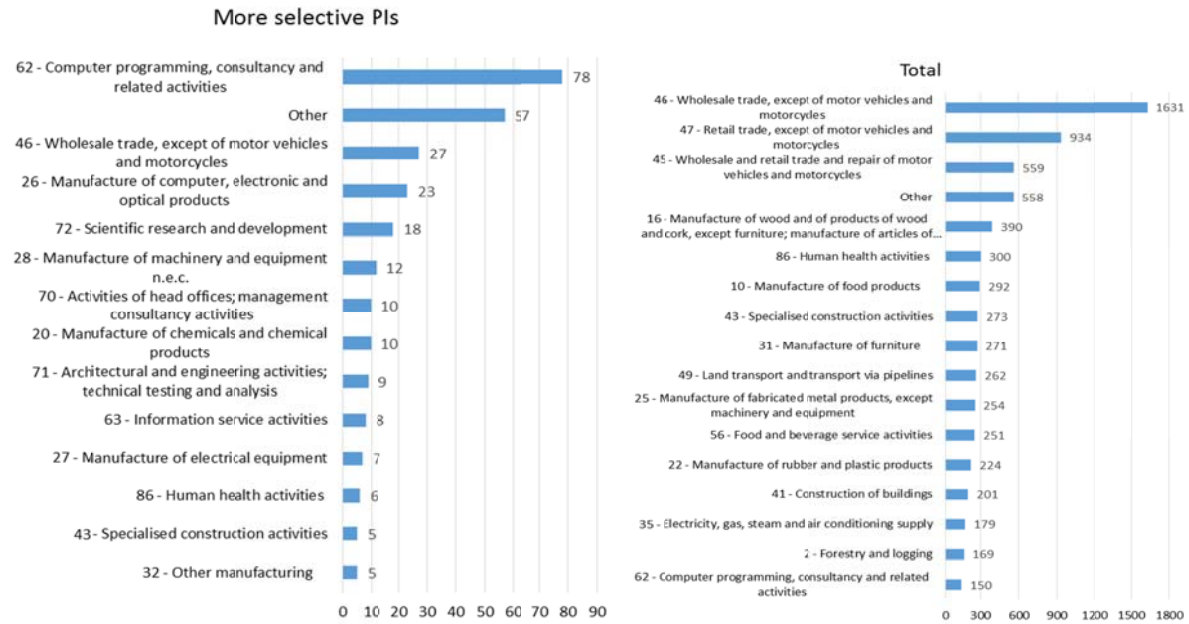


Figure 7. Direct beneficiaries by sector, more general instruments



Source: SFMIS, March 2015. NB: only policy instruments that provide direct funding to the beneficiaries are included in the calculations

Figure 8. Target beneficiaries by sector (total and more selective PIs)



Source: SMIS, March 2015. More selective PIs: Idea LT, Intellect LT, Intellect LT+.

None of the policy instruments (excluding Assistant - 2) target specific sectors. However, it is possible to identify the economic sectors with the highest number of SMEs participating in the projects (Figure 8 above). The self-selection of applicants seeking R&D support included a plethora of enterprises in medium-high and high-technology intensive enterprises, as well as some low- and medium-low tech firms, in line with the policy objectives (see Figure 6 below). Idea LT and Intellect LT measures (40% of selected projects) dominated among the applications for R&D, especially in the ICT sector.

Companies in low- and medium-low technology intensive sectors unsurprisingly tend to seek capital investment funding (from Leader LT, Holding fund and similar measures) more frequently. The assumption is that the mature enterprises in traditional sectors choose to apply for capital investment more frequently than their counterparts in high tech manufacturing or knowledge-intensive services.

Finally, the SMEs, which implemented projects in regional centres or in less developed municipalities, received bonus points in the evaluation of applications. However, this did not result in more active participation of the SMEs from regional centres or less developed municipalities. The percentage of SMEs implementing projects in these areas was lower than the percentage of SMEs registered in these municipalities (see Annex VI).To sum up, it is unlikely that ERDF policies had a significant effect on the development of high / medium high technology sector in Lithuania. According to Eurostat, 30% of Lithuanian SMEs carry out innovation-related activities. However, direct support for business R&D reached merely 270 individual firms, of which 157 operated in high tech / medium high tech sectors. The case study of the computer and electrical equipment manufacturing sector (ESTEP, 2015) has shown that the ERDF support had a significant positive effect on the performance indicators of 15 firms from that sector that participated in more selective policy instruments. However, this effect was "a drop in the water" in the face of declining value added and other performance indicators of other companies in this sector.

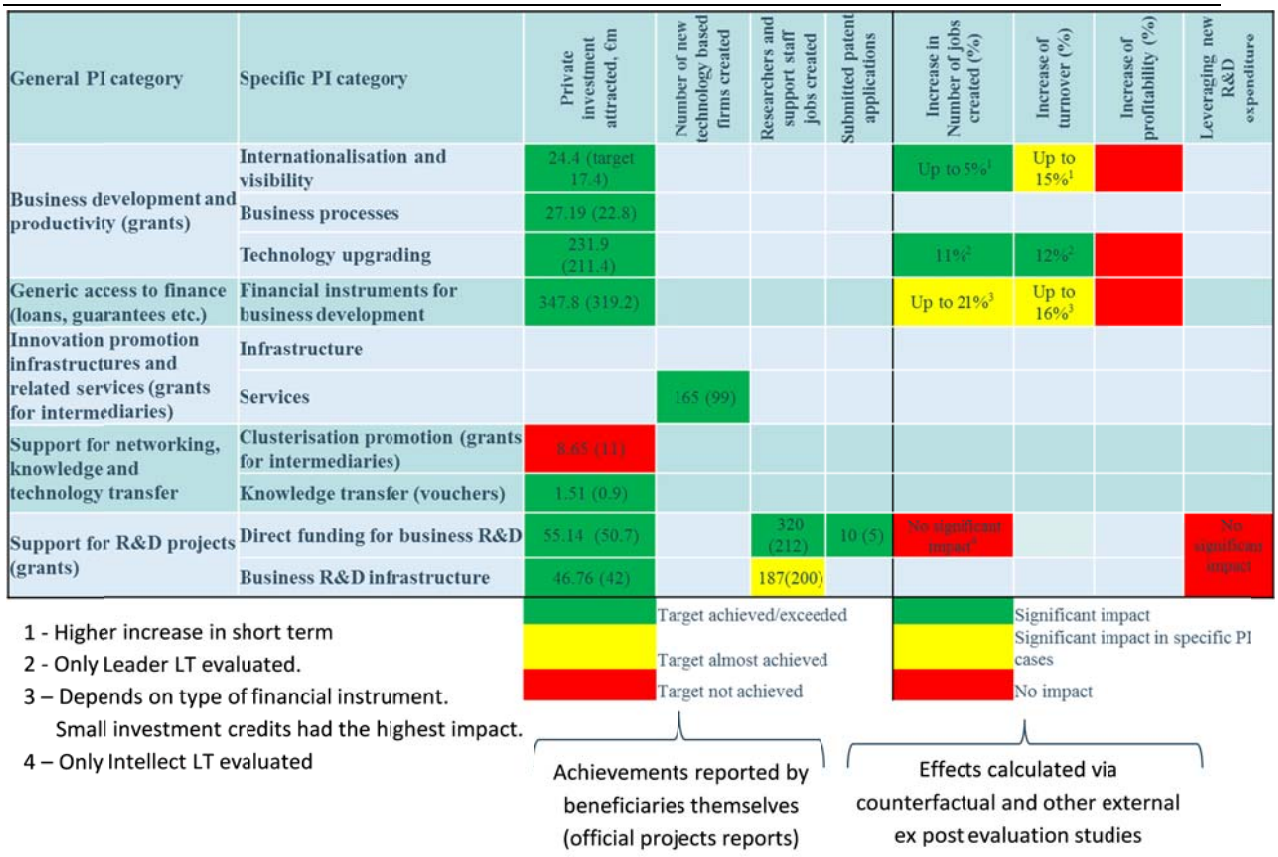
On the other hand, distance between high technologies and other technologies is not clear cut – there may be innovative companies working in traditionally "low tech" sectors, and non-innovative high tech companies simply outsourcing their human resources, but not developing own brands and products (which is often the case in Lithuania). There is a need to abandon the statistical sector-based approach and to view innovation development as an opportunity to speed up the transformation of various economic sectors towards higher value added. The focus on sectors has a number of drawbacks: it impedes rather than facilitates inter-sectoral cooperation that is needed for the development, commercialisation and spill-overs of innovations. As a result - potential synergies remain unexploited[20].

4.3. Achievements

Not all the supported projects were finished by the time when the case study was prepared. Nevertheless, existing data on output and results indicators (reported by the beneficiaries in their project reports) indicate that vast majority of the formally set target indicators will be achieved by the end of the programming period. The interviewed authorities are also confident that all targets will be achieved, except in some specific cases, for example, of the clusters' policies. However, first results of *ex post* evaluations (including counterfactual) indicate that the effects of ERDF support on some key firm performance indicators (as depicted by Figure 9) will be limited/insignificant.

[20] In contrast to the traditional approach, the Smart Specialisation Strategy 2014-2020 in Lithuania seeks to foster interactions between sectors by linking priorities with emerging opportunities and challenges and focusing on measurable outcomes.

Figure 9. Evidence of (most relevant) achievements and effects



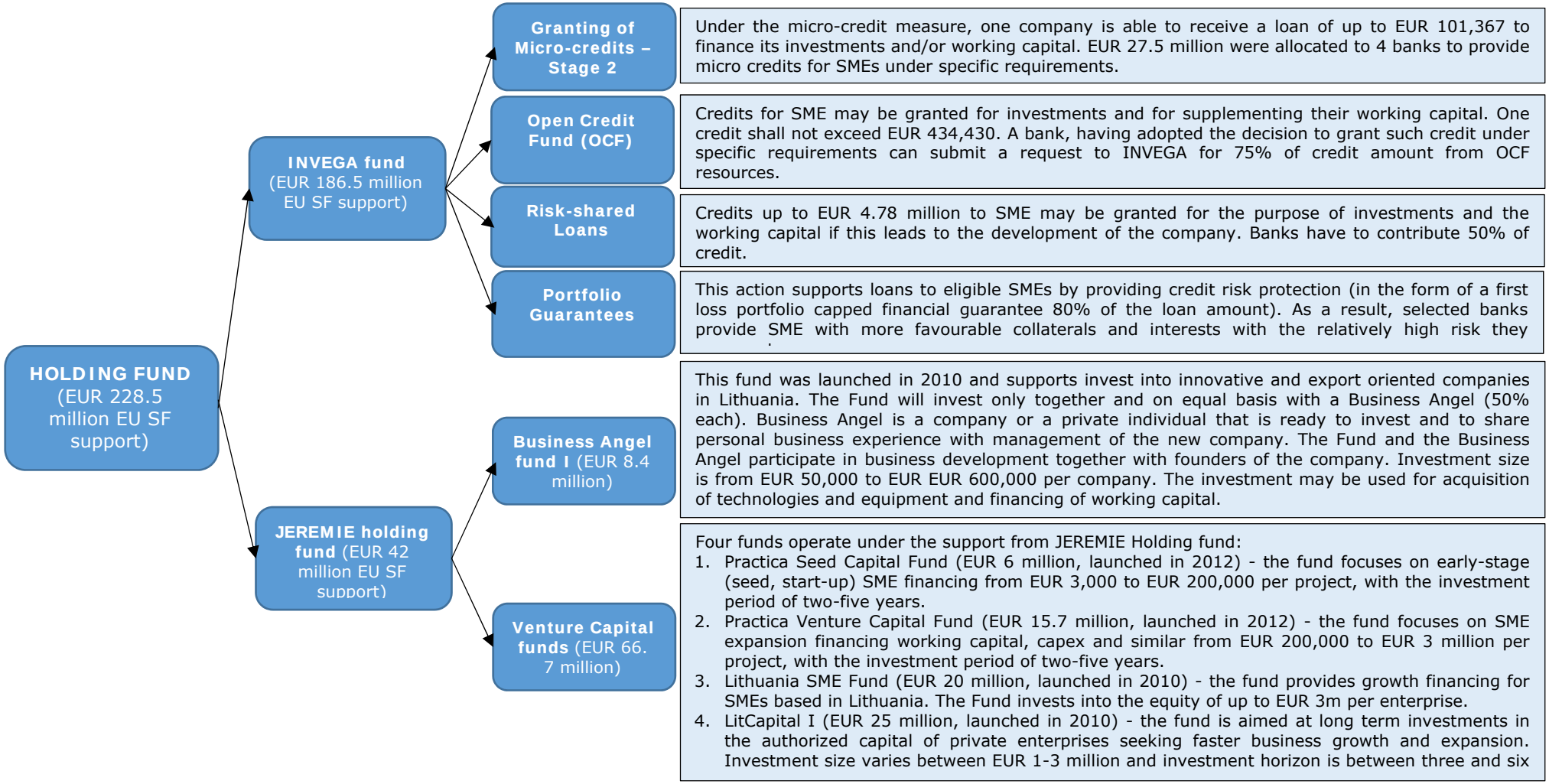
Sources: own elaboration based on SFMIS data of April, 2015; Invega data of December, 2014; BGI Consulting (2014, 2015); Visionary Analytics et al (2015).

The Figure above summarises the main results achieved by the policy instruments. The detailed information on the output and result indicators set and achieved by each policy instrument by April 2015 is provided in the Annex 1. The following sub-chapters provide a detailed discussion on the achievements of specific categories of policy instruments, **starting with the most significant** (general access to finance – the financial engineering instruments, 38% of total funds allocated) and finishing with the least significant (support for networking and technology transfer, 3% of funds). Due to the limited validity and reliability of the achievements reported by the beneficiaries and collected by the SFMIS, the results of counterfactual evaluations are discussed instead, if they are available.

4.3.1. Generic access to finance (financial engineering)

Generic access to finance or the financial instruments (the Holding fund, Compensation of credit interests and State guarantees fund) constitute the most significant group of policy instruments available to SMEs under the ERDF umbrella. The Holding Fund - the most significant instrument in the group – itself consists of several actions (see Figure 10).

Figure 10. Actions under the Holding fund



Source: own compilation based on www.invega.lt http://www.litcapital.lt/EN/menu/litcapital-i#sthash.GFNPwwQz.dpuf http://www.mesinvest.lt/index.php/business-angels-fund-i/82 http://www.baltcap.com/baltcap-funds/lithuania-sme-fund-kub http://practica.lt/en/top/about-us/

Notes: Venture capital funds size includes private investment. Share of EU SF support is 70% for Practica Venture Capital fund, Lithuania SME fund and LitCapital fund, and 100% for Practica Seed capital fund.

Funding for infrastructure and technology absorption in business was mainly allocated through loans and business guarantees. At the same time, grants for technology absorption (Leader LT, see 3.3.2) were also available. However, evidence collected indicates that in Lithuania **grants did not crowd out the financial engineering instruments**. All the financial engineering instruments met or will meet the targets set for attracting private investments[21] (see Annex 1). One of the key factors increasing the attractiveness of the loans was their relatively easy administration – grants required up to three – four times more administrative resources (see 2.5.3).

According to the results of the counterfactual impact evaluation (BGI Consulting, 2014)[22] the financial engineering instruments had a significant effect on business viability, especially during the time of economic crisis, although the effects did not last in some cases. Results differ in cases of the specific policy instruments:

- The **State Guarantees Fund** did not have a lasting impact on enterprise turnover, jobs created or profitability after the projects were finished. However the support had an immediate positive effect during the economic crisis, which ensured a lower decrease of firm performance indicators. The turnover in the group of assessed beneficiary companies decreased by -13% in 2009, whereas on average it decreased by -28% in the control group. This effect did not last.
- One of the **INVEGA fund's** actions – "micro credits" (See figure 10) on average did not have a statistically significant impact on SMEs turnover, jobs created or profitability. However, if within "micro credits" the investment credits are separated from the compensation of working capital costs, it appears that investment credits had a high statistically significant effect on firm performance indicators (increase of 16%[23]) and jobs created (increase of 21%[24]). This positive effect is higher than in the effect of grants for technology upgrading (see 3.3.2). It is expected that investment credits under other measures of Holding fund also had a positive impact on SMEs performance indicators and jobs created (these actions were not evaluated).
- Data on the effects of the policy instrument "**Compensation of SMEs' credit interests**" is not available, apart from the opinions of the beneficiaries surveyed that this policy instrument was successful in ensuring access to finance during the economic downturn (INVEGA, 2013).

According to one of the Holding fund's actions (**JEREMIE holding fund**) performance analysis (LT VCA, 2015), LT VCA data and European Investment Fund data, business and economic performance indicators of JEREMIE holding fund's portfolio companies increased significantly[25]:

- Turnover of the portfolio companies increased by 66% from the beginning of investment to 2013, and reached EUR 96.92 million in 2013.
- Export of the portfolio companies grew by 31% from the beginning of investment[26] to 2013 and was EUR 44.5 million in 2013.

[21] The Holding fund has not reached the target of private investment attracted (EUR 180.6 million attracted, the target is EUR 206.2 million) due to the fact that the Risk-shared Loans (see Figure 10) were launched later than expected due to the delayed selection of operators (banks). The Holding Fund will run till end of 2015.

[22] Overall, the quality of the counterfactual impact evaluation (CIE) mainly used in this study (BGI Consulting, 2014) is good. However, it was clearly limited by available resources. For example, due to the limitations, CIE was only performed on a small number of selected instruments or smaller actions (e.g. within the Holding fund). First, partly due to small sample, some of the conclusions are statistically not significant (they were not used for the purposes of this evaluation). Second, not all instruments were covered. Therefore some other conclusions of this evaluation rely on surveys or interviews.

[23] With 74% level of statistical significance.

[24] With 98% level of statistical significance.

[25] This data has been collected via survey of beneficiaries, counterfactual evaluation was not performed.

[26] Here and below the beginning of investment refers to the launch of each fund. Practica Seed Capital Fund was launched in 2012; Practica Venture Capital Fund was launched in 2012; Lithuania SME Fund was launched in 2010; LitCapital I was lauched in 2010; Business Angels fund was launched in 2010.

- Number of employees increased by 14% from the beginning of investment to 2013 and was 1,559 in 2013.
- The additional private investment attracted was 2.5 times higher than EU SF support until 2013.

JEREMIE holding fund was launched relatively recently (three funds were launched in 2010 and two funds - in 2012). The supported funds will operate for approximately 10 years. Hence the interviewees could not evaluate impacts, and *ex post* (counterfactual) impact assessments are not available. Furthermore, it is impossible to state that all the above mentioned improvements were the result of JEREMIE holding fund investment. However, as the portfolio companies applied for funding, seeing this as a key factor for further growth (BGI, 2014), the majority of the above mentioned impact can be assigned to the JEREMIE holding fund investment.

In addition, qualitative evidence of **JEREMIE Holding fund's** indirect impact on the overall financial market ecosystem is observed:

- *Formation of venture capital ecosystem*. Until 2010 (when the JEREMIE venture capital funds started to operate) venture capital market was dominated by foreign investors and was not stable. Now there are 5 venture capital funds operating under JEREMIE roof and one private venture capital fund. In addition, the regulatory system of venture capital funds was also slightly improved (improvements were made in legal and tax base).
- *Private venture capital funds entered the market*. In 2013 the private venture capital fund "Nextury Ventures" was established.
- *Network of private investors is developing*. Now there is a business angels network of approximately 100 angels (BGI Consulting, 2014), private pension funds (e.g. Swedbank, SEB pension funds) and foreign investors (e.g. „Intel Capital", „Accel Partners", „Nokia Ventures") are investing into venture capital funds.

Specific comments regarding **venture capital funds** are listed below:

- In addition to above mentioned achievements of venture capital funds, mentoring, advice, contacts and other help provided via these funds created benefits for the supported SMEs.
- The main *challenge* faced by venture capital funds relate the restrictions of fund's investment opportunities. Firstly, each fund has a ceiling for investment per SME. In some cases, especially in the later investment stage, a larger investment is needed (e.g. for the acquisition of infrastructure). This is the problem also for the *early stage investment* (seed capital fund) as the highest sum of investment is only EUR 0.2 million. As a result majority of investments are made in the ICT sector as this sector does not require capital-intensive investments in the early stages of business. Secondly, the funds can invest only in Lithuania's territory. This restriction makes it harder to attract private investors, as the risk of investing only in Lithuania is higher than investing in e.g. all three Baltic States. This is especially important for the seed capital funds as they are riskier than the later stage investment funds and it is harder to manage such funds.
- In addition, only one seed capital fund is available in the whole venture capital ecosystem (and it was launched at the very end of the programming period). On the other hand, according to the interviewees, there are not so many good ideas to be supported. This points to the lack of soft support (see a similar comment regarding R&D facilitation in a sub-chapter 4.4).

Specific comments regarding **Business Angels fund I** are listed below:

- According to the interviewees, about half of the investments co-funded by the Business Angels fund would not be made without the existence of this fund. This fund has supported development of innovative SMEs and creation of new products (e.g. "Ars Lab" created the world first device to test the freshness of meat "electronic nose"). Nine patent applications have already been submitted by portfolio companies.

- The Business Angel fund faces three main challenges. Firstly, the investment is limited to EUR 0.6 million per SME (same challenge as described above). Secondly, the regulatory policy for business is seen as unstable. Every proposal to change e.g. tax system, changes the risks of investments and the fund has to recalculate their current investments. Finally, there is a lack of good quality business proposals (innovative and perspective young SMEs). However, this problem is seen as a challenge to find potential and perspective SMEs.

To conclude, first, financial engineering measures are seen as more appropriate instruments in business development because of their positive effects, easier administration (for the beneficiaries) and lower negative impact on the market. The intention of the Managing Authority is that they will continue to be the main instrument for this purpose in the 2014-2020 EU SIF period. All INVEGA and JEREMIE funds measures will be continued in the upcoming period. The only change under the JEREMIE fund actions - higher requirements for private investment contribution to the funds. Seed capital funds have to consist of at least 10% of private contribution (in the previous period there was no requirement for private capital contribution in the fund) and the later-staged funds have to consist of at least 40-60% of private contribution (in the previous period - 30%). INVEGA fund will continue both "working capital" and "investment credits" instruments, but with greater emphasis on investment credits as this instrument demonstrated a greater effect on firm performance indicators. However, second, financial engineering instruments are less attractive to financial institutions administering these instruments (the operators) in cases when instruments are expected to reach specific policy goals. For example, the goal to mainstream the use of KETs in industry, finance more risky R&I investments or focus on specific fields of smart specialisations, focus on less developed regions etc., imposes additional restrictions and greater administrative cost for operators. Hence, in the specific above-mentioned cases, when policy instruments are expected to facilitate firm behavioural changes, the responsible authorities continue to use grants with a greater rate of private contribution (55-75%). Both these decisions are justified. Third, there is a lack of seed and pre-seed capital funding, and especially the tailored facilitation and mentoring support to create a pipeline of good quality projects for further investment.

4.3.2. Business development and productivity (grants)

Support for business processes. According to available data, grants for support of business processes (Process LT, E-business LT) were not as effective as grants for business infrastructure and technology upgrading. The survey of SMEs, which received funding show that this instrument had comparatively lower effect (compared to other instruments) on beneficiaries' turnover, export growth and profitability. The significance of these instruments in terms of funds allocated per beneficiary was also lower. The number of employees decreased in beneficiaries of this instrument. It may be because the beneficiaries optimized their manufacturing and management processes and thus optimized the number of employees, even if no major effect on profitability (as a result of increased efficiency) is observed. However, they helped to increase labour productivity because of optimised manufacturing processes and new electronic management systems installed. Conclusions are supported by evidence collected:

- According to the survey of beneficiaries (BGI Consulting, 2014), due to the support received from **Process LT** its beneficiaries experienced 1.5-2% perceived[27] increase in export, profitability, income from sales and average salary. However, according to the beneficiaries, the number of employees decreased by 0.75% because of the participation in this policy instrument. This can be explained by optimised processes and more effective use of human resources.

[27] I.e. reported by the beneficiaries but not supported by any 'hard' evidence such as counterfactual or modelling results.

- According to the same survey of beneficiaries, **E-business LT** increased the profitability of the beneficiary enterprises by about 8%. This can be explained by increased productivity as new electronic management systems were installed.

Support for internationalisation and visibility. The results of the counterfactual impact evaluation of the **New Opportunities LT** instrument show that the positive effect of the instrument on turnover and number of workers can be seen only during the implementation of the project, but not after the project has finished[28]. This policy instrument was attractive because the application process was simplified by introducing the "fixed sum" principle. LVPA assumed that the funding was used very efficiently - 1,053 projects were supported with EUR 39.3 million (EUR 37,352 per project while average support of all PIs for one project was EUR 81,267). Evidence on the effects and achievements:

- Results of the counterfactual impact evaluation showed no positive impact on turnover, profitability and jobs created in the medium term (approximately one year after the project finish). In the short term (immediately after the projects), the counterfactual impact evaluation showed a 15% increase[29] in turnover, and 5% increase in jobs created[30]. The short term effects on turnover and jobs created did not dissolve after the project despite the fact that growth of turnover and jobs created slowed down and was slightly lower than in the control group. Also, it is likely that more positive impact of policy instrument will occur in a longer period of time (BGI Consulting, 2014).
- The survey of beneficiaries (BGI Consulting, 2014) showed perceived 13.7% increase in exports as an effect of participation in this instrument. Also the same survey showed approximately 5% increase in profitability, income from sales and average salary in enterprises, number of employees.

Support for business infrastructure and technology upgrading (grants). According to the results of the counterfactual impact evaluation (BGI Consulting, 2014) grants for technology upgrading (**Leader LT**) had a significant positive effect on the SMEs' turnover, profitability and jobs created:

- Leader LT had a positive effect on the SMEs turnover (12%) and number of employees (11%), but it had no positive impact on profitability. Some SMEs received funding from other policy instruments (e.g. Process LT), so part of the effect could be assigned to other instruments. Moreover, the survey of beneficiaries depicts perceived positive effect of the instrument in terms of export growth (30.6%), profitability (17%), and income from sales (25.6%).
- It is too early to formulate conclusions on the achievements of **Invest-LT** because only 10 of 48 projects have been finished. However, this policy instrument has already reached the target of public investment attracted (EUR 56.75 million whereas the target was EUR 52.1 million).

To conclude, grants for technology upgrading were effective. These grants were most demanded by the business sector. Based on limited evidence that is available, Leader LT had the highest impact compared to other grant-based policy instruments. On average, it also had a higher effect than the evaluated financial engineering instruments. However, the effect of Leader LT could hardly be separated from the effect of other instruments, because many companies benefited from different sources. Based on the interviews, the highest effect is achieved when the support from technology upgrade and upgrade of processes (managerial innovation) are combined.

[28] It must be noted that not all projects (only two thirds) were finished during the evaluation. Also some SMEs received other funding from other policy instruments, so part of the effect could be assigned to other instruments.

[29] With 93% level of statistical significance.

[30] With 63% level of statistical significance.

4.3.3. Direct support for business R&D projects (grants)

Direct support for business R&D (Idea LT, Intellect LT and Intellect LT+) is the main group of measures aimed at facilitating additional private investments in R&D, which have been historically very low in Lithuania (see chapter 1.2). The evidence on what kind of effect these measures had on business R&I is controversial. Some ex post evaluations conclude that there was no significant effect (BGI Consulting 2014, 2015), others make a normative conclusion that there the effect was "medium"[31] and will manifest itself over a longer period (ESTEP, 2015). Counterfactual evaluation of the effects on business R&D indicators is unavailable, but the results of the counterfactual evaluation of Intellect LT on employment indicators are on average insignificant. Based on the official statistics, the *ex post* evaluation and interview results the conclusion is that **these policy instruments had no significant effect on overall business R&D indicators, mainly because of (1) the lack of concentration of funds and (2) high administrative load that facilitated the substitution effect**.

There is also consensus that without such support private investments would have decreased drastically during the economic downturn when businesses were reluctant to invest. Hence, EU SF investment allowed business R&D investment to remain at pre-crisis level (ESTEP, 2015). In a survey of beneficiaries about half of the beneficiary enterprises stated that the measures of the EU structural funds have provided them with an incentive to invest into R&D and they intend to continue investing in the future (ESTEP, 2015). Intellect LT projects created 474 products, services, processes or prototypes (conceptions) (target of 318 exceeded). However, the **policy additionality[32] is limited**. In another survey, 69% of beneficiary firms that received support for business R&I, concluded that they would have implemented the funded projects even without the public support (although to a smaller extent or in a longer timeframe) (Paliokaitė et al. 2011). The ex post evaluation carried out by BGI Consulting (2015) also concluded that support did not create a strong impulse for the growth of business R&D investment. The interviewed authorities generally attribute this to the negative effect of an economic crisis. At the same time, implementing agencies see a positive effect on the overall business R&D culture. Given an extremely poor baseline situation, direct support for business R&D also served as awareness building (on what is R&D, what are the needs of companies) both for business companies, and for the implementing agencies and other innovation supporters. Larger effects are expected in a midterm long-term future. Other evidence on effects and results is also controversial:

- First, evidence available information suggests that jobs created in the Intellect LT projects would be also created without the ERDF support. According to the beneficiaries (SFMIS, March 2015), Intellect LT and Intellect LT+ contributed to the creation of 447 researchers jobs in the business sector. However, the results of the counterfactual impact evaluation of Intellect LT showed a statistically significant effect on employment only in one of four calls for tender. The effect of all four calls on jobs created was statistically not significant (Visionary Analytics et al., 2015).
- Second, Intellect LT exceeded the unambitious target of 5 patent applications (10 were submitted as a direct result of the projects), but did not reach the target of 10 design applications (only 2 were submitted). One explanation for a low number of design registration applications is a high number of ICT projects (36% of Intellect LT beneficiaries) in which patent or design applications are not typical. Moreover, enterprises are usually not applying for patents because of large international

[31] Not only direct support for business R&D, but the total effect of the ERDF/ESF policy mix on business R&D was evaluated.

[32] The additionality principle implies that the state subsidy is reasonable if its granting makes a company to incur additional costs for R&D and/or influences a new collaborative behaviour which would not occurred at all or would occurred to a substantially lesser extent without the subsidy. Thus, the evaluation of instruments which fund R&D activities should disclose whether subsidy schemes have influenced on changes of new activities (costs for R&D activities, behaviour, collaborative relationships, etc.) and whether activities that would be occurred without the state intervention have not been funded (deadweight effect). The direct funding for R&D is expected to attract private investments into new activities and not finance "more of the same".

patenting costs (ESTEP, 2015), hence there is a problem with the design of the policy instrument (patenting costs were not compensated).

- Third, as could be expected, the target indicator "R&D activities ordered from public research organisations" (EUR 8.7 million) was not met by the Intellect LT beneficiaries. The 2007-2013 policy mix generally failed to translate business-science collaboration objectives into policy measures, except for a mini-instrument of innovation vouchers. Enterprises prefer purchasing R&D services from other partners. In Lithuania, public-private R&D collaboration is not effective due to many complex issues, including the lack of effective regulatory measures (see 3.4.2).

4.3.4. Innovation promotion infrastructure and related services (grants for intermediaries)

Innovation promotion infrastructures. It is too early to evaluate policy instruments of this group (**Inogeb LT-2, Assistant-2**), because only 6 out of 21 projects are completed. Also the projects are supporting infrastructure construction and the effect of these investments should occur only after some time when the projects are finished. So far, only 1 technology park was developed and 5 arts incubators were built, reconstructed or established. 53 tenant SMEs are operating in these infrastructure units (the overall target is 200). The main reasons for the delay of the projects are long-taking public procurement procedures and legal issues related to property development (legal permissions, detailed plans etc., some cases have ended up in courts). Nevertheless, the authorities expect that all projects will finish on time and all targets will be achieved. However, based on the interviews, the established science and technology parks are highly dependent on public support. Quality of services would significantly decrease without the support (for more detailed discussion, see Chapter 4).

Innovation promotion related services. Half of the projects (13 of 26) in this group of policy instrument (Inogeb LT1-3, Assistant-1) have not been finished by the time when this case study was prepared. Some information on the achievements is available in SFM IS, however the validity of this data is limited[33]. For Lithuania business R&I capacity building is an important way to improve its R&I performance in terms of excellence. One of the reasons why companies in traditional industries are less engaged in R&D activities and partnership with universities and research institutes is their lack of competencies related to the acknowledgement of the value of innovation and/or capabilities related to the management of innovation processes. Precisely this failure justifies the additionality of State's intervention and the need for innovative ideas facilitation and acceleration services. However, firstly, this highly relevant need was not acknowledged when designing the policy instruments and the majority of funds (74%) was allocated for the physical infrastructure of the science and technology parks. It seems that up till now the State is still looking for a solution how 10 science and technology parks should operate, what is their role in the innovation promotion system along the newly created clusters and open access centres. Importantly, the role of brokering, foresighting, scouting, facilitating and mentoring innovation ideas and other promotion services remains a huge gap. Since 2011 the newly established MITA has been trying to fill this gap with ad-hoc projects funded by inogeb-LT3. However, there is a high need for more systematic and concentrated efforts.

4.3.5. Networking, knowledge and technology transfer

Support for clusterisation promotion (grants for facilitators of clusters). Clusterisation promotion instruments (**Inocluster LT/LT+**) are perceived as relevant and necessary instrument by both the responsible authorities and the beneficiaries. However, so far **there is no evidence of significant economic impact**. Clusterisation is a new practise in Lithuania. The related limitations and challenges have been described

[33] So far, Inogeb LT-3 and Inogeb LT-1 have achieved the target of establishing new technology based firms - 165 new technology based firms were created (the revised target is 99). According to the Assistant – 1 beneficiaries' reports, projects supported by this measure lead to creation of 1,028 jobs in enterprises which participated in project events (target value is 300).

in sub-chapter 3.4. The maturity of potential beneficiaries and "readiness" for this instrument was very low when the instrument was launched. Many potential beneficiaries did not understand the advantages of clusterisation. Up till now, many enterprises do not trust other cluster members and see them as competitors. EU SIF support enabled to create new clusters, to attract new cluster members (64) and SMEs' involvement in cluster activities. To conclude, the positive economic effects of clusterisation policy instruments may occur in the long run, because now the environment for clusterisation processes is in the stage of early development. However, currently cluster members are not willing to invest money into clusters - they are joining a cluster for pragmatic reasons. It is therefore doubtful if clusters remain when the financial support is not continued.

Support for knowledge transfer (innovation vouchers[34]). The Ino-vouchers LT is the only policy instrument is supporting knowledge transfer during 2007-2013 EU SIF period. This measure aimed at speeding the knowledge transfer processes between business and university sectors by giving a small fixed sum for R&D subcontracts. As an instrument facilitating first science-business collaboration contacts innovation vouchers were not expected to achieve a significant effect on R&D and innovation. However, its effect on facilitating first collaborative behaviour could not be underestimated. Many interviewed beneficiaries as well as respondents of beneficiary surveys (Visionary Analytics, 2014) highlight high satisfaction and perceived usefulness of this instrument even despite its small value. At the same time, the beneficiaries admit that the budget of this policy instrument is too small to have a significant effect on any performance indicators. Hence, more substantial measures and efforts (including regulative measures) are needed to foster business and science collaboration.

4.4. Mechanisms and conditions for behavioural changes

Evidence gathered suggests that the instruments of generic access to finance and other investments into technology absorption have helped the Lithuanian economy withstand the global financial and economic crisis in better shape than its regional peers, having a positive effect on firm viability. These instruments were not expected to facilitate specific firm behavioural change, hence are not discussed further. The policy instruments aimed at facilitating firm innovation constitute a more interesting case. Although the direct support for business R&D projects and other R&I related instruments were less attractive in a midst of economic crisis, there was still substantial demand. However, the effect on the whole economy and policy additionality were limited (see sub-chapters above). Why? Evidence collected suggests few propositions discussed below.

4.4.1. Absorptive capacities and the competence stairway

First, the policy mix has to acknowledge the different maturity of existing and potential innovators in the "competence stairway" (see Table 4). The key idea is that given the baseline situation with a very limited number of business R&D performers, the policy mix needs to take into account the different maturity of existing and potential innovators. The key aim of enterprise policies is to create incentives for all types of companies to move "up the competence stairway" (Paliokaitė, Martinaitis, 2014). This suggests different types of policy interventions, different intended results/outcomes, and different pace. For example, some R&D based companies or clusters could start with R&D / collaboration projects immediately, but others from „traditional" industry sectors with focus on trans-sectoral innovations, but with limited collaboration experience, would need a longer preparation process and specific instruments for entrepreneurial search (technology platforms, capacity building for cluster development, industry foresight etc.).

[34] The pilot innovation vouchers scheme was launched in 2010 and after the confirmed success was upgraded to the Ino-vouchers LT scheme in 2012 (the annual budget is EuR 1.65 million). The voucher enables an SME to buy R&D expertise or knowledge from a research or higher education institution. Supported activities: industrial or applied research; technological development (experimental or development, design and technological works); technical feasibility studies. 1047 ino-vouchers (EUR 4.3 million) were funded over 2010-2014 from both ERDF and national sources.

Table 4. 'Competence stairway' and the different needs of innovators

Type	Technology consumers	Potential innovators	Emerging / new innovators	Mature innovators
Type of companies	Manufacturing companies and service providers (including the public sector) that lack modern technological and managerial capacity and productivity.	Generally large manufacturing companies or service providers in the traditional sectors facing the loss of competitiveness and thus feeling the pressure to move to new business fields and products.	Generally young and small (below 100 employees) companies, export oriented, fast growing. Strong public R&D laboratories base are also in this group, with their strategies to be oriented towards economic results via spin-off creation.	Generally R&D-based large (>100 employees), long time in the market (>10 years), operating in the high technology sectors, export oriented, having well developed networks with the research institutions and business partners.
Challenges	Modernisation and strengthening of technology and absorptive capacities (incl. human resources).	Diversification and technology transfer, new innovative activities and new business models. More "D" than "R" in R&D – high need for many smaller experimentation projects.	Acceleration of innovative activities, incl. spin-off creation, access to venture capital and FDI to increase the critical mass, strengthening of capacities.	Moving to higher impact innovations, large scale R&D projects, new international markets, spin-outs.
Needs (what should the specific policy mix focus on?)	Demand-side incentives (innovative public procurement, pre-commercial procurement, etc.). Capacity development (attracting highly qualified specialists, learning, technology and process upgrading).	Incentives for transformation (platforms, clusters, foresight), support for experimentation and various innovation support services, encouraging moving to new products and new business models, such as idea development support, brokerage, scouting, mentoring, innovation facilitation services, science-industry R&D subcontracts.	Start-up acceleration (mentors, seed and risk capital), FDI attraction, R&D infrastructure and various innovation support services, including vouchers for technology oriented services at the science parks and similar (prototype development, validation and pilot manufacturing).	Large joint R&D projects for greater critical mass, facilitation of Horizon 2020 and other international initiatives. R&D infrastructure support – only if moving to new business activities. Promotion of technology diffusion and transfer from high tech to low tech.
Horizontal preconditions	Ensuring availability of high quality specialists (including upgrading higher education programmes). Clusterisation and networking promotion. Support for experimentation and foresight. Favourable framework conditions (entrepreneurship policies, flexible labour market, tax policy, R&I regulations, talent attraction policies, standardisation, favourable conditions for research careers, etc.)			

Source: Visionary Analytics (2014); Paliokaitė, Martinaitis (2014).

Second, *innovation promotion services, innovation brokering/scouting and pipeline facilitation via technical assistance and support* are necessary preconditions for higher absorptive capacities of potential innovators. For Lithuania capacity building is an important way to improve its R&I performance in terms of excellence. Buying a new production line just improves efficiency and quality, but still the business function remains the same. To move up in the value chain means leaving the previous function and starting with a new one and it needs different capacities than understanding of the production line (like design, engineering, marketing, service development etc.). The decision to move up in the value chain comes when business cannot stay competitive in its current function. Many of the companies in the Lithuania traditional industries are facing the decline of low cost based competitive strategies and are looking for new business fields; hence despite their limited R&D capacities they are potential innovators. One of the reasons why these potential innovators are less engaged in R&D activities and partnerships is their lack of competencies related to the acknowledgement of the value of innovation and/or capabilities related to the management of innovation processes. Precisely this failure justifies the additionality of State's intervention and the need for innovative ideas facilitation and acceleration services. Current policy mix lacked focus on the pro-active incentives to encourage companies to get involved in the discovery of diversification and experimentation opportunities:

- Mechanisms (e.g. vouchers) to boost experiments and discoveries while encouraging connections among economic agents;
- Industry, technology and market foresights, studies on long term future trends and likely development of technologies that could improve the forward looking capabilities and agility,
- Innovation scouting / brokerage, technical assistance and other innovation support services aimed at emphasizing the value of innovation and linking the activities of different actors in the innovation system (businesses and research institutions).
- More focus on the experimental development and engineering (more D than R, especially at the 6-9 technology readiness levels). About 30% of manufacturing companies lack prototype testing and pilot manufacturing services (Visionary Analytics, 2014).

Based on data collected, several weaknesses of R&I related enterprise policies can be listed. Importantly, the terminology reflected in the policy documents, measures, projects and monitoring systems focused on (a few) mature innovators and particularly in basic science. As a result, some critical elements of the innovation process related to the experimental and technological development (such as prototyping) as well as the incremental development of products and processes, and the systemic nature of innovation in general, was not captured. The implementing agencies, especially during the first calls for tenders, hired scientists to evaluate the applications, and these evaluators were looking for high-level science. As a consequence, many applications were rejected and the policy instruments gained "bad reputation". It lost attractiveness to some of the potential innovators who never applied, not only because of the restrictions related to the definition of R&D, but also due to the lengthy evaluation procedures and a high administrative load.

Interviews and evaluation studies confirm that due to the high administrative load (suboptimal - formal, technical, 'desk-top', long taking selection procedures, excessive bureaucracy, limited flexibility) public support may be replacing, rather than complementing, private expenditures on innovation and R&D. Such obstacles can be overcome in an efficient institutional environment, for instance by engaging professional programme managers. Importantly, experience from other countries suggests that early interactions between entrepreneurs and selection bodies often prove pivotal, as they allow entrepreneurs to acquire invaluable feedback on their business model, thus improving their future prospects for commercialisation or helping them abandon projects that may already be under implementation elsewhere. Face-to-face interaction, therefore, is justified in the broader context of entrepreneurial mentoring and attempts to build real and lasting entrepreneurial capacity.

As discussed in sub-chapter 3.3.4, the focus was on infrastructure of the science and technology parks and on general awareness raising activities such as seminars, conferences and trainings, much less on one-on-one consultation and support. Interviewed beneficiaries and authorities themselves doubted the effectiveness of this type of activities on firm behaviour. In the new period *the policy spotlight has to move from infrastructure development to capacity strengthening and acceleration of new ideas pipeline through the innovation support services*, seeking to encourage more "potential" and "new" innovators to invest into the development of new business fields, business models and products.

Third, innovation policies need to be opened for newcomers in the form of start-ups, spin-offs. Support for new technology firms, start-ups and spin-offs became available only at the very last stages of the programming period. In 2013-2014, a number of new innovators benefitted from the Inogeb LT-3 project "Technostart". Spin-off policy is rather new in Lithuania and the focus is on universities and technology transfer through IP commercialisations therein. However, considering the development phase of Lithuanian economy and the international R&D commercialisation experience, other forms of knowledge transfer could be more or equally relevant to target like e.g. collaborative projects with industry, industry PhDs, joint study programmes with industry etc. In addition, the spin-off policy should be extended also to encourage business spin-outs from mature innovators as a possible source for greater variety and knowledge spill-over. The role of FDI as one possible source of new activities and variety cannot be underestimated in the Lithuanian context, given the success story of the biopharmaceutical sector. Importantly, interviews and success stories suggest that *start-ups need business acceleration and mentorship systems and various seed capital funds* as opposed to public trainings and awareness raising events implemented by Enterprise Lithuania[35].

Fourth, upgrade of technology and innovation development is only effective with upgrade of skills and human resources. In Lithuania, an emerging constraint for innovation development and apparently the key bottleneck for the future is the availability of skilled human resources for innovation. In 2014, one third of the companies interviewed claimed that they lack engineers, technologists and technology designers for pursuing their innovation ideas. This bottleneck was rated higher than the need for R&D infrastructure (Visionary Analytics, 2014). Next to high economic migration and low higher education quality, the demographic trends create a scenario where the economy increasingly lacks skilled labour force, and there is a mismatch of skills supply and demand. The overall policy challenge is to substantially improve education and training of skilled specialists, especially in the technology and engineering professions, and to design smart talent attraction policies. However, there are some specific propositions for ERDF/ESF policies:

- No equipment (public or private) should be purchased without the development and training of human resources that will work with it. In case of sophisticated technology typically one week training by foreign technologists, engineers is needed (based on the manufacturing companies' survey, Visionary Analytics, 2014).
- Implement business researchers' international training and apprenticeships measures.
- Encourage foreign researchers and high-level specialist recruitment at the Lithuanian companies, clusters and R&D institutions.
- Encourage postgraduate student placements in enterprises, implement Industrial Doctorate programmes.

[35] For example (in Lithuanian): http://www.verslilietuva.lt/lt/verslo-pradzia/renginiu-ciklas-verslilietuva/pradekime-versla-kartu/; http://www.delfi.lt/verslas/verslas/pakviete-versla-pradeti-norincius-gyventojus-atejo-vos-vienas.d?id=67731810.

4.4.2. Knowledge transfer and collaboration

Given the historical separation of science and industry and the prevailing differences in culture, a lack of productive collaboration between the industry and public research sectors is one of the most challenging issues in the Lithuania's innovation system. Deficiencies are present on both sides – poor commercialisation endeavour and a lack of commercially-valuable results in the academy, and low ability to look outside the short term company's horizon, to identify and exploit external knowledge, on the business side. Information asymmetry, lack of motivation from both sides and sometimes too rigid setting of public policies only reinforce the weaknesses mentioned above. Few ERDF funded instruments attempted to address this challenge and faced mixed success, due to both lack of well-thought design and scale.

First, cluster policies faced mixed success in facilitating collaborative behaviour, there are many challenges ahead. The rationale behind Inocluster measures was that clusters could provide arenas for related variety/cross-sector links internally in the region and externally. However, the starting point was very weak. The key obstacle cluster policies failed to acknowledge at the beginning of the ERDF period was the lack of any collaboration culture in Lithuania. Cluster formation is thus in an early phase and a few of the first results are encouraging. The way clusters valleys' were initiated didn't support effectively enough the cross-sectoral approach and connections with the local knowledge sources (institutes, universities at 'valleys') and to outside Lithuania. As a result, clusters are rather sector based, inward looking, operating as 'private clubs' with five-seven members and with limited inter-regional connections. A warning sign is that there are now more than 40 clusters in Lithuania as a direct response to the instruments. The next period's challenge is thus to create incentives for merging the clusters working in similar sub-sectors and/or technology fields. On the positive side, in a country with extremely low social capital, *even the emergence of many "closed clubs" can be viewed as a first step towards more effective collaboration*. There are already several good practice examples of open innovation, when several companies establish an R&D cluster based around one export-oriented product[36].

Interviews indicate that collaborations with universities or research institutes, which were required by Inocluster LT/LT+, remain only "on paper". First, *public-private R&D collaboration is not functioning effectively mainly due to the internal/institutional weaknesses, not the lack of funding*, for example: complicated procedures are applied by public infrastructures, a bureaucracy, long execution periods, a lack of flexibility and responsibility; the substantial factor limiting public sector researchers' collaboration with companies - the researcher's career rules (overdependence on academic publications, and little attention to the R&D results), a lack of clear collaboration rules and IPR strategies including the rules for financial reward in case of service provision, invention or spin-off; an extensive fragmentation of various innovation support institutions, a narrow specialisation of created infrastructures, a lack of information and active promotion of the R&D services available; and a lack of human resources/skills to work with new technological equipment in the open access centres (Visionary Analytics, 2014).

Second, Lithuanian manufacturing companies tend to collaborate more intensively with suppliers and 'competitors', and by doing so they are more successful in R&D and innovation. Few case studies carried out on innovation in Lithuanian industry emphasize the role of foreign suppliers in triggering innovation. This can be illustrated with an example of BOD Group – a company that produced compact discs and has now switched to producing solar cells and is part of the Photovoltaics cluster. When facing the closing business market, BOD Group was looking for a new business practice, where it could use and expand its industrial, commercial and marketing skills. The sector of solar energy was chosen because of its technological proximity to the sector of optical equipment, the company's original sector of specialisation. The restructuring and moving towards a new

[36] For example, the Photovoltaic Technology Cluster aims at developing solar energy products, based on elements produced by different companies. The companies in this cluster also jointly use the R&D infrastructure and train their employees (Gaušas, Paliokaitė, 2012).

business field was triggered by BOD Group's foreign partners (suppliers). The company's long-term partner in Germany, Singulus Technologies AG, partly shifted its business activities to the solar technologies sector in 2007. They subsequently invited BOD Group (currently Baltic Solar Energy) to join this growing new sector, and presented the future business prospects (Gaušas and Paliokaitė, 2012). In a context of a catching up country, greater value comes from the proximity of mature economies and their companies, not from the local science base which is conservative and isolated from global technology and market trends.

The performance of entrepreneurs and firms in experimenting with and discovering potential domains for the future specialisation during 2015-2020 may depend upon the way in which they build connections with foreign/local laboratories, suppliers, international partners and users. The main policy problem therefore appears to be one of helping to design such inter-organisational connections (clusters, technology platforms, collaborating projects, etc.) and coordination of efforts in the sphere of experimentation and discovery. Some lessons learnt from 2007-2013:

- Bottom up, phased approach of programmes, control gates with metrics (targets) and evaluation in the process (to eliminate those that pursue opportunistic behaviour).
- Tailored programmes with eligibility of actions based on needs instead of limitations of funding frameworks (to take into account the different maturity of clusters).
- Calls need fermentation, exchange of views, technical sessions, workshops, presentations and other preparations for the initiation and maturation of collaboration of candidate participants on joint initiatives such as clusters or collaborative R&D.
- Strong cluster facilitator and dedicated management teams – brokers between public and private sector participants. Enterprise Lithuania and/or MITA could step in as external facilitators and moderators.
- Strong emphasis on international markets and export. Incentives for the development of transnational clusters and cross-clustering. Strengthened the role of cluster coordinators and other „change agents" (for example, business associations) in developing foresight-based strategies taking into account future trends, encouraging companies in their sectors to move into new business models and new fields.
- ERDF support as an incentive for merging small clusters working in similar sub-sectors and/or technology fields.
- Clusters' R&D infrastructure should become available to all interested parties beyond the cluster's boundaries (Visionary Analytics, 2014).

Second, ***innovation vouchers addressing huge demand could be mainstreamed.*** Apparently, the innovation vouchers instrument, intended as a "candy" for otherwise unsuccessful university-industry collaboration has hit "the bull's-eye" because of easy administration - no restrictions or administrative load, fast evaluation, which is very different from the SMEs' experience with any other SF-funded instrument. The mode of delivery based on a fixed sum principle, standardized activities and outputs, also creates less administrative costs for the implementing agency. Thus, the principle could be mainstreamed for other easy-to-standardize incentives in the next period. This instrument also meets the high demand for quick experimentation / rapid prototyping / incremental innovations which is not otherwise supported.

Third, currently ***innovation promotion intermediaries have limited effect on the SMEs' collaborative behaviour***: too much focus on infrastructure and fragmentation. There is a lack of consensus on the overall logic of intervention for fostering open innovation and knowledge transfer. Instead, different strategies (and their institutional "owners") focus on separate elements, which imply a risk of fragmentation. For example, the "clusters" approach fostered by the Ministry of Economy has not been coordinated with the science and technology parks or the "valleys" approach encouraged by the Ministry of Education and Science. Lack of coordination leads to huge fragmentation of instruments, programmes, institutions and infrastructures. As a result, various institutions play a similar role. All these institutions compete for limited ESF/ERDF public funding, making it impossible to attract qualified professionals and provide professional

services. The State should review the currently existing structures, for example, some clusters can become part of the existing science and technology parks (STPs). In some cases, science parks could lead the activities of clusters. Establishment of new institutions (centres of excellence, competence centres, technology centres, innovation centres, technology transfer centres and so on)[37] is hardly justified without reducing the fragmentation and ensuring better coordination.

[37] Based on the OP for 2014-2020.

5. MAIN FINDINGS AND CONCLUSIONS

Was the designed strategy appropriate to clearly address the most relevant barriers to innovation and growth faced by the regional/national SMEs?

Overall, the diverse 2007-2013 policy mix was largely appropriate given the needs of indigenous SMEs' and policy challenges on the SME development side. A mix of grants and loans aiming at technology and process upgrade (non-R&D innovation) as well as export promotion responded well to business challenges. Importantly, in Lithuania *grants did not crowd out the financial engineering instruments*. A key success factor was their relatively easy administration – an administrative load received with a grant was 3-4 times higher compared to a loan (BGI Consulting, 2014). Given the allocation of funds, ERDF policies reinforced a general systemic tendency to favour technology absorption through capital investment over innovation. On the one hand, more focus on investments into upgrading was justified given that the economic competitiveness is based on large traditional sectors still relying on basic technologies and skills, and the limited absorptive capacities for R&D support. From this perspective, technology upgrading can be viewed as a subset to innovation. On the other hand, the appropriateness of the intervention logic on business innovation side (Priority Axis I) had a number of flaws:

- First, the business-science collaboration objectives and related policy challenges were not transformed into more substantial policy instruments. R&I policies in general adopted a linear approach to innovation, supporting precompetitive research through investment in research infrastructure at public R&D institutes and universities (EUR 364 million from the ERDF, outside the scope of this assessment) with an assumed subsequent effort to encourage R&D commercialisation and business-science collaboration. The investments in R&D infrastructure were necessary considering the worn out state of the research base. However, this approach has proven weak in leveraging private sector investments into R&I and fostering public research commercialisation, and tended to reinforce the existing trend of low investment in R&D and innovation by business sector. Despite the huge potential, weak capacity to commercialise and exploit public research for economic benefits becomes more evident after heavier investments in research production. The assumption that university-led investments into the science "valleys" will automatically lead to opening research laboratories to business proved incorrect. The share of other ERDF funds allocated to knowledge and technology transfer was residual (less than 3%).
- A second weakness lies in overdependence on intermediaries, especially science and technology parks, and focus on infrastructure instead of instead of "soft" support (brokers, consultants, mentors etc.). There was a lack of qualified one-on-one service provision to SMEs', in order to increase the pipeline of innovative business projects through capacity building. The same applied to the creation of start-ups, leaving the demand for seed capital funding and business acceleration largely unfilled (EUR 6 million Practica seed capital fund was only launched in 2012). Lack of focus on business R&D absorptive capacities and small scale of direct funding for business R&D created a vicious circle, largely leaving possible newcomers in the form of start-ups, spin-offs and potential innovators from traditional industries with their development needs out of the scope. The existing target group in Lithuania for the excellence-based competitive R&D measures is rather limited – consisting mainly of the limited number of top-tier research groups and few knowledge-based companies. Raising the allocations for direct R&D measures without simultaneously dealing with the pipeline creation through capacity building was doomed to result in problems with absorption of available funding.

Overall, there remains a mismatch between the ambitious strategic targets related to business R&I[38] and the funds allocated to innovation related policies at national level, compared to other policy objectives.

[38] For example, the Lithuanian Progress Strategy 2030 foresees that Lithuania should be 15th in the EU according to BERD/GDP figures by 2020, and 10th – by 2030.

Is there evidence that the OP was effective in addressing SMEs key barriers to growth and innovation?

Existing data on output and results indicators (reported by the beneficiaries) indicate that vast majority of the formally set target indicators will be achieved by the end of the programming period. However, the results of *ex post* evaluations indicate that the effects of ERDF support on some key firm performance indicators will be limited. Key positive effects are seen on the SMEs' development side[39]:

- Investments into technology absorption (both financial engineering instruments and grants for technology upgrading) helped the Lithuanian economy withstand the global financial and economic crisis in better shape than its regional peers (the *anticyclical role*) and both had a positive effect on firm viability, even if for a short period. Investment credits had the highest positive effect on jobs, SMEs' profitability and turnover. Possibly, the preferred instrument for the future.
- Grants for technology upgrading (Leader LT) had the highest and lasting effect on firm performance compared to other grant-based policy instruments. However, the impact of Leader LT is hardly separated from the effect of other instruments, because many companies benefited from different sources. The highest effect is achieved when the support from technology upgrade and upgrade of processes (managerial innovation) is combined.

The effects on business R&D and economic innovation outputs are less positive. Although first behavioural changes are seen in the innovation ecosystem and culture of collaboration, the effects are limited due to the lack of scale of the investments:

- It is unlikely that ERDF policies had a significant effect on the development of high technology sectors in Lithuania. Overall, about 80% of ERDF assistance went to the low / medium low technology sectors. Direct support for business R&D reached merely 270 individual firms, of which 157 operated in high tech / medium high tech sectors. On the other hand, there is a need to abandon the statistical sector-based approach and to view innovation development as an opportunity to speed up the transformation of various sectors of the economy towards higher value added. Moreover, there is a consensus among the national authorities as well as experts that, given the current economic specialisation, the returns from the restructuring of low technology sectors would be higher than returns from investments in the high technology sectors.
- Based on evidence available it can be concluded that *direct support for business R&D had no significant effect on overall business R&D indicators*, mainly because of (1) the lack of concentration of funds and (2) high administrative load that facilitated the substitution effect. The policy additionality has been achieved in about 30-40% of funded projects. However, there is a consensus that without the support private R&D investments would have decreased drastically during the economic downturn. Hence, EU SF investment allowed business R&D investment to remain at pre-crisis level.
- There is no evidence of significant economic impact of neither the clusterisation promotion measures nor the investments into the innovation promotion infrastructures. Innovation promotion intermediaries had limited effect on the SMEs' collaborative behaviour due to the focus on infrastructure, fragmentation, dubious quality and lack of scale. Clusterisation is at an early stage - the financial incentives have triggered both imitative "collaborations" as well as good practice examples. A warning sign is that there are now more than 40 clusters in Lithuania as a direct response to the instruments. In a country with extremely low social capital, this can be viewed as a first step towards more effective collaboration. The next period's challenge is thus to create incentives for merging the clusters working in similar sub-sectors and/or technology fields.

[39] If available, most results are based on the counterfactual evaluation results: BGI Consulting, 2014; Visionary Analytics et al., 2015. The results of ex post counterfactual evaluations are only available on some of the Holding fund (INVEGA fund) actions - the State guarantee fund and micro credits, as well as for Leader LT, New Opportunities LT, and Intellect LT (only on employment effects). Other conclusions are based on weak(er) evidence – surveys of beneficiaries, monitoring data, interviews etc.

- The effects are also limited due to overall non-systemic governance, characterised by limited synergies and high fragmentation, for example, failure to re-align the science "valleys", science and technology parks and industry clusters. The role of the STPs remains unclear and the approach is constantly changing leading to the loss of stability leading to a loss of qualified people.

Which are the lessons learnt on the mechanisms and conditions for behavioural change?

Key lessons learnt from the mechanisms, in terms of increase in competitiveness, innovation or behavioural change, triggered (or lacking) by the policy instruments implemented:

- The policy mix has to acknowledge the different maturity of existing and potential innovators. The key aim of enterprise policies is to create incentives for all types of companies to move up the value added chain, including the emerging and potential innovators from traditional sectors. This suggests different types of policy interventions, different intended results/outcomes, and different pace. In addition, more focus is needed on the experimental development and engineering (at the 6-9 technology readiness levels[40]).
- Innovation promotion services and pipeline facilitation via technical assistance and support is a necessary precondition for higher absorptive capacities of potential innovators. While the today's R&D performers would need the boost to expand their R&I activities and engage into different collaborations and alliances, those with the R&I potential, but only modest or no R&I activity at present, would most benefit from capacity building measures like innovation and technology audits, vouchers, foresights, brokering, scouting, mentoring etc. In the new period the policy spotlight has to move from infrastructure development to capacity strengthening and acceleration of new ideas pipeline through the innovation support services and pipeline facilitation via technical assistance and support.
- Lack of coordination leads to huge fragmentation of instruments, programmes, institutions and infrastructures. The State should review the current existing innovation promotion structures, for example, some clusters can become part of the existing science and technology parks. In some cases, science parks could lead the activities of clusters. Successfully operating STPs and clusters can begin initiating large cooperation projects leading the companies in their fields. STPs should be merged and operate under the same brand. From the SMEs' perspective the quality of tailor-made services provided by the innovation promotion infrastructure is a key factor. Should the State continue investments into the STPs, the focus should be on the development of their human resources.
- In order to achieve economies of scale by using funding of various state institutions, it is advisable to focus on larger rather than small-scale projects and the combined use of policy instruments, when it comes to public private cooperation and mature R&D-based innovators[41]. These larger projects usually involve several stakeholders, do not rely on a single source of funding, and have large budgets, longer period of implementation and a few groups of beneficiaries. While the potential innovators (e.g. companies in traditional industries looking for new business models) would benefit from innovation support and smaller experimentation projects, mature innovators (larger R&D based SMEs, e.g. biotech or laser tech companies having good links with the research institutions) could immediately start with larger and more long term innovation projects combining various funding sources.
- Innovation policies need to open for newcomers through start-ups, spin-offs acceleration, mentoring and start-up/seed funding as well as targeted FDI attraction. The effectiveness of general awareness-raising through Enterprise Lithuania and other intermediaries has been questioned by the interviewed experts and beneficiaries.

[40] Source: http://en.wikipedia.org/wiki/Technology_readiness_level

[41] The explanation is provided by Table 4 „Competence stairway and the different needs of innovators", sub-chapter 4.4.1.

- Lack of skilled specialists is an emerging challenge for innovation development in SMEs which needs to be addressed. From the ERDF perspective, no equipment (public or private) should be purchased without the development and training of human resources that will work with it.
- Size of different instruments needs to be balanced – currently, there are many small instruments (e.g. Inogeb LT group) versus very large ones (e.g. the Holding fund). Implementation of very small instruments implies high administrative costs. Whereas implementation of very large ones (like Holding fund) has other problems, for example, limited accountability on the results and impact of specific actions within the instrument.
- Finally, good governance and programme management matters to the behavioural change and the effect. High administrative load (suboptimal - formal, technical, 'desk-top', lengthy procedures, excessive bureaucracy, limited flexibility) reduces the number of riskier innovation projects with potentially higher impact and thus has a negative effect on the effectiveness of the funding. For example, the "paper-based" application procedure provides incentive for firms to hire consulting companies to draft grant applications that appeal to the reviewers but favour form over substance. Application and evaluation procedures are much more complicated compared to the national level assistance or even the international programmes, or experience of other countries.

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Olga Celova	EU SF Coordination Department Head of Structural Assistance Policy Division	Ministry of Economy	16-04-2015
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Tomas Jankauskas	Head of Support Analysis Division	Lithuanian Business Support Agency (LVPA)	06-11-2014
Viktorija Vaitkevičienė	Project Manager	Investment and Business Guarantees (INVEGA)	11-11-2014 13-04-2015
Mantas Biekša	Chief Officer of Innovation support and technology transfer division	Agency for Science, Innovation and Technology (MITA)	11-11-2014
Erna Suslavičiūtė	Project manager	Invest Lithuania	14-04-2015
Lijana Lubytė	Analyst	Invest Lithuania	14-04-2015
Ignas Paukštys	Deputy director of project management department	Lithuanian Business Support Agency (LVPA)	17-04-2015
Giedrius Komičius	Acting Deputy Head of R&D Project Management Division of Project Management Department	Lithuanian Business Support Agency (LVPA)	17-04-2015
Sigita Trinkūnaitė	Senior Project Manager of R&D Project Management Division of Project Management Department	Lithuanian Business Support Agency (LVPA)	17-04-2015
Agnė Vaitkūnienė	Deputy Head of Business Project Management Division of Project Management Department	Lithuanian Business Support Agency (LVPA)	17-04-2015
Darius Jakubauskas	Head of Project Management Division of Project Management Department	Lithuanian Business Support Agency (LVPA)	17-04-2015
Jūratė Aželionytė	Representative in Lithuania	European Investment Fund	15-06-2015
Silvestras Tamutis	Partner	Practica Capital	18-06-2015
Arvydas Strumskis	Partner, Strategic management	Business Angels Fund I	11-06-2015
Beneficiaries			
Edvardas Satkauskas	Lithuania Office director	JSC "Vittammed"	23-02-2015
Rokas Bagdzevičius	Project coordinator	JSC "Light Conversion"	27-02-2015
Ligita Valalytė	Managing Director	Science and technology park "Technopolis"	07-04-2015
Vismantas Satkauskas	Project manager	Lithuanian Medical Tourism Cluster	13-04-2015
Saulius Arelis	Director	Visoriai Information Technology Park	17-04-2015
Algirdas Galdikas	Director	Applied Research Institute for Prospective Studies (coordinator of the Photovoltaic Technology Cluster)	22-04-2015
Experts, socio-economic partners			
Andrius Plečkaitis	Project Manager	ICT Association "Infobalt"	10-04-2015
Inga Miliauskienė	Director	Lithuanian Private Equity and Venture Capital Association	15-06-2015

ANNEXES

ANNEX I: Achievements

Policy instrument	Indicator type	Indicator	Target*	Value in April 2015 (SFMIS)	Projects that reported these indicators, % of all projects
Idea LT (all 178 projects are finished)	Result	Private investment attracted, EUR million	3.2	3.55	100.00
	Output	Number of R&D projects	180	178	100.00
	Result	Patent cleanliness' and 'patentability' studies implemented, percentage of all feasibility studies	20	16.29	16.29
Intellect LT (188 of 260 projects are finished)	Result	Private investment attracted, EUR million	47.5	51.59	100.00
	Output	Number of R&D projects	212	183	100.00
	Result	Number of products, services or processes prototypes (conceptions) created	318	474	93.46
	Result	Submitted patent applications for EPO or WIPO	5	10	6.15
	Result	Design registration applications submitted	10	2	5.38
	Output	R&D activities ordered from PROs, in EUR million	8.7	3.75	21.92
	Output	Researchers and support staff, who carry out R&D activities during the project	2,650	3,547	99.62
Intellect LT + (88 of 129 projects are finished)	Result	Private investment attracted, EUR million	42	46.76	99.22
	Output	Number of R&D projects	100	86	100.00
	Output	Researchers and support staff jobs created	200	187	94.57
Inocluster LT (6 of 19 projects are finished)	Output	Number of R&D and innovation environment improvement projects	15	6	100.00
	Result	Number of new cluster members	43	64	89.47
	Result	Cluster members who used the information of research implemented during this project in their business, percentage from all cluster members who received this information	5	66.67	73.68
	Output	Number of marketing activities of cluster members	43	105	78.95
	Output	Number of market analysis for cluster development	33	34	78.95
	Output	Number of events dedicated to share the experience between cluster members	43	161	94.74
Inocluster LT+ (3 of 13 projects are finished)	Output	Number of R&D and innovation environment improvement projects	4	4	100.00
	Result	Private investment attracted, EUR million	11	8.65	100.00
	Result	Researchers and support staff jobs created in the research centres established during the project	20	8	92.31
	Result	Number of training programmes in the training centres	8	0	23.08
	Output	Number of created and operating cluster training centres	4	0	46.15
	Output	Number of created and operating cluster R&D infrastructure	5	4	100.00
Ino-vouchers LT	Result	Private investment attracted, EUR million	0.9	1.51	100.00
	Output	Number of R&D projects	850	651	100.00
Inogeb LT-2 (1 of 9 projects are finished)	Output	Number of R&D and innovation environment improvement projects	11	1	100.00
	Result	Number of created or developed technology parks	5	1	100.00
	Output	Area of the science and business centre (valley) prepared by investment, in ha	50	6.83	66.67

Policy instrument	Indicator type	Indicator	Target*	Value in April 2015 (SFMIS)	Projects that reported these indicators, % of all projects
	Output	Area of supported technology park infrastructure, in square meters	15,000	7,329.45	77.78
Assistant - 2 (5 of 12 projects are finished)	Output	Number of business environment improvement projects	12	5	91.67
	Result	Number of build, reconstructed or established arts incubators	12	5	100.00
	Output	Area of art incubators supported under EU funds in square meters	18,000	10,418.51	100.00
Inogeb LT-1 (All 14 projects are finished)	Result	Number of new technology based firms created	15	57	92.86
	Output	Number of R&D and innovation environment improvement projects	14	14	100.00
	Result	Number of enterprises which used the services of support for innovation	1,000	2,417	100.00
	Output	Number of modern technologies and innovative communication tools implemented	20	56	100.00
	Output	Number of public information portals and databases created	5	22	92.86
Inogeb LT-3 (0 of 4 projects are finished)	Result	Number of new technology based firms created	84	108	75.00
	Output	Number of R&D and innovation environment improvement projects	4	0	100.00
	Result	SMEs which used consultation services related to international R&D and innovation and related programmes	2,000	3,642	100.00
	Result	The increase of number of science-business innovation network projects 2 years after the project in percentage	15	0	50.00
	Output	The number of implemented R&D and innovation promotion and communication measures	15	14	4.00
	Result	The number of products or services technological prototypes created	20	0	25.00
	Output	The number of science-business innovation network projects implemented	5	4	25.00
Assistant - 1 (13 of 22 projects are finished)	Output	Number of business environment improvement projects	23	10	100.00
	Result	The number of enterprises which export to new markets after the project	30	2	40.91
	Result	The number of enterprises which expanded their export markets after the project	70	0	36.36
	Result	The number of created or saved jobs of enterprises which participated in project events	300	1,028	100.00
	Output	The number of enterprises which participated in project events organized by direct beneficiary	300	1,833	90.91
	Output	The number of enterprises which used the expert services of direct beneficiary	120	608	31.82
	Output	The number of enterprises which used the implemented feasibility studies	80	1,090	45.45
	Output	The number of enterprises participated in international fairs	120	270	63.64
	Output	The number of enterprises which participated in contact fairs and business missions	200	344	36.36
Compensation of SMEs' credit interests	Result	Number of SMEs supported	3,300	4,540	N/A

Policy instrument	Indicator type	Indicator	Target*	Value in April 2015 (SFMIS)	Projects that reported these indicators, % of all projects
Holding fund[42]	Result	Private investment attracted, EUR million	206.21	196.02	N/A
	Output	Number of SMEs supported	2,505	2,951	N/A
Guarantee fund	Output	Number of SMEs supported	1,300	2,803	N/A
	Result	Private investment attracted, EUR million	112.95	167.21	N/A
New opportunities (640 of 1053 projects are finished)	Result	Private investment attracted, EUR million	17.4	24.39	100.00
	Output	Number of projects for increasing business productivity, including small and medium enterprises projects	600	640	99.62
	Output	The number of measures prepared to improve the enterprise image	40	692	28.30
	Result	The number of enterprises which export to new markets after the project	40	335	46.91
	Output	The number of implemented foreign markets studies	100	687	23.65
	Result	The number of enterprises which expanded their export markets after the project	100	279	44.35
	Output	The number of export production development strategies for economic sectors	10	207	18.14
	Result	The number of created or saved jobs	150	1,339	23.93
E-business Lt (439 of 440 projects are finished)	Result	Private investment attracted, EUR million	19.4	22.72	100.00
	Output	Number of projects for increasing business productivity, including small and medium enterprises projects	100	441	100.00
	Result	The number of business processes connected with installed e-business projects	100	3149	97.05
	Result	New enterprises (younger than 2 years) supported as a percentage of all enterprises supported	20	5.82	N/A
	Result	The number of created or saved jobs	50	1,293	50.00
Process LT (108 of 154 projects are finished)	Result	Private investment attracted, EUR million	3.4	4.47	100.00
	Output	Number of projects for increasing business productivity, including small and medium enterprises projects	85	101	100.00
	Result	The number of employees who were trained to work with installed management methods and systems	900	3,722	90.26
	Output	The number of modern management methods installed	140	114	74.68
	Output	The number of certified management systems	60	158	64.94
	Output	The number of management systems methodologies prepared for the enterprises	10	136	59.09
Invest LT-2 (10 of 48 projects are finished)	Result	Private investment attracted, EUR million	52.1	56.75	100.00
	Output	Number of projects for increasing business productivity, including small and medium enterprises projects	30	10	100.00

[42] Holding fund consist of INVEGA fund and JEREMIE holding fund. INVEGA fund attracted EUR 180.6 million (target was EUR 189.1 million) private investment and supported 2874 SMEs (target 2444). JEREMIE holding fund attracted EUR 15.43 million private investment (target was EUR 17.05 million) and supported 77 SMEs (target was 61).

Policy instrument	Indicator type	Indicator	Target*	Value in April 2015 (SFMIS)	Projects that reported these indicators, % of all projects
	Result	The number of long-term jobs created	1,100	608	100.00
Leader LT (87 of 90 projects are finished)	Result	Private investment attracted, EUR million	159.3	175.14	100.00
	Output	Number of projects for increasing business productivity, including small and medium enterprises projects	80	88	100.00
	Result	The number of new product examples introduced to the market	150	260	67.78
	Result	New enterprises (younger than 2 years) supported as a percentage of all enterprises supported	20	7.69	N/A
	Output	The number of patented (licensed) technologies installed	20	47	27.78
	Output	The number of new or modern technology lines installed	140	163	98.89

* - based on Government resolution (number 1480) of December, 2014. Green indicates that the target indicator was achieved or exceeded, yellow – almost achieved, red – not ahieved. Sources: SFM IS, data of April, 2015; INVEGA, data of 31-12-2014.

ANNEX II: Target beneficiaries by sector

PIs	NACE	No of beneficiary SMEs	% of total No of SMEs in this PI
Idea LT	62 - Computer programming, consultancy and related activities	42	33%
	26 - Manufacture of computer, electronic and optical products	13	10%
	46 - Wholesale trade, except of motor vehicles and motorcycles	10	8%
	72 - Scientific research and development	8	6%
	27 - Manufacture of electrical equipment	5	4%
	63 - Information service activities	5	4%
	70 - Activities of head offices; management consultancy activities	5	4%
	71 - Architectural and engineering activities; technical testing and analysis	5	4%
	Other	33	28%
Intellect LT	62 - Computer programming, consultancy and related activities	59	36%
	46 - Wholesale trade, except of motor vehicles and motorcycles	17	10%
	26 - Manufacture of computer, electronic and optical products	15	9%
	72 - Scientific research and development	12	7%
	28 - Manufacture of machinery and equipment n.e.c.	7	4%
	63 - Information service activities	6	4%
	20 - Manufacture of chemicals and chemical products	5	3%
	70 - Activities of head offices; management consultancy activities	5	3%
	Other	37	23%
Intellect LT +	26 - Manufacture of computer, electronic and optical products	14	15%
	72 - Scientific research and development	13	14%
	46 - Wholesale trade, except of motor vehicles and motorcycles	10	11%
	62 - Computer programming, consultancy and related activities	7	8%
	86 - Human health activities	6	6%
	20 - Manufacture of chemicals and chemical products	5	5%
	32 - Other manufacturing	5	5%
	21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations	4	4%
	28 - Manufacture of machinery and equipment n.e.c.	4	4%
	71 - Architectural and engineering activities; technical testing and analysis	4	4%
	25 - Manufacture of fabricated metal products, except machinery and equipment	3	3%
	70 - Activities of head offices; management consultancy activities	3	3%
	Other	21	23%
Ino-vouchers LT	No data	No data	No data
Leader LT	25 - Manufacture of fabricated metal products, except machinery and equipment	6	9%
	46 - Wholesale trade, except of motor vehicles and motorcycles	6	9%
	10 - Manufacture of food products	5	7%
	18 - Printing and reproduction of recorded media	5	7%
	22 - Manufacture of rubber and plastic products	5	7%
	26 - Manufacture of computer, electronic and optical products	5	7%
	27 - Manufacture of electrical equipment	5	7%
	20 - Manufacture of chemicals and chemical products	4	6%
	28 - Manufacture of machineryand equipment n.e.c.	4	6%
	13 - Manufacture of textiles	3	4%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	3	4%
	31 - Manufacture of furniture	3	4%
	Other	14	21%
Inocluster LT	*	*	*
Inocluster LT+	*	*	*
E-business Lt	46 - Wholesale trade, except of motor vehicles and motorcycles	44	10%
	62 - Computer programming, consultancy and related activities	28	6%
	49 - Land transport and transport via pipelines	27	6%
	52 - Warehousing and support activities for transportation	24	6%

PIs	NACE	No of beneficiary SMEs	% of total No of SMEs in this PI
	70 - Activities of head offices; management consultancy activities	22	5%
	18 - Printing and reproduction of recorded media	17	4%
	31 - Manufacture of furniture	16	4%
	22 - Manufacture of rubber and plastic products	14	3%
	10 - Manufacture of food products	13	3%
	69 - Legal and accounting activities	13	3%
	43 - Specialised construction activities	12	3%
	47 - Retail trade, except of motor vehicles and motorcycles	11	3%
	25 - Manufacture of fabricated metal products, except machinery and equipment	10	2%
	45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	10	2%
	73 - Advertising and market research	10	2%
	32 - Other manufacturing	9	2%
	86 - Human health activities	9	2%
	58 - Publishing activities	8	2%
	68 - Real estate activities	8	2%
	71 - Architectural and engineering activities; technical testing and analysis	8	2%
	74 - Other professional, scientific and technical activities	8	2%
	85 - Education	8	2%
	Other	106	24%
Process LT	46 - Wholesale trade, except of motor vehicles and motorcycles	17	15%
	62 - Computer programming, consultancy and related activities	12	11%
	43 - Specialised construction activities	8	7%
	31 - Manufacture of furniture	7	6%
	22 - Manufacture of rubber and plastic products	7	6%
	41 - Construction of buildings	5	4%
	10 - Manufacture of food products	5	4%
	71 - Architectural and engineering activities; technical testing and analysis	4	4%
	49 - Land transport and transport via pipelines	4	4%
	25 - Manufacture of fabricated metal products, except machinery and equipment	4	4%
	18 - Printing and reproduction of recorded media	4	4%
	70 - Activities of head offices; management consultancy activities	3	3%
	69 - Legal and accounting activities	3	3%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	3	3%
	Other	27	24%
New opportunities	46 - Wholesale trade, except of motor vehicles and motorcycles	49	9%
	62 - Computer programming, consultancy and related activities	45	8%
	10 - Manufacture of food products	37	7%
	31 - Manufacture of furniture	33	6%
	25 - Manufacture of fabricated metal products, except machinery and equipment	30	6%
	28 - Manufacture of machinery and equipment n.e.c.	25	5%
	14 - Manufacture of wearing apparel	22	4%
	32 - Other manufacturing	22	4%
	26 - Manufacture of computer, electronic and optical products	21	4%
	22 - Manufacture of rubber and plastic products	19	4%
	13 - Manufacture of textiles	16	3%
	52 - Warehousing and support activities for transportation	16	3%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	14	3%
	41 - Construction of buildings	13	2%
	43 - Specialised construction activities	13	2%
	Other	165	31%
Compensation of SMEs'	46 - Wholesale trade, except of motor vehicles and motorcycles	640	15%
	47 - Retail trade, except of motor vehicles and motorcycles	406	10%

PIs	NACE	No of beneficiary SMEs	% of total No of SMEs in this PI
credit interests	45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	280	7%
	56 - Food and beverage service activities	211	5%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	185	4%
	43 - Specialised construction activities	163	4%
	86 - Human health activities	151	4%
	10 - Manufacture of food products	134	3%
	31 - Manufacture of furniture	132	3%
	35 - Electricity, gas, steam and air conditioning supply	127	3%
	49 - Land transport and transport via pipelines	114	3%
	25 - Manufacture of fabricated metal products, except machinery and equipment	109	3%
	22 - Manufacture of rubber and plastic products	95	2%
	41 - Construction of buildings	94	2%
	96 - Other personal service activities	93	2%
	73 -Advertising and market research	90	2%
	77 - Rental and leasing activities	88	2%
	2 - Forestry and logging	70	2%
	55 - Accommodation	67	2%
	23 - Manufacture of other non-metallic mineral products	66	2%
	Other	926	22%
Assistant - 1	*	*	*
Assistant - 2	*	*	*
Inogeb LT-1	*	*	*
Inogeb LT-2	*	*	*
Inogeb LT-3	*	*	*
Invest LT-2	28 - Manufacture of machineryand equipment n.e.c.	5	14%
	22 - Manufacture of rubber and plastic products	4	11%
	25 - Manufacture of fabricated metal products, except machinery and equipment	4	11%
	31 - Manufacture of furniture	4	11%
	8 - Other mining and quarrying	2	6%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	2	6%
	46 - Wholesale trade, except of motor vehicles and motorcycles	2	6%
	68 - Real estate activities	2	6%
	Other	10	29%
Holding fund	46 - Wholesale trade, except of motor vehicles and motorcycles	442	21%
	47 - Retail trade, except of motor vehicles and motorcycles	257	12%
	45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	140	7%
	49 - Land transport and transport via pipelines	112	5%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	89	4%
	41 - Construction of buildings	84	4%
	43 - Specialised construction activities	81	4%
	2 - Forestry and logging	62	3%
	35 - Electricity, gas, steam and air conditioning supply	52	2%
	86 - Human health activities	50	2%
	25 - Manufacture of fabricated metal products, except machinery and equipment	49	2%
	10 - Manufacture of food products	48	2%
	22 - Manufacture of rubber and plastic products	48	2%
	31 - Manufacture of furniture	40	2%
	68 - Real estate activities	40	2%
	56 - Food and beverage service activities	37	2%
	Other	496	23%
Guarantee fund	46 - Wholesale trade, except of motor vehicles and motorcycles	440	20%
	47 - Retail trade, except of motor vehicles and motorcycles	258	12%

PIs	NACE	No of beneficiary SMEs	% of total No of SMEs in this PI
	F (41-43) - Construction	143	6%
	45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	125	6%
	49-51 - Land, water, air transport and transport via pipelines	96	4%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	93	4%
	I (55-56) - Accommodation and food service activities	82	4%
	86 - Human health activities	80	4%
	35-36 - Electricity, gas, steam and air conditioning supply and water collection, treatment and supply	76	3%
	10 - Manufacture of food products	67	3%
	25 - Manufacture of fabricated metal products, except machinery and equipment	57	3%
	Other	701	32%
More selective	62 - Computer programming, consultancy and related activities	78	28%
	46 - Wholesale trade, except of motor vehicles and motorcycles	27	10%
	26 - Manufacture of computer, electronic and optical products	23	8%
	72 - Scientific research and development	18	7%
	28 - Manufacture of machinery and equipment n.e.c.	12	4%
	20 - Manufacture of chemicals and chemical products	10	4%
	70 - Activities of head offices; management consultancy activities	10	4%
	71 - Architectural and engineering activities; technical testing and analysis	9	3%
	63 - Information service activities	8	3%
	27 - Manufacture of electrical equipment	7	3%
	86 - Human health activities	6	2%
	32 - Other manufacturing	5	2%
	43 - Specialised construction activities	5	2%
	Other	57	21%
More general	46 - Wholesale trade, except of motor vehicles and motorcycles	1617	17%
	47 - Retail trade, except of motor vehicles and motorcycles	933	10%
	45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	558	6%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	389	4%
	86 - Human health activities	294	3%
	10 - Manufacture of food products	290	3%
	43 - Specialised construction activities	271	3%
	31 - Manufacture of furniture	270	3%
	49 - Land transport and transport via pipelines	262	3%
	25 - Manufacture of fabricated metal products, except machinery and equipment	252	3%
	56 - Food and beverage service activities	250	3%
	22 - Manufacture of rubber and plastic products	224	2%
	41 - Construction of buildings	201	2%
	35 - Electricity, gas, steam and air conditioning supply	179	2%
	2 - Forestry and logging	169	2%
	Other	2812	35%
Total	46 - Wholesale trade, except of motor vehicles and motorcycles	1631	17%
	47 - Retail trade, except of motor vehicles and motorcycles	934	10%
	45 - Wholesale and retail trade and repair of motor vehicles and motorcycles	559	6%
	16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	390	4%
	86 - Human health activities	300	3%
	10 - Manufacture of food products	292	3%
	43 - Specialised construction activities	273	3%
	31 - Manufacture of furniture	271	3%
	49 - Land transport and transport via pipelines	262	3%
	25 - Manufacture of fabricated metal products, except machinery and equipment	254	3%

PIs	NACE	No of beneficiary SMEs	% of total No of SMEs in this PI
	56 - Food and beverage service activities	251	3%
	22 - Manufacture of rubber and plastic products	224	2%
	41 - Construction of buildings	201	2%
	35 - Electricity, gas, steam and air conditioning supply	179	2%
	2 - Forestry and logging	169	2%
	62 - Computer programming, consultancy and related activities	150	2%
	Other	558	6%

Notes: * - SMEs are not direct beneficiaries, hence there is no data on supported SMEs. Sources: SFM IS, data of March, 2015; INVEGA, data of 31-12-2014.

ANNEX III: Reprogramming data

Policy instrument	A Initial allocation*, M EUR	B Total allocation after reprogramming**, M EUR	A-B Reprogramming, M EUR (from largest gain to largest loss)
Holding fund***	50.7	228.5	177.8
Invest LT-2	Not planned initially	65.1	65.1
New opportunities	14.5	39.3	24.9
Inogeb LT-3	Not planned initially	9.3	9.3
Guarantee fund	29	37.4	8.4
Ino-vouchers LT	Not planned initially	3.5	3.5
Intellect LT	57.92	60.4	2.4
Inogeb LT-2	34.1	35.1	1
Assistant - 2	23.9	22.2	-1.6
Inocluster LT	9.5	3.6	-5.9
Assistant - 1	10.2	4.1	-6.1
Inogeb LT-1	13.6	6.4	-7.2
Idea LT	12.6	4.3	-8.3
Process LT	14.5	3	-11.5
E-business Lt	29	15.6	-13.3
Compensation of SMEs' credit interests	30.1	16.2	-13.9
Inocluster LT+	56.9	16.1	-40.8
Intellect LT+	128.5	69.8	-59
Leader LT	179	97	-82
More selective	313	208.4	-104.7
More general	380.8	528.5	147.7

Notes:
* - Calculations based on Lithuanian Government resolution „On the Approval of the Annexes to the Human Resources, Economic Growth and Cohesion Facilitation Operational Programmes", 2007. Available online at: http://www3.lrs.lt/pls/inter3/oldsearch.preps2?a=312824&b=
** - Calculations based on www.esparama.lt [April, 2015]
*** - Venture capital funds and Business Angel fund under JEREMIE umbrella (EUR 42 million) and INVEGA fund (EUR 186.5 million) are within the Holding fund instrument.

ANNEX IV: Participation and absorption rates, EU SF funds, 2007-2015

Policy Instrument	A Number of appli-cants	B Number of supported SMEs	B/A Participation success rate, %	C Allocated public expenditure, M EUR	D Public expenditure already transferred to the beneficiaries, M EUR	D/C Absorption rate, %
Assistant - 1	31	22	71%	4.1	3.6	88%
Assistant - 2	17	12	71%	22.2	14.9	67%
New opportunities	1,535	1,053	69%	39.3	27.4	70%
Inogeb LT-2	13	9	69%	35.1	20.9	60%
Inogeb LT-3	6	4	67%	9.3	4.7	51%
Ino-vouchers LT	1407	815	58%	3.5	2.3	66%
E-business Lt	759	440	58%	15.6	15	96%
Process LT	299	154	52%	3	2.4	80%
Inogeb LT-1	27	14	52%	6.4	6.2	97%
Intellect LT	512	260	51%	60.4	42.5	70%
Intellect LT +	310	129	42%	69.8	46.8	67%
Invest LT-2	118	48	41%	65.1	26.7	41%
Idea LT	476	178	37%	4.3	3.8	88%
Inocluster LT	54	19	35%	3.6	2.2	61%
Inocluster LT+	44	13	30%	16.1	9.7	60%
Leader LT	368	90	24%	97	92	95%
Compensation of SMEs' credit interests	No data	4,540	No data	16.2	15.9	98%
Holding fund	No data	2,798	No data	228.5	228.5	100%
Guarantee fund	No data	2,803	No data	37.4	37.4	100%

Source: SFMIS data, March, 2015; data provided by INVEGA, December 2014.

ANNEX V: Technological intensity calculation methodology

The economic sectors (NACE rev.2 classification) have been categorised in four levels of technological intensity, on the basis of the intramural R&D expenditure of the business enterprise sector (BERD) as a share of gross value added (GVA), according to data available between 2006 and 2012. Firstly, the average BERD/GVA by sector in the EU28 was computed. When the quartiles in the BERD/GVA distribution in the EU28 was estimated making 4 technological intensity classes referring to quartiles. More specifically:

Economic sectors with BERD lower than 0.01 percentage points over GVA were assigned to the technological intensity class 1 (low technology intensity);

Economic sectors with BERD equal or higher than 0.01 and below 0.03 percentage points over GVA were assigned to the technological intensity class 2 (medium-low technology intensity);

Economic sectors with BERD equal or higher than 0.03 and below 0.05 percentage points over GVA were assigned to the technological intensity class 3 (medium-high technology intensity);

Economic sectors with BERD equal or higher than 0.05 percentage points over GVA were assigned to the technological intensity class 4 (high technology intensity).

For Lithuania, the assumed distribution of economic sectors by level of technological intensity is presented in the Table below.

Technological Intensity	**NACE sectors**
Low	**B:** Mining and quarrying; **C10-C20:** Manufacture of beverages, tobacco products, textiles, wearing apparel, leather and related products, wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials, paper and paper products, coke and refined petroleum products, chemicals and chemical products and printing and reproduction of recorded media; **C22-C25:** Manufacture of rubber and plastic products, other non-metallic mineral products, basic metals, fabricated metal products, except machinery and equipment; **C27:** Manufacture of electrical equipment; **C30-C32:** Manufacture of other transport equipment, furniture and other manufacturing; **C33:** Repair and installation of machinery and equipment; **D35:** Electricity, gas, steam and air conditioning supply; **E:** Water supply; sewerage, waste management and remediation activities; **F:** Construction; **G:** Wholesale and retail trade; repair of motor vehicles and motorcycles; **H:** Transportation and storage; **I:** Accommodation and food service activities; **J59:** Motion picture, video and television programme production, sound recording and music publishing activities; **J60:** Programming and broadcasting activities; **L68:** Real estate activities; **N77-N79:** Rental, leasing, employment activities and travel agency, tour operator reservation service and related activities.
Medium low	**C28:** Manufacture of machinery and equipment n.e.c.; **C29:** Manufacture of motor vehicles, trailers and semi-trailers; **N80-N82:** Security and investigation activities, services to buildings and landscape activities, office administrative, office support and other business support activities.
Medium high	**C21:** Manufacture of basic pharmaceutical products and pharmaceutical preparations; **C26:** Manufacture of computer, electronic and optical products; **J58:** Publishing activities; **J61:** Telecommunications; **M69-M71:** Legal and accounting activities, activities of head offices, management consultancy activities, architectural and engineering activities; technical testing and analysis; **M73-M75:** Advertising and market research, other professional, scientific and technical activities, beterinary activities.
High	**J62:** Computer programming, consultancy and related activities**; J63:** Information service activities; **M72:** Scientific research and development.
Other*	**A:** Agriculture, forestry and fishing; **K:** Financial and insurance activities; **O:** Public administration and defence; compulsory social security; **P:** Education; **Q:** Human health and social work activities; **R:** Arts, entertainment and recreation; **S:** Other service activities; **T:** Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; **U:** Activities of extraterritorial organisations and bodies

Notes: * - Other refers to sectors not included in the classification. Source: CSIL data and own compilation.

ANNEX VI: Characteristics of target beneficiaries

Indicator	The whole population of Lithuania SMEs		SMEs applied for the support	Supported SMEs / Total	More selective PIs[2]	More general PIs[3]	Business development and productivity (grants)	Generic access to finance
	2007	2015						
Total number of SME contracts	-	-	3,838* / (total number of applications unavailable)	2,006*/ (total number of SMEs contracts – 12,147**)	517	11,630	1,489	10,141
Number of SMEs	59,712	76,077	2021*/ (total number of applications unavailable)	1,088/ (total number of supported SMEs – 6,653**)	270	6,503**	938	5565
SMEs, % of total No of enterprises	78.04%	81.79%	88.74%*	97.41%**	90.6%	**	84.81%	100%
Private investments in EUR, total	-	-	-	583.29m	81.04m	502.25m	169.17m	333.08m
Private investment per one SME in EUR	-	-	-	87,673.2	300,134.36	77,233.58**	180,356.53	59,852.65m
Public contribution in EUR, total	-	-	-	540.67m	109.45m	431.22m	149.16m	282.06m
Public contribution per one SME in EUR	-	-	-	81,267.04	405,380.04	66,310.9**	159,018.69	50,684.64m
SMEs implementing projects in less developed municipalities[4], %	8.27%	7.12%	6.67%*	5.7%*	4.07%	No data	5.86%	-
SMEs implementing projects in regional centres[5], % o	9.19%	8.15%	6.01%*	6.34%*	6.3%	No data	6.18%	-
High-tech SMEs, % of total	1%	2%	12% /(N/A)*	13% (total number of SMEs – %**)	38%	2%**	9%	1%
Medium high-tech SMEs, % of total	10%	12%	16% /(N/A)*	15% (total number of SMEs – 7%**)	20%	7%**	15%	6%
Medium - low tech SMEs , % of total	1%	2%	5% /(N/A)*	6%* (total number of SMEs – 2%**)	7%	2%**	6%	2%
Low-tech intensity SMEs, % of total	77%	74%	62% /(N/A)*	62%* (total number of SMEs- 78%**)	32%	79%**	67%	80%

Source: Statistics Lithuania database, April, 2015; SFMIS, March, 2015.
Notes: (1) * - Generic access to finance PIs are not included. ** - It is impossible to conclude whether the Generic access to finance beneficiaries overlap with SMEs supported by grants for business R&D or Business development and productivity. *** - Indirect funding (i.e. Inocluster LT, Inocluster LT+, Assistant – 1, Assistant – 2, Inogeb LT-1, Inogeb LT-2) and Ino-vouchers LT are excluded. (2) Selective PIs calculated – Idea LT, Intellect LT, Intellect LT+. (3) More general PIs calculated - Leader LT, E-business Lt, Process LT, New opportunities, Compensation of SMEs' credit interests. (4) According to 31-01-2007 Government's regulation No. 112 "regarding the problematic territories, less developed municipalities were: Akmenė district municipality, Druskininkai district municipality, Ignalina district municipality, Jonava district municipality, Joniškis district municipality, Jurbarkas district municipality, Kelmė district municipality, Lazdijai district municipality, Mažeikiai district municipality, Pasvalys district municipality, Rokiškis district municipality, Skuodas district municipality, Šalčininkai district municipality, Švenčionys district municipality. (5) According the government's Regulation "Regarding Lithuanian Regional Policy until year 2013", the regional centres are: Alytus, Marijampolė, Tauragė, Telšiai, Utena, Mažeikiai, Visagina

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