The Lithuanian Economy

Innovation – most room for progress

- Lithuania is still a low-to medium-value-added economy
- Higher spending on R&D is no guarantee for success
- Low FDI, universities, and education are the most to blame

Not a high-tech country...
Despite some positive recent examples, the country still by and large remains a low-to medium-value-added economy, dominated by less knowledge-intensive services and low and medium-low technology manufacturing. The high-tech sector, which tends to be the most productive, still remains very small and underdeveloped. Transition towards a more value-added economy, through more innovation, is extremely important for Lithuania, otherwise the country risks getting stuck in the middle-income trap.

Higher spending on R&D is no guarantee for success
Despite the government’s focus on targeting R&D innovation, business R&D intensity, as well as patent applications, remains at stubbornly low levels. However, R&D is not the only source of innovation. Lithuanian companies tend to spend more on non-R&D innovation than companies do on average in the EU, but this does not seem to be delivering tangible results. The ability to absorb and adapt external technical knowledge is very poor in Lithuania.

Low FDI, universities, education and other culprits
One of the reasons why the high-tech sector in Lithuania is small and there is a lack of innovation is low and stagnating inward FDI and, thus, a lack of large innovative companies. Weak universities, fragmented research infrastructure, the poor quality of the education system, lack of alternative financing, and burdensome government support schemes also play an important role. Improving the situation requires structural reforms in education, regulation of the labour market, taxation, etc.

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Value added in the business economy, 2013

- High-tech manufacturing: 1%
- Medium high-tech manufacturing: 3%
- Low- and medium-low tech manufacturing: 19%
- Knowledge-intensive high-tech services: 5%
- Knowledge-intensive market services*: 8%
- Less knowledge-intensive market services: 47%
- Other: 17%

Source: Eurostat

*except financial intermediation and high-tech services

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Innovation – most room for progress

Transition towards a more value-added economy is extremely important for Lithuania. The working-age population in the country is shrinking rapidly, production of low- and medium-value-added goods and services can no longer ensure rapid economic growth and continued convergence to the income level of developed countries. The country risks getting stuck in the middle-income trap. Moving up the value chain requires a breakthrough in innovation, but so far the results are disappointing.

Not a high-tech country…

Despite a few examples of booming, innovative Lithuanian high-tech companies (mostly in biopharmaceuticals and laser technology industries) and the establishment of an increasing number of IT competence centres by foreign companies in Lithuania, the country still by and large remains a low- to medium-value-added economy. In 2013, almost half of all the value added in the business economy was generated by less knowledge-intensive market services, which was one of the largest shares in the EU. Lithuania’s manufacturing sector, which creates more than one-fifth of all value added in the business economy, is also dominated by low- and medium-low-technology production. In 2013, it created more than four-fifths of all value-added in the manufacturing sector – more than in any other Baltic country.

The high-tech sector, which tends to be the most productive, is still very small and underdeveloped

Meanwhile, the Lithuanian high-tech sector, which tends to be the most productive, remains very small and underdeveloped. Value added in the high-technology sector as a whole, which includes high-tech manufacturing, such as the manufacture of pharmaceuticals, computer, electronic, optical products, etc., and knowledge-intensive high-tech services, such as computer programming and consultancy, information service activities, scientific R&D, etc., accounted for only 6.3% of the total value added in the business economy in 2013 - below most of other EU countries, including Latvia and Estonia. On a positive note, it is likely that the situation has improved somewhat in recent years as the volume of high-tech production has increased by more than 66% since 2013 – more than in less value-added production. However, employment in the high-technology sector is not yet showing any of those positive signs – in 2014, only 2.1% of all employed Lithuanians worked in the high-technology sector, the lowest number in the whole EU.

Without more innovation, the country risks getting stuck in the middle-income trap

Transition towards a more value-added economy is extremely important for Lithuania. The working-age population in the country is shrinking rapidly, production of low- and medium-

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2 Detailed list can be found here: http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Knowledge-intensive_services_(KIS)
value-added goods and services no longer ensure rapid economic growth and continued convergence to the income level of developed countries, and the end of support from the EU structural funds is approaching. More innovation could lead to higher productivity growth and higher potential output, and would have a positive effect on wage growth, creation of jobs, and the country’s ability to compete effectively in the global economy.

**Lithuania continues to score low in international rankings on innovation**

Despite the great need of becoming more innovative in order to move up the value chain, the country continues to score low in international country rankings on innovation. In the Global Innovation Index’s (GII) ranking of 141 countries, Lithuania took 35th place, but was ranked only 23rd among the 28 EU countries. On a positive note, the country has been slowly moving up in these rankings. However, according to the Innovation Union Scoreboard rankings, compiled by the European Commission in 2015, Lithuania falls behind the EU average considerably and outperforms only three other EU countries – Latvia, Bulgaria, and Romania. Moreover, the country has made no tangible progress in moving up in this ranking in recent years.

Nevertheless, at the company level, there has been improvement in the innovation area - the share of Lithuanian companies that innovate increased from 30% in 2010-2012 to over 40% in 2012-2014. Nevertheless, the Innobarometer 2015, a survey on activities and attitudes related to innovation, showed that the share of companies that had introduced innovations since 2012 was still significantly lower in Lithuania than the EU average, across all innovation types, with the largest differences in the areas of new or significantly improved marketing strategies and products.

**Higher spending on R&D is no guarantee for success**

Lithuania’s efforts to increase the level of innovation and move up the value chain have been mostly focused on targeting R&D innovation. Various measures, ranging from a profit tax incentive to co-financing of R&D using the EU structural funds, have been allocated in order to increase business R&D intensity. This can be justified to some extent - research shows that R&D tends to have a higher positive effect on productivity than non-R&D expenditure; it also tends to affect positively the “absorptive capacity”, or the ability of a company to identify new, external knowledge, assimilate it and apply it to commercial ends, as well as significantly increases the likelihood of successful innovation. However, it seems like the efforts to encourage more R&D-based innovation has not been delivering significant results.

Although the total R&D expenditure in Lithuania as a share of GDP, or the total R&D intensity, has been slowly inching upwards, it stood at only 1% in 2014 and was still two times lower than the EU average. Public spending on R&D as a share of GDP reached that of the EU average in 2014, while business R&D expenditure amounted to only 0.3% of GDP compared with the EU average of 1.3%--the fourth-worst result in the EU. Moreover, the effectiveness of R&D is low in Lithuania - in 2013 it cost more than EUR 10 million of

4 J. Lopez-Rodrigues and D. Martinez (June 2014), “Looking beyond the R&D effects on innovation: The contribution of non-R&D activities to total factor productivity growth in the EU”

5 EBRD Transition Report 2014, “Drivers of Innovation”

6 In 2014, public spending on R&D in Lithuania and on average in the EU was 0.72% of GDP
R&D spending to produce one patent application to the European patent office (EPO) – twice as much as in the EU on average. This can also be explained by the fact that R&D in Lithuania is dominated by the public sector, which tends to be less efficient, less goal – oriented, and less likely to focus on marketable ideas than the private sector.

Invention is not innovation

However, it is important to understand that invention, which may involve lots of R&D spending, is not innovation. Inventions may contribute to innovation if they lead to new or improved products, services, or processes, but inventions will not lead to innovation if they are never applied. Thus, spending more on R&D, especially by the public sector, is no guarantee of better innovation outputs.

Companies may engage in non-R&D innovation

Moreover, although governments tend to focus on R&D, this is not the only source of innovation - companies may also engage in non-R&D innovations through an adoption of technology (e.g., the purchase of advanced machinery, computer hardware and software, and the acquisition of patents and licenses), minor modifications or incremental improvements to products or processes using existing knowledge, imitations or the adoption of innovations developed by users, or the combination of existing knowledge in new ways.

Data by the Innovation Union Scoreboard 2015 showed that, although Lithuanian companies spend very little on R&D, they spend 60% more on non-R&D innovation than the EU companies do on average. Whether this expenditure translates into innovation outputs is a different question. Data on trademarks and designs, which may be used as a proxy for non-technological innovation, indicate that this does not have to be the case. Although trademark applications per million inhabitants are inching upwards, they still remain about two times lower than the EU average and more than three times lower than those in Sweden; meanwhile, community design-filed applications per million of inhabitants are among the lowest in the EU.

The absorptive capacity is very low

Moreover, data on the inflow of foreign knowledge show that the ability to absorb and adapt external technical knowledge is also very poor in Lithuania. The country scored 7th lowest out of 141 countries and the lowest among the EU countries on the absorptive capacity index, compiled in the GII 2015 report.

Low FDI, universities, and other culprits

There may be plenty of possible explanations why the high-tech sector in Lithuania is still small and the level of innovation is falling behind that of many other EU countries. One of them is a lack of large, innovative foreign companies – an outcome resulting from low and stagnating inward foreign direct investment (FDI). In 2015 the stock of FDI in Lithuania

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7 Trademarks are words or figurative marks that are an essential part of the ‘identity’ of goods and services. They help deliver brand recognition, e.g., in logos, and play an important role in marketing and communication. (Eurostat)

8 A design is the outward appearance of a product or part of it, resulting from the lines, contours, colors, shape, texture, materials and/or its ornamentation. (Eurostat)

9 The absorptive capacity index, compiled by GII, consists of four components: royalty and licence fee payments, % of total trade; high-tech imports minus re-imports, % of total trade; communication, computer and information services imports, % of total trade; and FDI net inflows, % of GDP.
accounted for around 38.7% of its GDP, compared with 59% in Latvia and 98% in Estonia. Moreover, the FDI stock as a share of GDP has been stagnating in Lithuania for the last five years.

However, according to Invest Lithuania, a government agency responsible for attracting FDI, Lithuania leads the Central and East Europe region in terms of FDI projects per million inhabitants; however, they tend to be rather small (which partly explains why FDI stock is low). In 2015, there were 14% more FDI projects than in 2014. Over one-third of these projects were in manufacturing (mostly non-high tech), but the design, testing, and development activities are catching up rapidly. The most positive trends are visible in IT services, since an increasing number of large, established companies (e.g., NASDAQ, Barclays, Swedbank, Uber, etc.) have been opening IT centres in Lithuania. However, a lack of IT specialists, which is becoming increasingly pronounced, could become a limiting factor in the further expansion of this sector.

Lithuania could become more attractive to FDI by improving the investment climate, e.g., by reducing labour taxes and introducing a ceiling on social security contributions, eliminating taxation of reinvested profits (as in Estonia), relaxing the regulation of the labour market, increasing the efficiency of government spending, lowering the level of corruption, improving the quality of education, introducing more flexible immigration procedures, etc. These measures would be highly appreciated, not only by foreign, but also by local investors. Lithuanian high-tech companies tend to be rather small – in 2013, a high-tech manufacturing company had on average 26 employees, compared with more than 51 employees per company in Estonia (see graph below). However, research shows that there is a positive correlation between firm size and innovation; moreover, larger firms are more likely to engage in R&D than small firms. Thus, the above mentioned structural reforms in the labour market, taxation, migration policy and others would create a more favourable environment in which the high-tech companies could grow larger.

Nevertheless, the lack of innovative foreign companies is just one part of the puzzle. The question of what keeps Lithuania’s companies from moving up the value chain by engaging in innovative activity still remains unanswered. One of the possible explanations is the lack of strong universities, with high-quality research capabilities and cooperation with business. Strong universities are important for a few reasons – they may provide R&D services to small and medium-sized enterprises (SMEs), university researchers often start their own businesses in the high-tech sector outside academia, and universities educate students who are later employed by innovative companies.

11 Read more in Swedbank Analysis “Baltic economies have recovered quickly, but investments remain behind the curve” (November, 2014) http://www.swedbank-research.com/english/swedbank_analysis/2014/14-11-04/swedbank_analysis-investments_in_baltics.pdf
12 Read more in EBRD Transition Report 2014 „Drivers of Innovation“
Universities are inward looking and are not seeking collaboration with business

However, wages in the universities are low; thus, attracting talent is difficult. Universities also tend to be inward looking and thus are often not seeking collaboration with business or with other research institutions, including those outside Lithuania. Another problem is the motivational system – academic staff are promoted and receive higher remuneration based only on the number of scientific publications, but not their quality, relevance, or applicability. In other words, researchers are encouraged to have a few mediocre research ideas per year rather than one great idea in a decade.

There is a lack of skilled scientists and engineers

The quality of education often receives a lot of criticism from employers, who argue that it is not well-suited for the needs of business. A recent survey by Deloitte, a consultancy, found that the availability of skilled and experienced researchers was the main factor determining company spending on R&D in Lithuania. Meanwhile, in terms of availability of scientist and engineers, Lithuania ranks only 61st out of 140 countries in the Global Competitiveness Report 2015-2016 by the World Economic Forum (WEF).

R&D infrastructure is fragmented, there is a lack of alternative financing, government support schemes are burdensome

Another negative aspect is that Lithuania’s public R&D infrastructure is scattered across different universities and other institutions, lacking coordination; thus an SME, willing to outsource its R&D activities, might face difficulties in finding an institution that could provide the required services. Innovating companies might also face issues related to the financing of R&D. The banks often abstain from financing risky investments, the capital markets are underdeveloped, and there are still very few venture capital (VC) funds for financing start-ups. Meanwhile, retrieving funding from the EU structural funds requires complicated application procedures that lack flexibility. The same survey by Deloitte found that Lithuanian companies lack information on the support schemes available to them and/or on how to apply for them.

One innovation agency could solve a lot of problems

One agency responsible for the implementation and coordination of innovation policies, as well as for encouraging knowledge transfer across different industries, providing advice to companies on financing and supporting options available to them, connecting companies with research partners, and helping them to access international product markets could be extremely useful in boosting the innovation level in the country. The support schemes should also become less burdensome – the European Commission recommends introducing innovation vouchers that would allow the SMEs to buy services from scientists.

Education – the centrepiece of innovation

Technology-based start-ups are another indicator that can tell a lot about the innovative activity in a country and the creative potential of its people. Start-ups are important as they tend to invest in breakthrough technology, which is usually associated with high risk and unpredictable returns. Sometimes, just one highly successful start-up can have a large effect on the country’s economy and encourage more innovation through second-round effects.

Still few start-ups with fundraising rounds

The good news is that the start-up ecosystem in Lithuania has been evolving. The number of start-ups, as well as the investments into them, have been on the rise in recent years, but Lithuania still lags behind Estonia and the Scandinavian countries. Data by the Lithuanian Private Equity and Venture Capital Association show that, although Lithuanian start-ups outperform their Baltic peers in terms of headcount, Estonia leads the Baltics in the number of start-ups with fundraising rounds. The gap between Estonia and the other two Baltic countries widens even more when the number of start-ups with fundraising rounds per 100,000 inhabitants is compared – over the period 2007-2015, there were 37.3 such start-ups per 100,000 inhabitants in Estonia, compared with 15.2 in Lithuania and only 11.1 in Latvia. Estonia also leads the Baltics in terms of per capita investments into start-ups by VC firms (see graph below).

There is still a lack of financing for start-ups

The gap between Lithuania and Estonia, as well as the Scandinavian countries, is probably caused by two factors – there are not as many promising high-quality start-ups worth investing in, and/ or there is a lack of specialist financing (e.g. angel investors, seed financing, venture capital) in the country. It cannot be ruled out that the capital available to

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13 Read more: http://www2.deloitte.com/lt/lt/pages/tax/articles/deloitte-ld-survey.html
14 Read more in the Country Report Lithuania (May 2016), the European Commission
15 Over the period 2007-2015 there were 438 start-ups with fundraising rounds in Lithuania, compared to 489 in Estonia and only 200 in Latvia
start-ups is insufficient, especially in the seed stage. Angel investors are almost non-existent\(^{16}\), but if a start-up is lucky to receive some kind of early stage financing, the sums are usually very small, while the requirements for and control of start-ups tend to be exaggerated. The situation will most likely improve when the country moves closer to the technological frontier and there are more examples of successful Lithuanian start-ups, since investors into start-ups tend to be founders of successful innovative companies.

![Investments into start-ups by VCs, EUR per capita](source)

However, lack of financing is just one part of the puzzle. The capabilities of the Lithuanian education system to raise creative entrepreneurs aware of the cutting-edge technology (and brave/skilled enough to commercialize it) is questionable. The entire education system is falling behind that of the developed countries and no longer meets today’s demands. In terms of quality of the education system, Lithuania ranks 53\(^\text{rd}\) out of 140 countries in the Global Competitiveness Report 2015-2016 – above Latvia, but well below Estonia (34\(^\text{rd}\)) and Sweden (25\(^\text{rd}\)). There are plenty of reasons for this. First, pre-primary education is not mandatory in Lithuania; thus, many pupils start an official education institution relatively late, and the levels of knowledge vary widely among them. According to PISA 2012, almost one-third of Lithuanian children had not attended any pre-primary education— one of the largest shares among PISA-participating countries and economies.

The secondary-education outcomes are also poor - Lithuanian 15-year-olds on average score below the OECD average and below the other two Baltic countries across all areas measured by PISA – performance in reading, mathematics, and science literacy. Lithuanian students also tend to avoid studying subjects related to number crunching – in 2014, only 6% of all students enrolled in tertiary education studied science, math, and computing, which was the lowest number in the EU. This lack of interest in these subjects is probably a result of poor secondary education - students tend to go for “easier” subjects at universities because they lack knowledge in the exact sciences.

The education system in general lacks focus on fostering creativity and entrepreneurship, as well as critical thinking, which are extremely important for the innovation potential in a country. The teaching methods also need to adapt to the requirements dictated by the changing environment. Moving closer to the technological frontier requires substantial improvements in the Lithuanian education system. After all, human capital is the centrepiece of innovation and productivity growth.

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