MEASURING INNOVATIVE PERFORMANCE

Svetlana Jesiļevska, University of Latvia /
Central Statistical Bureau of Latvia, Latvia[1]

Abstract. Nowadays innovation is the main driving force to economic growth and prosperity. Europe has a long tradition of good performance in research and innovation, and each Member State has its own policies and programs on research and innovation. The support and development of innovation performance is one of the priority tasks for the government of Latvia. The targets of European Union (EU) within the Europe 2020 strategy for smart growth include combined public and private investment levels to reach 3% of EU's GDP as well as better conditions for R&D and Innovation. Latvia has made some progress towards the Europe 2020 target indicators, but there is still place for improvement in a significant number of areas as Latvian innovation rate is still below EU's average.

European Commission declares a need to produce an indicator to measure Europe's progress towards a more innovative economy. The indicator will measure the progress of strategy and represent overall research and innovation performance and reasons why it differs between member states. An important aspect of the indicator is that it should allow comparability on the global level.

Latvia should consider the applicability of new innovation indicator. The paper aims to discuss the innovation performance of Baltic States and to examine the usability of the new approach of calculating Europe 2020 Innovation Indicator in case of Latvia.

The theoretical and methodological evidence is based on the analysis of the economic literature, scientific works published by Latvian and foreign scientists; the legal documents of European Commission; the statistics database of the Central Statistical Bureau of Latvia; Eurostat and other international statistical and methodological materials. Bibliography review, as well as methods of statistical analysis such as grouping, processing and comparative analysis has mainly been used in the paper.

Keywords: *Europe 2020 strategy, high-growth enterprises, Community Innovation Survey, Innovation Indicator, methodology*

Jel code: C0, C13, O31

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[1] Corresponding author – e-mail address: svetlana.jesilevska@csb.gov.lv, telephone: +371 20200858

Introduction

Innovation is a major force of economic growth. In the context of the Europe 2020 Strategy, an innovation indicator is developed to measure Europe's progress towards a more innovative economy. The new innovation indicator measures the share of high growth innovative enterprises in the economy. Business register of the Central Statistical Bureau (CSB) of Latvia keeps all the necessary information to carry out identification and calculation of high-growth enterprises by the required criteria.

The EU data show that Latvia's innovation performance is one of the lowest among the Baltic States and in Latvia there is one of the smallest numbers of high-growth companies among the newly-established enterprises. So, the CSB argues whether an approach of high-growth innovative enterprises is suitable in Latvia.

Europe 2020 strategy and performance of Latvia

Europe 2020 is a strategy for reviving the economy of European countries, based on a vision of 'smart, sustainable, inclusive' growth (Europe 2020). The three axes of the strategy are:

- Smart growth: developing an economy based on knowledge and innovation;
- Sustainable growth: promoting a greener, more resource-efficient and competitive economy;
- Inclusive growth: fostering a high employment economy delivering social and territorial cohesion.

The Smart Europe sub-index consists of four pillars of various aspects of Europe's ability to develop smart economies:

Pillar 1: Enterprise environment − improving the overall enterprise environment.

Pillar 2: Digital agenda − making full use of information and communication technologies.

Pillar 3: Innovative Europe − sufficient investment in research and development (EU targets include combined public and private investment levels to reach 3% of EU's GDP and better conditions for R&D and Innovation).

Pillar 4: Education and training − improving the quality of higher education and training.

The capacity of countries to innovate depends on various factors – innovation support services, technology transfer mechanisms, R&D and ICT infrastructure, the existence of effective education and training institutions, the mobility of researchers, business incubators, new sources of finance and local creative potential, good governance etc. Performance in R&D and innovation varies across the EU's countries (Regional Policy for Smart Growth in Europe 2020).

Table 1

Rankings on the smart sub-index

Country/Economy	SMART		1. Enterprise environment		2. Digital agenda		3. Innovative Europe		4. Education and training	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Estonia	11	4.79	12	4.13	5	5.94	16	4.07	12	5.03
Latvia	23	4.05	21	3.69	20	4.60	24	3.30	22	4.61
Lithuania	19	4.29	25	3.53	11	5.35	21	3.49	17	4.81

Source: The Europe 2020 Competitiveness Report: Building a more Competitive Europe. 2012 Edition.

Table 1 shows rankings and scores between Baltic States on the smart sub-index. **Estonia** ranks 11th in the overall smart sub-index. Estonia's greatest strength relates to the country's digital agenda (ranked 5th), driven by strong information and communication (ICT) laws, strong company use of ICT and high government prioritization. At the same time Estonia has low R&D spending, a lack of available researchers, little collaboration between universities and the private sector in research and low registration in patents and industrial designs. This is also reflected in the education and training pillar ranked 12th, where Estonia does relatively well in educating its citizens, but could improve by upgrading training schemes.

Latvia is not focused on a knowledge-based economy (ranked 23rd). In particular, Latvia's low innovative capacity does not bode well for the future (ranked 24th in the Innovative Europe), because of a lack of scientists and engineers and inefficiencies related to scientific output. Over the longer period of time, moving towards a knowledge-based economy will require considerable efforts in education in order to increase participation and quality.

The cornerstones of **Lithuania's** productivity are the progressive digital agenda (ranked 11th), stable results on education and training (ranked 17th), reflecting Lithuania's high enrolment in tertiary institutions. Improving educational quality (22nd on the OECD Programme for International Student Assessment – PISA) and removing administrative obstacles to entrepreneurial activity are two areas that would help the country move towards a knowledge-based economy while increasing social inclusion (The Europe 2020 Competitiveness Report: Building a more Competitive Europe. 2012 Edition.).

Estonia and Latvia have many similarities in the context of economy, R&D and innovation. However, Estonia performs better in many aspects. The statistical data shows that in Estonia the science and research is much more developed, e.g., there are fewer barriers for entrepreneurs to conduct the business activity, and there is a larger value added in the national export. The main problems in the innovation systems of Latvia and Estonia are the poor connection between research institutions and the enterprises; the poor orientation of the research towards the needs; the researchers become old and number of researchers is decreasing constantly. These problems are more topical in Latvia than in Estonia (Early stage business needs analysis. Research Report.).

R&D intensity

Investments in research and innovation are crucial for all countries, but countries start with different capabilities. R&D intensity that is R&D expenditure as a percentage of GDP, reflects the R&D and innovation performance in a given country. The Europe 2020 strategy sets an objective for R&D intensity as a 3% of GDP, most member states have already adopted their national R&D intensity target for 2020. Total R&D expenditure is split between private and public funding. Private R&D funding is the main component of total R&D expenditure in the more advanced knowledge economies. Its level reflects the attractiveness of the national innovation system for business investments. Public R&D funding shows the commitment of a government to promote R&D and innovation activities directly and through the leverage effect on business R&D expenditure. In Latvia, Lithuania and Estonia structural funds have become a significant – if not the main – source of public R&D funding (Europe 2020 Targets: Research and Development.). While it is important to define target of the GDP to R&D, these 3% should not be a target in itself, and should mobilize a wide range of different instruments, not just public resources to finance public research (Overall Assessment of the Communication from the Commission, Europe 2020, a Strategy for smart, sustainable and inclusive growth. 3 March 2010.). According to statistical data, Latvia has the lowest R&D intensity in the EU (0.6% of GDP in 2010). For Latvia R&D growth is targeted at 1.5% of GDP for 2020 (see Figure 1).
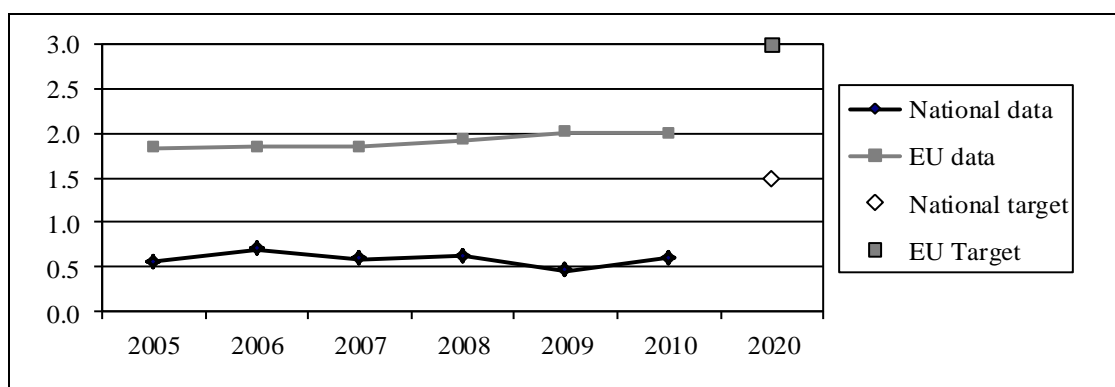
Latvia and Lithuania set very ambitious national target with regard both to starting levels and past trends (see Table 2). Latvia and Lithuania are among Member States, which need to fundamentally raise their rate

of increase in R&D intensity to reach their target. The financial crisis of 2008 had a significant impact on the R&D expenditure in Latvia, in order to achieve its 2020 target; Latvia has to increase the R&D intensity both in the public and the private sectors. According to the Latvian National Development Plan 2014-2020 'Establishing knowledge as the key resource for the country's development means that people as the creators and disseminators of knowledge become the main driving force and the beneficiaries of this development. In such a growth model, knowledge determines the quality of the labour force, the use of capital and the development of technologies' (Jankovskis, J. et al. 2012). The support and development of innovation performance is one of the priority tasks for the government of Latvia.

Source: Europe2020 in Latvia.

Fig. 1. **Gross domestic expenditure on Research and Development (% of GDP);
National data of Latvia and EU data**

Estonia is among Member States, which are on track to reach their target based on their average rate of progress over the period 2000-2010. Estonia has relatively ambitious target according to its starting point.

Table 2

Situation of Member States with regard to their R&D intensity target

	R&D Intensity			
	2010	**Target 2020**	**Average annual growth (%) 2000-2010**	**Average annual growth (%) required to meet the 2020 target 2010-2020**
EU	2.00	**3.00**	+0.8	4.1
Estonia	1.62	**3.00**	+10.4	6.3
Lithuania	0.79	**1.90**	+3.1	9.1
Latvia	0.60	**1.50**	+3.1	9.5

Source: Europe 2020 Targets: Research and Development.

The target on R&D intensity in Latvia (1.5%) is significantly lower than in Estonia (3%). Even if Latvia will be able to achieve its goal in 1.5%, performance of Latvia will be far below the EU average and even below the rate of Lithuania and Estonia.

The vision of Europe 2020 strategy for the 21st century is built on a partnership between the European Commission and the Member States. While the Member States set national targets and set out the R&D and innovation support policies, the European Commission evaluates progress, gives policy recommendations and develops initiatives to stimulate sustainable growth and jobs at the EU level (Europe 2020 – The EU strategy for smart, sustainable and inclusive growth).

Innovative Latvia in Figures

Latvian companies generally belong to the larger size classes: not only are there proportionally more large companies; even within the SME sector the medium sized and small segments make up a higher percentage of the total than in the average EU country (see Table 3). Services are the leading sector in terms of number of enterprises (49%) and value-added (43%), with shares very close to the EU average; however, they create only 36% of the jobs (against 40% in the EU as a whole). Trade plays a greater role in Latvia than in the other EU countries, especially in terms of employment (31% of the total). What concerns high-tech manufacturing and knowledge-intensive services, they are less important in Latvia than in the EU as a whole: their 22% share in the creation of value-added is 9 points below the EU average. In manufacturing 68% of Latvian SMEs have specialised in the low-tech segment of the market (to compare, the EU average of 53%).

The Latvian SME structure used to be even more oriented towards larger enterprises than it is now, but the crisis caused a major fall in the number of all size classes except micro enterprises, which grew until 2010 and then levelled off at a much higher level than before the crisis. The recent reforms, which made it easier and less expensive to found and run a micro enterprise, have played an important role in increase in the number of new micro enterprises.

Table 3

SMEs in Latvia for 2011 – basic figures

	Number of Enterprises			Employment			Value added		
	Latvia		*EU27*	Latvia		*EU27*	Latvia		*EU27*
	Number	**Share**	*Share*	**Number**	**Share**	*Share*	**Billion €**	**Share**	*Share*
Micro	70 011	88.7%	92.2%	148 382	27.1%	29.6%	1	16.4%	21.2%
Small	7 313	9.3%	6.5%	144 307	26.4%	20.6%	2	22.8%	18.5%
Medium-sized	1 408	1.8%	1.1%	131 148	24.0%	17.2%	2	26.6%	18.4%
SMEs	78 732	99.8%	99.8%	423 837	77.4%	67.4%	5	65.8%	58.1%
Large	195	0.2%	0.2%	123 743	22.6%	32.6%	3	34.2%	41.9%
Total	78 927	100.0%	100.0%	547 580	100.0%	100.0%	8	100.0%	100.0%

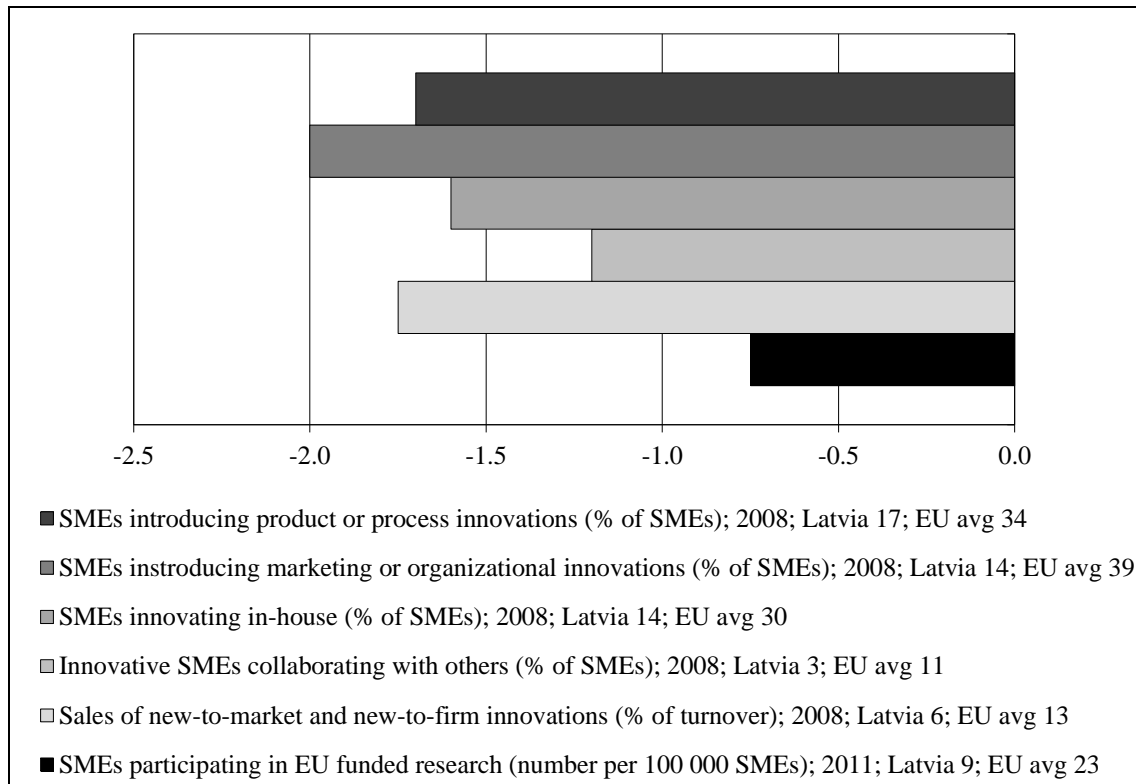*Source: Enterprise and Industry. SBA Fact Sheet 2012. Latvia.*

Latvian SMEs have particular difficulties in introducing innovations, in innovating in-house, and in getting innovative SMEs to cooperate (see Figure 2). The indicator for the participation of SMEs in EU funded research are also below the mean, but less markedly so. In 2011 the government adopted two main policy measures to improve the situation in this area. New regulations on the 'Development Programme of New Products and Technologies by Micro, Small and Medium Enterprises' (a sub-activity of the Action Programme 'Entrepreneurship and Innovation') were adopted by the Cabinet of Ministers. This effectively created the procedure for SMEs to participate in the development programme. Moreover, the

Cabinet of Ministers approved the regulations on 'High-Value Added Investments', another sub-activity of the same Action Programme 'Entrepreneurship and Innovation', which aims to attract investments with a view to boosting firms' competences, technologies and innovation capacity.

- SMEs introducing product or process innovations (% of SMEs); 2008; Latvia 17; EU avg 34
- SMEs instroducing marketing or organizational innovations (% of SMEs); 2008; Latvia 14; EU avg 39
- SMEs innovating in-house (% of SMEs); 2008; Latvia 14; EU avg 30
- Innovative SMEs collaborating with others (% of SMEs); 2008; Latvia 3; EU avg 11
- Sales of new-to-market and new-to-firm innovations (% of turnover); 2008; Latvia 6; EU avg 13
- SMEs participating in EU funded research (number per 100 000 SMEs); 2011; Latvia 9; EU avg 23

Source: Enterprise and Industry. SBA Fact Sheet 2012.Latvia.

Fig. 2. **Distance from the EU-average (measured in standard deviations, EU-average=0)**

The following four key structural challenges of the national Research, Technological Development and Innovation system of Latvia can be identified:

Unstable R&D funding and governance system – public funding for R&D is too dependent on EU structural funds, which is a wrong approach in a long-term perspective.

Limited innovative capacity of the enterprise sector – only a few of the existing industrial enterprises in Latvia prove to be internationally competitive in the high-tech area; Latvia has one of the lowest levels of innovation performance; the service sector dominates in Latvia and demonstrates low innovative capacity, while the industrial sector is too small to make a significant contribution in the national innovation performance.

Insufficient supply and sustainability of skilled labour force – the problem with the supply of qualified labour force; major outmigration of the Latvian population; overall lack of entrepreneurs as well as in technology-intensive branches.

Underdeveloped and weakly motivated collaborative practices – weak collaborative practices in the domains or domestic intersectoral knowledge/technology transfer, integration of universities and institutes, as well as science and technology cooperation. This challenge largely results from the above-

mentioned challenges related to the limited innovative capacity of the business enterprise sector and the insufficient supply and sustainability of skilled labour force that both limit the possibilities for collaboration. (Erawatch Country Reports 2011: Latvia.)

Europe 2020 Innovation Indicator

In 2010, the Europe 2020 strategy announced the development of an innovation indicator to complement the R&D intensity indicator. The innovation indicator should measure the capacity of countries economy to create high quality jobs in economic sectors that are promising for the future in terms of innovation, growth and employment (Summary of the Workshop).

The indicator should be representative of the economy and reactive to innovation policy changes. The indicator is supported by a marker that counts only employment in high-growth enterprises, instead of total employment in each economic sector as it is the case for the innovation indicator.

The high-growth enterprises in the economy represent a small proportion of the business population, nevertheless are considered promising for the creation of more jobs and innovation, so interest in high-growth enterprises is high among policy makers.

An important aspect of the indicator is that it should allow comparability on the global level. In Latvia, like in most European countries, innovative enterprises are defined based on the Community Innovation Survey (CIS), which implements the Oslo Manual guidelines. According to new methodology, the CIS could not be used to identify high-growth innovative enterprises for the innovation indicator for the following reasons: the CIS is a sample survey and does not cover all enterprises and all sectors of the business economy; the CIS data are not available on an annual basis but only every two years, so if the CIS were used to identify high-growth innovative enterprises, the indicator could not be updated annually (Summary of the Workshop).

A number of non-European countries do not carry out innovation surveys or do not use harmonized questionnaires so the problem on international comparability is still open. One more aspect here is that the results of the CIS are significantly affected by the way the survey is implemented in a country (e.g. compulsory or voluntary survey, web-based or paper survey etc.).

Doubtful aspect of the methodology on calculating the innovation indicator is the sector-specific coefficient. CIS variables quantify the actual level of innovation in a sector. Knowledge intensity informs about the innovation potential of the sector, as innovation is based on knowledge and requires highly qualified human resources. The weight of sectors' labour productivity is too high in calculation of Sector-specific coefficient, but in practice sectors' labour productivity is not the result of innovation only but of other factors too. Total Factor Productivity would be a better measure of competitiveness. But the problem here is that total factor productivity data at sectoral level does not exist. In author's point of view, applying the same sectoral coeficients to all countries seems to be in contradiction with "smart specialisation" – a country specialises where it has a comparative advantage.

In author's opinion the index contains too many elements and therefore it does not clearly identify the weak areas of economy, which would require additional government policy intervention. In author's view the indicator and marker suffer from the same drawbacks as composite indicators: they integrate many elements which interact together so that it becomes difficult to interpret and learn lessons for policy makers. Moreover, there could be some difficulties to set clear and measurable target values, like for other target indicators form the Europe 2020 strategy.

The concept of high-growth enterprises

Initially the concept of a high-growth enterprise seems to be simple; it is an enterprise, which grows at a rate which is high enough in comparison to the majority of enterprises. In practise there are a number of

practical issues when forming a criteria and definition of high-growth enterprise. In terms of distinguishing high-growth enterprises from others, two basic features are usually used: there should be a strong growth in size (usually measured as numbers of employees within the enterprise), and this growth should be over an intensive period (High Growth Enterprises. What Governments can do to make a difference?).

According to new methodology, data source for high-growth enterprises for calculating the Innovation Indicator is National Business Registers (based on EU Regulation). The definition of high-growth enterprises applied to be used for National Business Registers purposes is as follows: 'all enterprises with average annualised growth greater than 20% per annum, over a three year period should be considered as high-growth enterprises. Growth can be measured by the number of employees or by turnover.' Manual on Business Demography Statistics gives one more definition: 'all enterprises up to 5 years old with average annualised growth greater than 20% per annum, over a three year period, should be considered as gazelles.'(Eurostat − OECD Manual on Business Demography Statistics).

In author's view the above mentioned definitions do not take into account the differences in growth rates between industries. It is important, however, to measure growth relative to industry peers. An example comes from Spanish research on the link between innovation and employment change in Spain based on data for 1998-2000 (Jaumandreu, 2003). During this time of rapid growth in Spain's economy, manufacturing enterprises averaged sales growth of 10% while service enterprises averaged 12%. Also, recent research aimed at investigating the OECD's definition of high growth as it relates to italian firms points to the fact that an equal number of employees (for instance ten employees) has a different economic significance according to the sector of economic activity (Cella and Moorone, 2008). The employment average, which in Italy is below the threshold of ten employees for almost all economic activities, varies greatly from sector to sector.

Moreno and Casillas (Moreno and Casillas, 2007) provide an alternative to the OECD approach: they define high growth simply as a three-year growth rate of more than 100% above the sector median. This approach removes the difficulty of a variation of sector growth rates (High Growth Enterprises. What Governments can do to make a difference?).

The following are the parameters of the definition of high-growth enterprises to calculate marker: minimum size of enterprises is 10 employees, growth rate minimum threshold (annual average) is 10%, time period of observation for employment growth is 3 years. The 10% threshold for annual average growth is more adapted to the economic crisis and allows to cover a more significant part of the economy, remaining selective. Variables to be used are number of employees or number of persons employed; practically the number of employees is better as it is more widely available and comparable across European countries. Turnover and value-added could be a good alternative to identify high-growth enterprises, but were rejected to be included in the definition, because turnover is less comparable across sectors, value-added causes a number of data problem and of timeline to get the results. Moreover, the creation of jobs by enterprises in innovative sectors matters.

A size threshold of ten employees at the start of an observation period is set to avoid the small size class bias that the definition of high growth enterprises inevitably contains. The optimal threshold in terms of firm size at start, growth rate and growth period are selected to provide as detailed and as meaningful information as possible, and to maximise information that can be disclosed (e.g. taking into account confidentiality rules, to produce the indicators at as detailed an industry level as possible, and by standard size classes by employment criteria) (Summary of the Workshop).

In Latvia one more definition of high-growth enterprises exists. In 2012 Dienas Bizness in collaboration with Lursoft IT already for the twelfth year created the list of Latvian high-growth enterprises. In order to be included in the list of high-growth enterprises – Gazelles, an enterprise should meet the following criteria: continuous increase of turnover during last three years (2009-2011); turnover is more than 100 thousand LVL in 2009; equity capital is positive; during 2011 an enterprise was profitable. (Panākumi "Gazeles 2012" ceļ spārnos!) In author's view the quantitative criteria of 'continuous increase of turnover during last three years' should be identified. Moreover, author cannot

support the choice of turnover as criteria for high-growth enterprises as growth in turnover is less comparable across sectors.
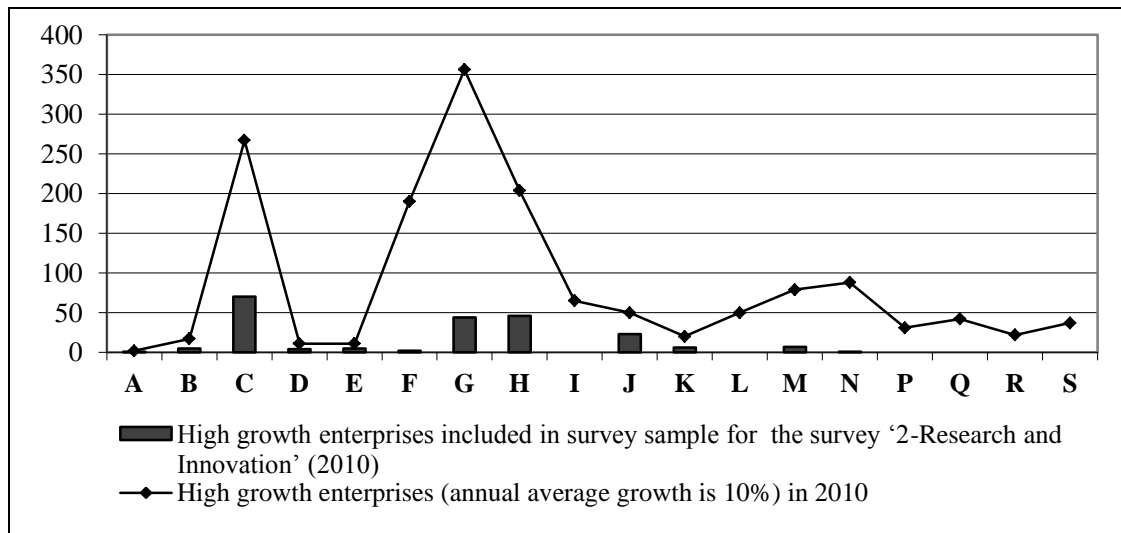
Table 4

Number of small and medium-sized enterprises with 10 to 249 employees, 2010

Enterprise types	All enterprises	Gazelles	High-growth enterprises	Other enterprises
GEO ＼ Year	2010	2010	2010	2010
Lithuania	10 820	432	112	10 276
Latvia	9 154	136	906	8 112
Finland	18 336	156	806	17 374
Italy	213 975	1 388	6 996	205 591

Source: Statistics Explained.

The existence of several different definitions cause misunderstanding of the essence of the term high-growth enterprises, the significant research should be made in order to define optimal criteria for identification of high-growth enterprises.

A number of important findings about high-growth enterprises have emerged from research presented at the 2009 ISBE Conference: 'a few rapidly growing firms generate a large share of all net new jobs (this is particularly marked in recessionary periods when these firms continue to grow); high-growth enterprises or Gazelles can be of all sizes; newness is a more important factor than size in terms of rapid growth; high-growth enterprises and Gazelles are found in all industries. They are not over-represented in high technology industries. If anything, they are over-represented in services' (Implication for policy).

Source: Author's calculations based on unpublished CSB data.

Fig. 3.**Number of high-growth enterprises in Latvia with annual average growth at least 10% and number of high-growth enterprises filled in the survey questionnaire '2-Research and Innovation' by main kind of economic activity (NACE Rev.2), 2010**
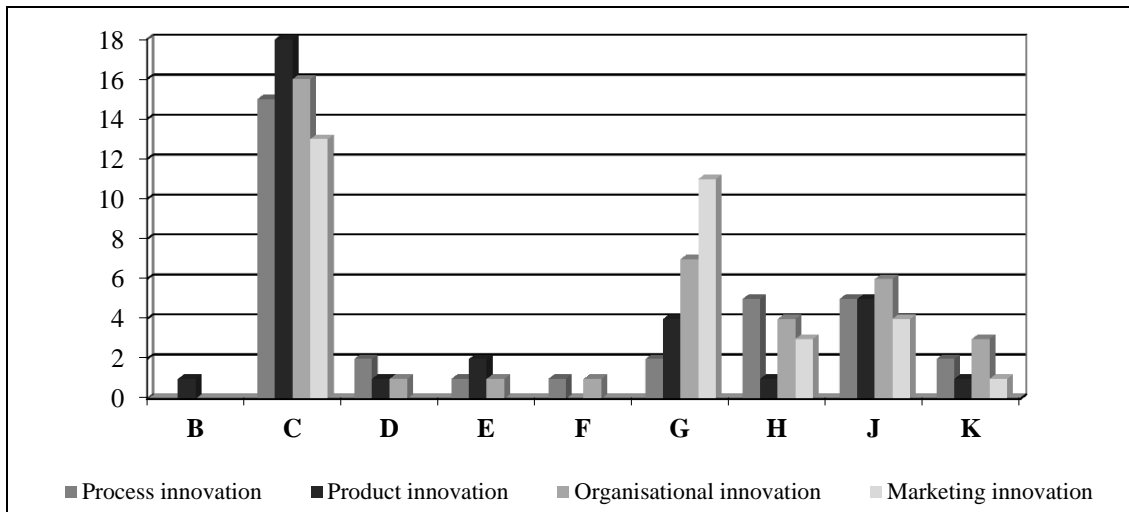
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In Latvia, high-growth enterprises represent a small percentage of the overall number of enterprises. The EU data show that in Latvia there is one of the smallest numbers of high-growth companies among the newly-established enterprises (see Table 4 – Gazelles and high-growth enterprises are calculated with accordance of OECD definition).

Author calculated number of high-growth enterprises according to the parameters of new methodology (minimum size of employees 10 employees, growth rate minimum threshold 10%). The results are presented in Fig. 3. Out of 1542 high-growth enterprises 214 enterprises were included in the survey sample for the survey '2-Research and Innovation' in 2010 that is only 13.9% of high-growth enterprises. In 2010 only 190 out of 214 high-growth enterprises submitted survey questionnaire '2-Research and Innovation'. Out of 190 enterprises responded to the survey, only 68 have introduced process or/and product or/and organisational or/and marketing innovations during the time period 2008-2010 (see Fig.4). We can conclude that Latvia should adjust the new principles of sampling methodology to assess the possibility of including the largest number of high-growth enterprises in the innovation survey sample.

Source: Author's calculations based on unpublished CSB data

Fig. 4. **Number of high-growth enterprises in Latvia with annual average growth at least 10% that according to '2-Research and Innovation' results introduced Product, Process, Organisational or Marketing innovations during 2008-2010 by main kind of economic activity (NACE Rev.2)**

Author has no fundamental objection to the new approach, but some more test should be made on the frequency of proposed marker (if the marker is calculated and published annually or every third year); who is responsible for calculation of proposed indicator and marker for each country; tests should be made with criteria of identifying high-growth enterprises for the marker calculation (employment in 10 and more employees and 10% threshold for annual average growth).

Conclusions, proposals, recommendations

1. According to statistical data, Latvia has the lowest R&D intensity in the EU (0.6% of GDP in 2010). For Latvia R&D growth is targeted at 1.5% of GDP for 2020; this is significantly lower than in

Estonia (3%). Even if Latvia will be able to achieve its goal in 1.5%, performance of Latvia will be far below not only the EU average but even below the rate of Lithuania and Estonia.

2. In Latvia the crisis caused a major fall in the number of all size classes except micro-sized enterprises, which grew until 2010 and then levelled off at a much higher level than before the crisis. The recent reforms, which made it easier and less expensive to found and run a micro company, have undoubtedly played an important role in a strong increase in the number of new micro enterprises.

3. The weight of sectors' labour productivity is too high in calculation of Sector-specific coefficient, but in practice sectors' labour productivity is not the result of innovation only but of other factors too. Total Factor Productivity would be a better measure of competitiveness, but the problem is that total factor productivity data at sectoral level does not exist. Applying the same sectoral coeficients to all countries seems to be in contradiction with "smart specialisation" – a country specialises where it has a comparative advantage.

4. In Latvia, high-growth enterprises represent a small percentage of the overall number of enterprises. The EU data show that in Latvia there is one of the smallest numbers of high-growth companies among the newly-established enterprises.

5. The mentioned definition of high-growth enterprises for the calculation of marker do not take into account the differences in growth rates between industries. It is important, however, to measure growth relative to industry peers. The recent research shows that the employment average varies greatly from sector to sector.

6. Author has no fundamental objection to the new approach, but some more test should be made on the frequency of proposed marker (if the marker is calculated and published annually or every third year); who is responsible for calculation of proposed indicator and marker for each country; tests should be made with employment in 10 and more employees and 10% threshold for annual average growth.

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