WORLD ECONOMY RESEARCH INSTITUTE

ROLE OF INNOVATIONS
IN THE INCREASING OF REGIONAL
COMPETITIVENESS IN LATVIA

I. Judrupa, I. Berzina

No 322

Warsaw 2014

CONTENTS

Introduction

For Latvia as an open economy country, the growth of economy and increase of social welfare depends on ability to create and sell goods and services in world market.

The leading economists of the world have a view that nowadays there is going on transition from postindustrial (knowledge based) economy to creative economy (Pinc D.H., 2006). The main motive force of knowledge based economy is innovative activity, which promotes the use of the newest science and technology achievements. Innovative activities promote the participation of professionally qualified experts in commercial activities and increasing demand of research work in universities and research institutions. The final results of innovation are products which are able to make competition in world market and services with high added value. Result provides important increase rate of gross domestic product, more work places for qualified specialists, which can promote economical growth, social welfare and country upgrowth (Latvian Technological Centre, 2012).

All enterprises, which are thinking about their development, must be innovative. But in real life the most of enterprises, especially SME, still do not understand, that it is necessary to develop effective system of innovative process management in the enterprise and that such system will give positive effects in the future. For understanding of innovation concept and to manage innovation process there must be established special department in the enterprise, which would evaluate each product, service and process using criterions of innovative actions to improve growth and competitiveness of the enterprise. This department would work out suggestions for improvement of enterprise's innovative activities.

The global economy becomes more dependent on knowledge, on growth of production effectiveness and ability of new products to meet the market requirements, on harmonized interaction of all components of innovation system: education – science – production – legislation – financing, as well as on many other factors, that can increase competitiveness of enterprise and can help them to be ready to the challenges in future.

Concept of innovation

Competitiveness of regions is often defined as high level of productivity. In advanced economies, productivity growth depends heavily on the ability to create higher value products and services, as well on as improving the efficiency of processes (Porter, 2001). For that reason it is obvious, that prosperity and competitiveness of region rest on capacity for

continuous innovation. Regions need to innovate to be able to produce competitive products and services. To understand the nature of innovations and to find out the best definition of innovations, which will be used to evaluate innovation factors in regional competitiveness, authors of the article summarized different definitions of innovations.

The academic literature contains a number of definitions of innovation, each revealing important aspects of it. Several authors emphasize newness, including anything perceived to be new by the people doing it or innovation as something different for each organization into which it is introduced, or as the generation, acceptance, and implementation of new ideas, processes, products or services in an applied setting. Some see it as early adoption of a new idea, others as synonymous with creativity, still others as the same thing as improvements, and a final group as substantive but not revolutionary changes (Glor E., 1999).

The term "innovation" first was mentioned by Joseph Shumpeter in his work *"Business cycles"*. Here innovation is explained as possibility to work differently in the kingdom of economy J.Shumpeter hold a view that innovation is:

- creation of something new that is unknown to consumers or making any goods in other quality;

- yet unknown producing methods in the definite industry, the base of which is not always new scientific findings, but appropriate use of the product or new kind of commerce;

- adaptation of new markets – markets that up to now were not represented in production in the country;

- new suppliers of semi-finished products or raw materials;

- when appropriate reorganizations have been made, for example, providing conditions for monopoly or threatening of monopoly conditions of other firms (Shumpeter J., 2007).

J.Shumpeter also said, that innovation is ideas applied successfully in practice and he identified as areas where innovations can be applied the introduction of new goods, new methods of production, the opening of new markets, the conquest of new sources of supply and the carrying out of a new organization of any industry (Howlett R.J., 2010).

Innovation, according to Regis Cabral, for a particular network is a new element introduced in the network which changes, even if momentarily, the costs of transactions between at least two actors, elements or nodes, in the network (Cabral R., 1998).

There are also many other authors that have defined innovation:

- The three stages in the process of innovation: invention, translation and commercialization (Bruce D. Merrifield);

- The ability to deliver new value to a customer (Jose Campos);

- Innovation is the way of transforming the resources of an enterprise through the creativity of people into new resources and wealth (Paul Schumann);

- Innovation does not relate just to a new product that would come into the marketplace. Innovation can occur in processes and approaches to the marketplace (David Schmittlen) [Innovation Zen, 2006].

The UK government in the *White Paper Innovation Nation* defines innovation as:

The successful exploitation of new ideas. "New" in this context can be new to the sector or the organization, taking an idea from one context and adapting it to another (National Audit Office, 2009).

In the *Latvia National innovation program 2003-2006* and also in the *Program of business competitiveness and innovation promoting 2007-2013* there is the following definition of innovation:

Innovation is the process in which new scientific, technical, social, cultural or other ideas, elaborations and technologies are realized in the competitive product or service, which is in demand at market (Nacionālā inovāciju programma 2003-2006, Komercdarbības konkurētspējas un inovācijas veicināšanas programma 2007-2013).

OECD/Eurostat definition of innovation contains 4 types of innovation identified in the Oslo Manual for measuring innovation:

- Product innovation involves a good or service that is new or significantly improved. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. In the education sector, a product innovation can be a new or significantly improved curriculum, a new educational software, etc.;

- Process innovation involves a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. In education, this can for example be a new or significantly improved pedagogy;

- Marketing innovation involves a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. In education, this can for example be a new way of pricing the education service or a new admission strategy;

- Organizational innovation involves introducing a new organizational method in the firm's business practices, workplace organization or external relations. In education, this can for

example be a new way organization of work between teachers, or organizational changes in the administrative area (OECD, 2007).

In the European Commission research *Innovation Management and the Knowledge-Driven Economy* there are also summarized some definitions of innovation. Innovation is:

- a process, more specifically a problem-solving process (Dosi G., 1982);

- a process occurring primarily within commercial firms, where the role of government agencies or public laboratories is to a certain extent secondary;

- an interactive process involving relationships between firms with different actors (Kline S.J., Rosenberg N.,1986). These relationships are both formal and informal and position firms within commercial networks;

- a diversified learning process. Learning may arise from different issues: learning-by-using, learning-by-doing or learning-by-sharing (Rosenberg N., 1982), internal or external sources of knowledge (Dogson M., 1992) and the absorption capacity of firms (Cohen W.M., Levinthal D.A.,1990);

- a process involving the exchange of codified and tacit knowledge (Patel P., Pavitt K., 1994);

- an interactive process of learning and exchange where interdependence between actors generates an innovative system or an innovation cluster (European Commission, 2004).

Innovation as defined by the *European Commission* is:

> The renewal and enlargement of the range of products and services and the associated markets; the establishment of new methods of production, supply and distribution; the introduction of changes in management, work organization, and the working conditions and skills of the workforce (European Commission. 2005).

There are also other formulations of innovation:

- innovation is improvement of products and services, at the same time expanding their market share;

- innovation is introduction of new producing, delivery and distribution methods;

- innovation is increasing of enterprise management, work organization, working conditions and level of labor professionalism;

- innovation is new way of thinking about business development forms and how successfully commercialize new ideas and introduce new technologies;

- innovation is driving force of society (Derksen U., 2011).

So in every explanation or definition of innovation the word "innovation" is used to describe process or activity in the result of which needs of society for new products or services are satisfied, and in which all intellectual potential of the country is involved, in such way providing continuous interaction during all the process: education – professional training – science – research – producing and its organization – market research and realization of the finished products.

There is difference between traditional and modern approach to innovation conception. The traditional idea is that innovation is based on research (theory of "speeding-up" technologies) and interaction between enterprises and other market participants. But nowadays there is the innovation theory of social cooperation net, where the main role is given to the knowledge and skills to put them into practice to promote innovation (Derksen U., 2011).
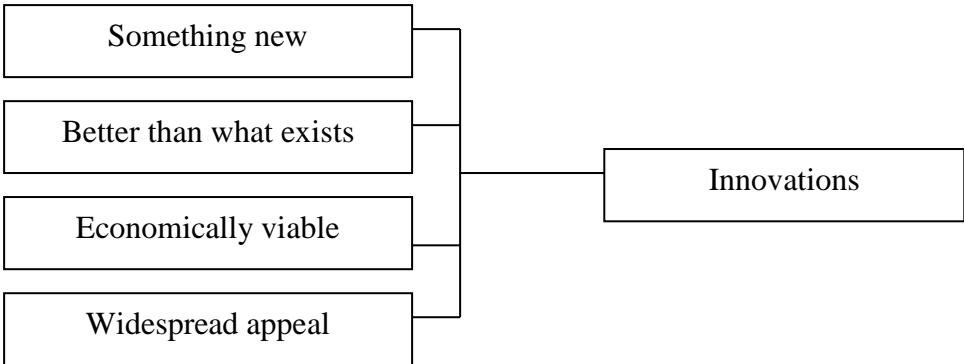
The term innovation has been defined in many different ways. The authors of the article agree with Amidon D.M., that all these definitions can be broadly classified in two categories:

1) those that see innovation as the final event - the idea, practice, or material artifact that has been invented or that is regarded as novel independent of its adoption;

2) those who see innovation as a process which proceeds from the conceptualization of a new idea to a solution of the problem and then to the actual utilization of a new item of economic or social value (Amidon D.M., 1995) .

In all cases here are four essential ingredients to a definition of innovation (Fig.1).

Figure 1. Approaches to define innovations
  [made by author after (Reavis D., 2009)]

Innovation is the lifeblood of any organization. It is therefore important that we have a good working innovation definition. Innovation can apply to many things. It is usually the term applied to a new product (something new or better than what exists), but it can also be

used to describe new processes, methods or inventions, that are economically viable or widespread appeal.

In this article innovation is not a word that characterizes some definite object, thing, activity or service, but it is a word, that characterizes conception. This conception includes all activities that must be done to create, produce and realize new product or service in the market. Innovation includes also all activities in the society starting with education, then comes scientific research, protection of intellectual property, organization of production, market research and realization of production in the market. We must also put attention to the activities related with putting in order the business environment and creating of innovation promotion structures.

Prosperity of the regions depends upon the productivity with which region uses labor and capital to produce goods and services, whereas productivity rises because of innovation. Sustained economic growth will require continued innovation at all levels of economy (Porter, 2001).

Innovations in the regional competitiveness models

Innovation is a very important aspect of competitiveness. If the enterprise is innovative, it will be competitive. If it is competitive, it will produce more and it will be able to allocate more finances to develop new innovations (Berzina I., 2011). E.Helander in her definition of regional competitiveness said, that competitiveness of region depends on its ability to create innovative products (Helander E., 2003).

Scientists B.Gardiner, R.Martin and P.Tyler from Cambridge University were worked out the model of regional competitiveness, in which the factors influencing regional competitiveness are divided into 3 levels: sources of competitiveness, revealed competitiveness and target outcomes – quality of life on which regional competitiveness depends (Fig.2.).

Figure 2. The Pyramid model of regional competitiveness (Gardiner B., Martin R., Tyler P., 2004)
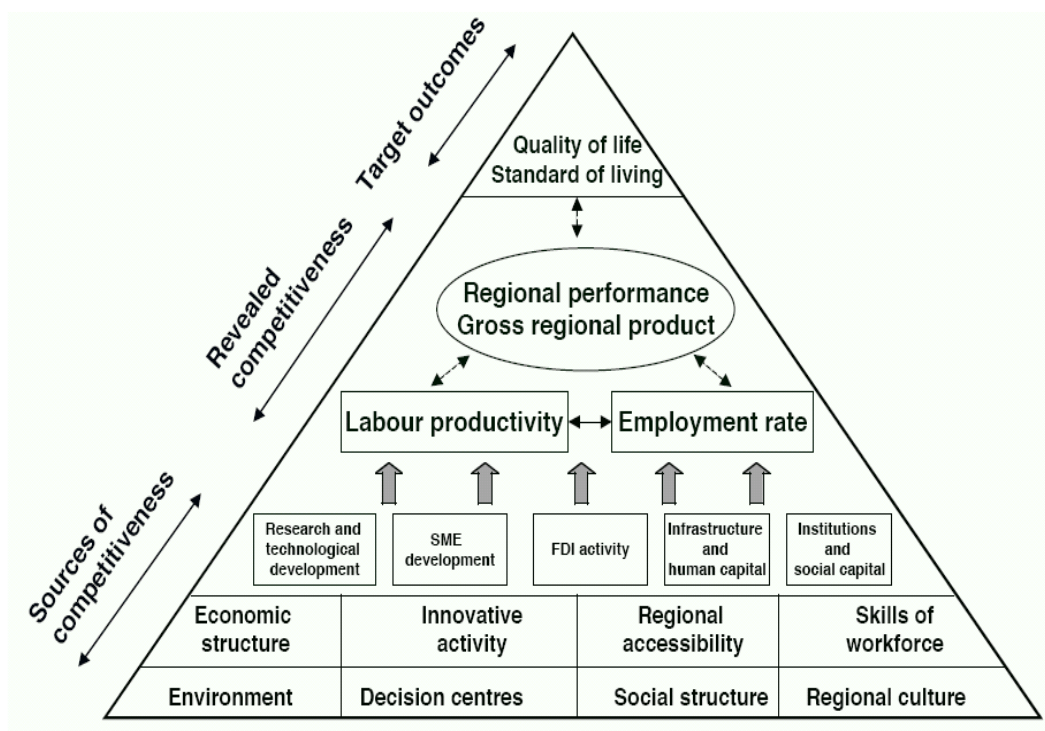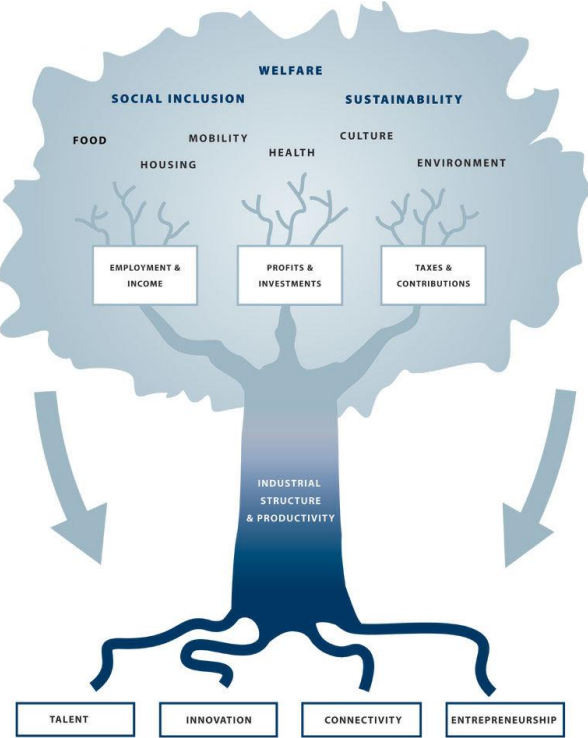

Figure 2 suggests that in a regional context labor productivity is the outcome of a variety of determinants (including the sort of regional assets alluded to above). Many of these regional factors and assets also determine a region's overall employment rate. Together, productivity and the employment rate are measures of what might be termed revealed competitiveness, and both are central components of a region's economic performance and its prosperity (as measured say by GDP per head), though obviously of themselves tell us little about the underlying regional attributes (sources of competitiveness) on which they depend. It is possible to see, that innovative activity is the source of competitiveness.

The scientists group *ECORYS* offers new model of regional competitiveness – Competitiveness Tree Model. This model was developed in order to illustrate how the complex factors that influence competitiveness are related to positive outcomes such as social inclusion, welfare and sustainability.

Figure 3. Competitiveness tree model (Ecorys, 2004)

In the Figure 3 it is also possible to see, that innovations are the source of regional competitiveness. The organic nature of the tree emphasizes the cyclical character of the concept of competitiveness. The quality of the soil and effective functioning of the system of roots, trunk and branches determine the strength of the tree and the capacity to bear fruit. This is a dynamic process as the fertility of the soil is determined partly by the extent to which it is revitalized by fruit from the tree.

On the basis of the research, which was done by the author, the regional competitiveness model was worked out (Fig.4.).

Fig.4. The Regional Competitiveness Influencing Factors
[made by authors]

The regional competitiveness is mainly influenced by the quality of life, productivity and employment rate in the region. While these factors are dependent on the regional competitiveness influencing internal factors, that is the interaction result of human resources, social sphere, culture, sport, infrastructure, research, innovation and production development. Likewise the external factors, that are the state political stability, developed strategies, state's participation in different international organizations, state unions etc., have significant role in the evaluation of the regional competitiveness. The regional competitiveness can also be significantly influenced by accidental events – natural disasters (floods, storms, earthquakes) etc. But the aim of the research is to evaluate only internal factors of regional competitveness.

After analysis of factors and indicators used to characterize competitiveness it is possible to conclude, that "innovation" is included as one of the most important factors in the evaluation of regional competitiveness. Higher levels of innovation output lead to higher levels of prosperity and competitiveness of the region.

In the following part of article it will be possible to see calculation of Regional Competitiveness Index for regions of Latvia. To evaluate role of innovations in increasing region's competitiveness, one of the subindexes - Innovation Subindex will be calculated and analyzed.

Regional Competitiveness Index (RCI) calculation methodology for regions of Latvia

For the evaluation of importance of the regional competitiveness influencing factors the method of the factor paired comparison will be applied, which by its nature is to be applied as an expert method, and it can be successfully used at evaluating the situation in the regions. The factor relative scales were defined by surveying 8 experts of the economy and regional development field and the obtained results are shown in Table 1.

Table 1. Relative Scales of Subindexes of the Regional Competitiveness Index (RCI)
[made by authors after the experts' evaluations and the author's calculations]

Subindex	Relative scale
F_C- subindex of human resources	0,10
F_S- subindex of social sphere	0,09
F_{IZ}- subindex of education sector	0,13
F_K- subindex of culture sector	0,03
F_V- subindex of health care	0,09
F_P- subindex of accessibility	0,16
F_{IN}- subindex of innovation sector	0,10
F_R- subindex of economy and production	0,16
F_D- subindex of natural resources	0,06
F_E- subindex of ecology sector	0,08

In Table 1 it can be seen that the most significant factors influencing the regional competitiveness with the highest scale 0,16, according to the experts are accessibility and the development of economy and production. The second important aspect is education with the relative scale 0,13. Innovations take only the 3rd place with relative weight 0,10 (together with human resources).

The Regional Competitiveness Index for the author's developed regional competitiveness model with 10 competitiveness influencing factor groups is expressed by Formula 1:

$$RCI = (\alpha_1 F_C + \alpha_2 F_S + \alpha_3 F_{IZ} + \alpha_4 F_K + \alpha_5 F_V + \alpha_6 F_P + \alpha_7 F_{IN} + \alpha_8 F_R + \alpha_9 F_D + \alpha_{10} F_E) \rightarrow 1,$$

$$(1)$$

where: RCI – the Regional Competitiveness Index;
        $\alpha_{1...}\alpha_n$- the relative scales of the factors;
        F_C- subindex of human resources;
        F_S- subindex of social sphere;
        F_{IZ}- subindex of education sector;
        F_K- subindex of culture sector;
        F_V- subindex of health care;
        F_P- subindex of accessibility;
        F_{IN}- subindex of innovation sector;
        F_R- subindex of economy and production;

F_D- subindex of natural resources;
F_E- subindex of ecology sector

In Formula 1 the Regional Competitiveness Index tends to 1 as for the data normalization the min-max normalization [-1;1] was applied meaning that the maximum value that the Regional Competitiveness Index can reach is 1.

The subindex F_n of each factor group is calculated by taking into account the characterizing indicators of the group, applying the above mentioned min-max normalization [-1;1]. In order to maintain the value of the index in the interval from -1 to 1 the arithmetic average of certain factor group influencing indicators is calculated.

$$F_n = \frac{1}{N}\left((2*\frac{f_1 - f_{min_1}}{f_{max_1} - f_{min_1}} - 1) + (2*\frac{f_2 - f_{min_2}}{f_{max_2} - f_{min_2}} - 1) + ... + (2*\frac{f_n - f_{min_n}}{f_{max_n} - f_{min_n}} - 1) \right), \qquad (2)$$

where: F_n- subindex of the regional competitiveness influencing factors;
$f_1...f_n$ - the real values of the factor characterizing indicators;
f_{min}, f_{max} - the minimum and maximum values of the factor characterizing indicators;
N – the number of the factor characterizing indicators.

For calculating the RCI, first the subindexes F_n of each factor group will be calculated. For the evaluation of the competitiveness level the RCI criteria shown in Table 2 will be used.

Table 2. The RCI Criteria for Evaluation of the Regional Competitiveness Level
[made by authors]

RCI values	Competitiveness level
-1 – -0,61	Low (L)
-0,6 – -0,21	Below average (BA)
-0,2 – 0,19	Average (A)
0,2 – 0,59	Above average (AA)
0,6-1	High (H)

In the analysis of the competitiveness level it is very important which of the competitiveness level influencing indicators is competitiveness facilitating or on the contrary hinders the increase of the competitiveness level in the region. In order to determine whether the indicator is competitiveness facilitating or hindering both its development tendencies (whether the situation in the region improves or declines) and the region's place among other regions according to the specific indicator have to be defined. In order to evaluate this, the F_n value of a specific region was compared to the average value 0 and the average growth rate of each indicator of the selected time period was calculated by using Formula 3:

$$T_n = \frac{1}{n}\left(\frac{f_1 - f_0}{f_0} + \frac{f_2 - f_1}{f_1} + ... + \frac{f_n - f_{n-1}}{f_{n-1}} \right),$$

(3)

14

where: T_n- the growth rate of the specific factor;
f_n- the real value of the factor characterizing indicators in the current year;
f_{n-1}- the real value of the factor characterizing indicators in the previous year;
n – number of years;

For the basis of development of the matrix for competitiveness level and indicator growth rate the matrix of "The Market Share / Growth Rate" developed by the scientists of the Boston Group was used, which for defining the regional competitiveness is shown in Figure 5.

Fig.5. Matrix of the Competitiveness Influencing Factors for the Planning Regions
[made by authors]

Competitiveness level	COMPETITIVENESS **POTENTIALLY HINDERING** FACTOR	1 COMPETITIVENESS **CURRENTLY ENSURING** FACTOR
	-∞ COMPETITIVENESS **CURRENTLY DECREASING** FACTOR	0 +∞ COMPETITIVENESS **POTENTIALLY FACILITATING** FACTOR -1

Growth rate

Considering the historical division 4 planning regions were made in Latvia: Kurzeme region, Latgale region, Vidzeme region and Zemgale region, but as the 5th planning region Riga region was established. Such planning regions were established for the planning and coordination of regional development and ensuring of cooperation among local governments in Latvia.

In Picture 5 it can be seen that ***competitiveness currently ensuring*** are those factors that have been with a positive growth and have ensured the region's indicator above the average competitiveness level.

Competitiveness currently decreasing are those factors that showed a negative growth and determined the region's ranking below the average competitiveness level.

If the competitiveness influencing factor in the planning region is above the average compared to other regions but its development tendency is negative then in future if this tendency continues to be the same the region can become incompetitive. Such factors are ***competitiveness potentially hindering***.
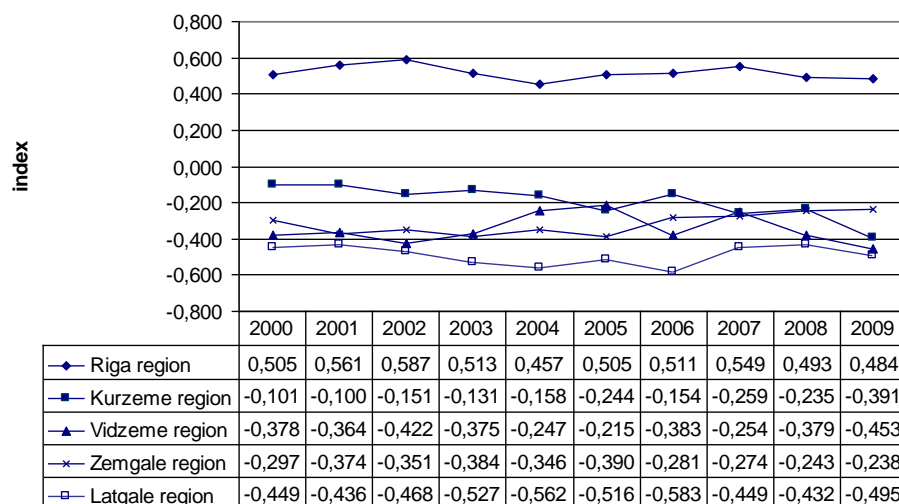
If the competitiveness influencing indicator is comparatively low (below the average level) but with a tendency to improve then in future if this tendency persists the given factor

15

can become competitiveness facilitating. Such factors are ***competitiveness potentially facilitating***.

Calculation and analysis of Regional Competitiveness Index (RCI)

After calculation of the competitiveness index of each factor it is possible to define also the overall competitiveness index RCI for each planning region. Using formula for index calculation (Formula 1) and factor scales set by the experts (Table 1) the Regional Competitiveness Index will be calculated for all planning regions in Latvia. The obtained results are shown in Figure 6.

Fig.6. Regional Competitiveness Index RCI in the Planning Regions
[authors' calculations]

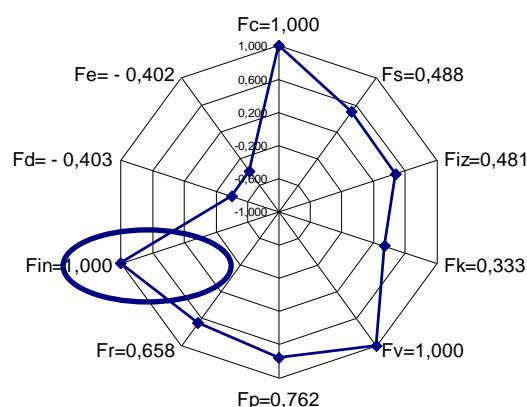|	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Riga region	0,505	0,561	0,587	0,513	0,457	0,505	0,511	0,549	0,493	0,484
Kurzeme region	-0,101	-0,100	-0,151	-0,131	-0,158	-0,244	-0,154	-0,259	-0,235	-0,391
Vidzeme region	-0,378	-0,364	-0,422	-0,375	-0,247	-0,215	-0,383	-0,254	-0,379	-0,453
Zemgale region	-0,297	-0,374	-0,351	-0,384	-0,346	-0,390	-0,281	-0,274	-0,243	-0,238
Latgale region	-0,449	-0,436	-0,468	-0,527	-0,562	-0,516	-0,583	-0,449	-0,432	-0,495

From Figure 6 it can be seen that the most competitive is Riga planning region, which RCI in 2009 was 0,484. The indicator of Riga region significantly differs from the rest planning regions. The regional competitiveness comparing years 2009 and 2000 has slightly increased only in Zemgale planning region. However we can not talk of significant increase of differences between Riga and other planning regions.

However the analysis of the RCI subindexes reveals that each planning region has both competitiveness facilitating and competitiveness hindering factors. To see, which are the most competitive areas of each region, the average competitiveness level evaluated by RCI will be presented, and values of Innovation Subindex will be pointed out.

The average competitiveness level of **Riga planning region** in the period 2000-2009 by the RCI subindexes is shown in Figure 7.

Fig.7. Average Competitiveness Level of Riga Planning Region by the RCI Subindexes in 2000-2009
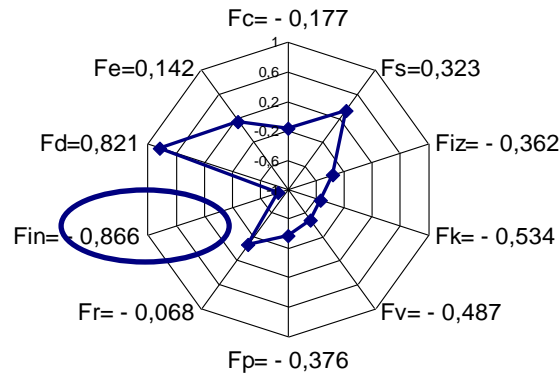
[the author's calculations]

From Figure 7 it can be seen that Riga region has high competitiveness level in sectors of human resources, health, accessibility, economy and research and innovations. In sectors of social sphere, education and culture the competitiveness of Riga region is above the average level, but in sectors of natural resources and ecology the competitiveness level is below average.

The average competitiveness level of **Kurzeme planning region** in the period 2000-2009 by the RCI subindexes is shown in Figure 8.

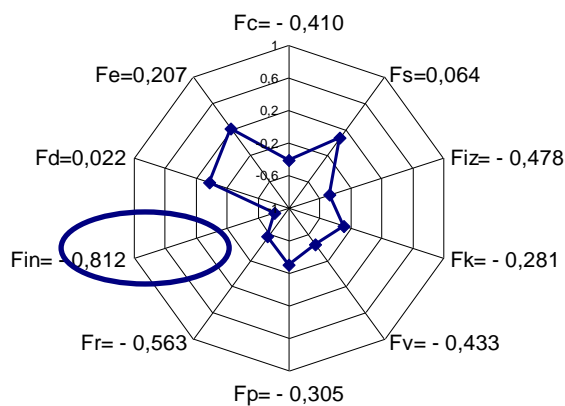**Fig.8. Average Competitiveness Level of Kurzeme Planning Region**
by the RCI Subindexes in 2000-2009

From Figure 8 it can be seen that Kurzeme region has high competitiveness level in the natural resource sector, as well as the competitiveness level is above the average in the social sphere sector. In sectors of education, culture, health and accessibility the competitiveness level in Kurzeme region is below the average level. In the economy and ecology sector the competitiveness level in Kurzeme region is average, but the competitiveness is low in the innovation sector.

The average competitiveness level of *Vidzeme planning region* in the period 2000-2009 by the RCI subindexes is shown in Figure 9.

Fig.9. Average Competitiveness Level of Vidzeme Planning Region
by the RCI Subindexes in 2000-2009

From Figure 9 it can be concluded that Vidzeme planning region has high competitiveness level in none of the sectors. Only in the ecology sector the competitiveness level is slightly above the average. There is an average competitiveness level in the sectors of natural resources and social sphere, but mostly the competitiveness level of Vidzeme planning region is below the average – in sectors of education, culture, health, accessibility, economy. The competitiveness level in the innovation sector can be noted as distinctly low.

The average competitiveness level of Zemgale planning region in the period 2000-2009 by the RCI subindexes is shown in Figure 10.

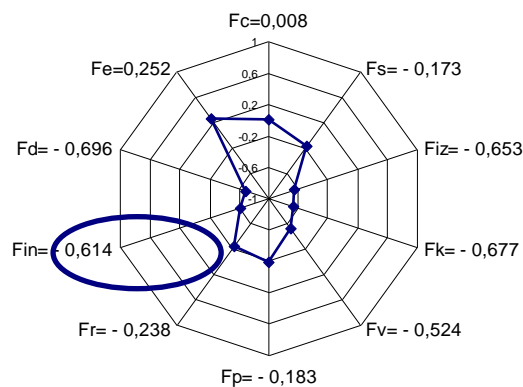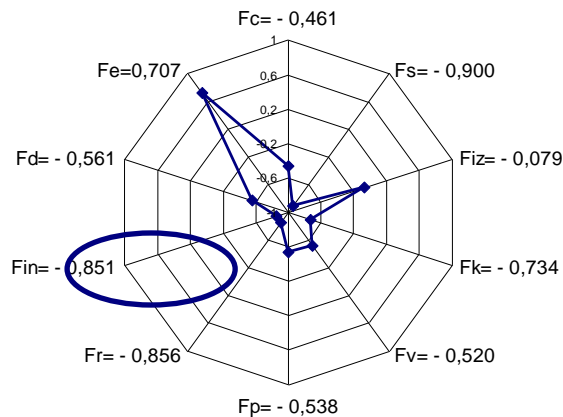**Fig.10. Average Competitiveness Level of Zemgale Planning Region by the RCI Subindexes in 2000-2009**
[the author's calculations]

Also in Zemgale planning region there is no sphere with a high competitiveness level. The only sector with a competitiveness level above the average is ecology. In part of indicators (human resources, social sphere, accessibility) the competitiveness level of Zemgale planning region is average, but in the economy sector it is slightly below the average. In four indicators Zemgale region has a low competitiveness level – education, culture, innovation and existence of natural resources.

The average competitiveness level of Latgale planning region in the period 2000-2009 by the RCI subindexes is shown in Figure 11.

Fig.11. Average Competitiveness Level of Latgale Planning Region
by the RCI Subindexes in 2000-2009
[the author's calculations]

Latgale planning region stands out with one competitive sector – ecology, which competitiveness level is high. It can be of course explained by the comparative backwardness of economic development. As one of the competitive sectors of Latgale region the education level of people can also be noted, in this sector the competitiveness level of Latgale region is average. In other sectors the competitiveness of Latgale planning region is below the average including the low competitiveness level in sectors of social sphere, culture, economy and innovation. However also Latgale region has its own competitiveness facilitating factors.

In Latvia only 20% of enterprises are involved into innovative activities. The financing from state budget for science and research is less than in developed EU countries. One of the essential problems in the development of innovations in Latvia is insufficient cooperation between entrepreneurs and scientists. The businessmen in Latvia have a lack of information about possible cooperation with scientists and introduction of innovative products. Most of scientists, in their turn, make fundamental researches, which promote their academic career, not promote development of innovative products. There have been worked out various documents and action plans in Latvia, but the practical realization of them is weak and situation improves very slowly. (Derksen U., 2011)

In innovation sphere only Riga region performs high result. To find out main reasons for this, the calculation process and analysis of Innovation Subindex was done.
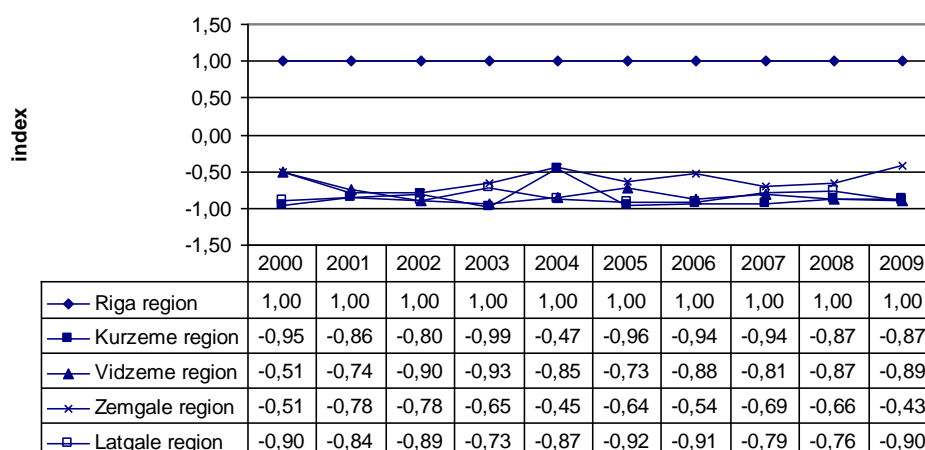
Calculation of Innovation Subindex

To characterize innovation in the authors' made regional competitiveness model (Fig.4.), the following indicators were selected:

1. Proportion of enterprises performing research among active enterprises in the region, %

2. Proportion of employees in enterprises performing research of the total number of workers in the region, %

3. Total expenditure for research, thousand LVL.

These indicators do not include such famous parameters like level of education, number of graduates, availability of computers or internet, because those indicators characterize other spheres of regional competitiveness – education and accessibility. But such indicators like number of patents, export of innovative products are not included, because of lack of statistics at regional level.

The Subindex of Innovation Sector is shown in Figure 12.

Fig.12. Subindex of Innovation Sector F_{IN} in the Planning Regions
[authors' calculations]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Riga region	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Kurzeme region	-0,95	-0,86	-0,80	-0,99	-0,47	-0,96	-0,94	-0,94	-0,87	-0,87
Vidzeme region	-0,51	-0,74	-0,90	-0,93	-0,85	-0,73	-0,88	-0,81	-0,87	-0,89
Zemgale region	-0,51	-0,78	-0,78	-0,65	-0,45	-0,64	-0,54	-0,69	-0,66	-0,43
Latgale region	-0,90	-0,84	-0,89	-0,73	-0,87	-0,92	-0,91	-0,79	-0,76	-0,90

In the innovation sector Riga region is convincingly the most competitive that ranked the first place in all indicators characterizing the innovation sector, thus in all years the innovation index for Riga region was the maximum possible. The indicators of other planning regions significantly lag behind Riga region. By analyzing the Innovation Subindex of the planning regions in dynamics it can be concluded that the Innovation Subindex does

not have an expressed tendency to increase or decrease. It shows that in the innovation sector there is no significant increase or decrease of differences between the regions.

The competitiveness level of regions in innovation sphere is obviously seen in the Table 3.
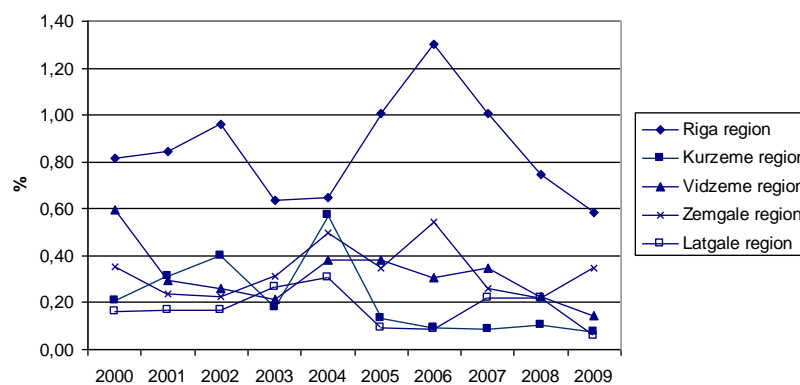
Table 3. Competitiveness level of planning regions of Latvia in innovation sphere
[made by authors]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Riga region	H	H	H	H	H	H	H	H	H	H
Kurzeme region	L	L	L	L	BA	L	L	L	L	L
Vidzeme region	BA	L	L	L	L	L	L	L	L	L
Zemgale region	BA	L	L	L	BA	L	BA	L	L	BA
Latgale region	L	L	L	L	L	L	L	L	L	L

From the Table 3 it is possible to conclude, that there are real difference between Riga planning region and others. Competitiveness level of Riga region is high (H), but in other planning regions it is low (L). To understand why it is so, all 3 indicators in each planning region of Latvia will be analysed.

One of the main indicators used to characterize innovations and research in planning regions is proportion of enterprises performing research among active enterprises in the region (Fig.13.)

Fig.13. Proportion of enterprises performing research among active enterprises
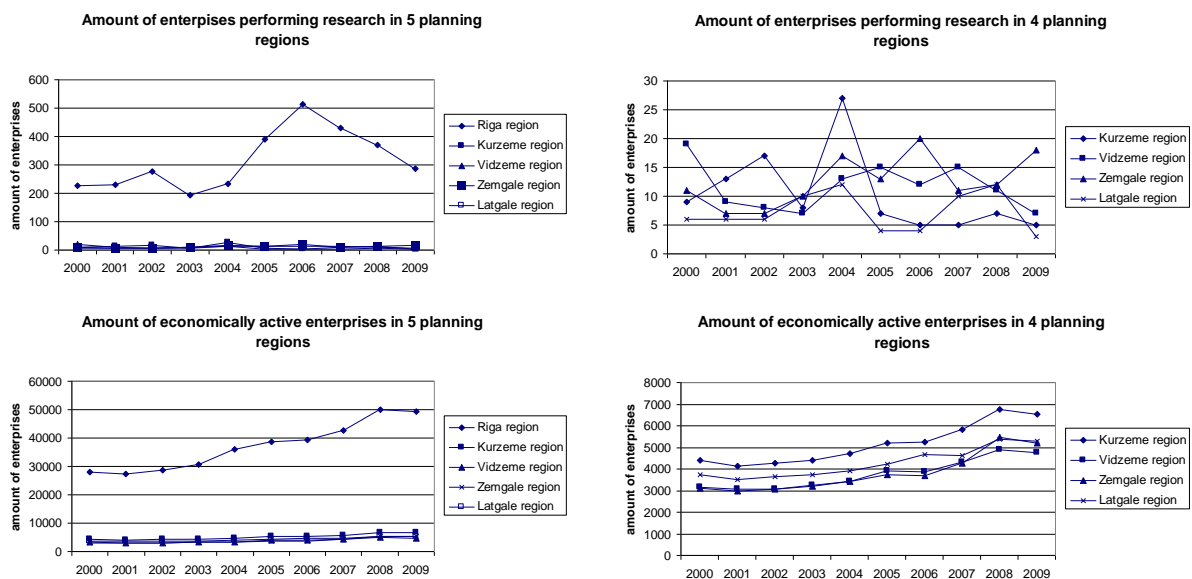[made by authors after Central Statistical Bureau data]

From Figure 13 it is possible to see that the biggest proportion of enterprises performing research among active enterprises was in the Riga region, where in 2009 such enterprises were 0,6% from all economically active enterprises. But the less (0,06%) proportion of enterprises performing research was in Latgale region. This indicator shows big difference

between Riga region and other planning regions of Latvia. However, in 2007 also in Riga region there was decrease of proportion of enterprises performing research among active enterpises.

Because this is relative indicator, it is necessary to evaluate which factor was more important -amount of enterprises performing research or amount of economically active enterprises in total. Trend of those indicators in planning regions of Latvia is shown in Figure 14. Because values of Riga region indicator are considerably higher than values of other regions indicators, to analyze trend in all planning regions, amount of innovative enterprises and economically active enterprises is shown in all 5 planning regions and also separately for 4 planning regions of Latvia.

Fig.14. Amount of enterprises performing research and economically active enterprises in planning regions of Latvia
[made by authors after Central Statistical Bureau data]

Amount of economically active enterprises in all planning regions every year, except 2009, is increasing. Amount of enterprises performing research varies by every year, but the main trend, except Kurzeme region, is positive. So it is possible to conclude that main factor affecting proportion of enterprises performing research among active enterprises is directly amount of enterprises performing research. Increase of total amount of economically active enterprises has lesser role. To define more precisely the main affecting indicator the correlation analysis of the above mentioned factors was made (Table 4).

Table 4.Correlation of indicators affecting proportion of enterprises performing research among active enterprises
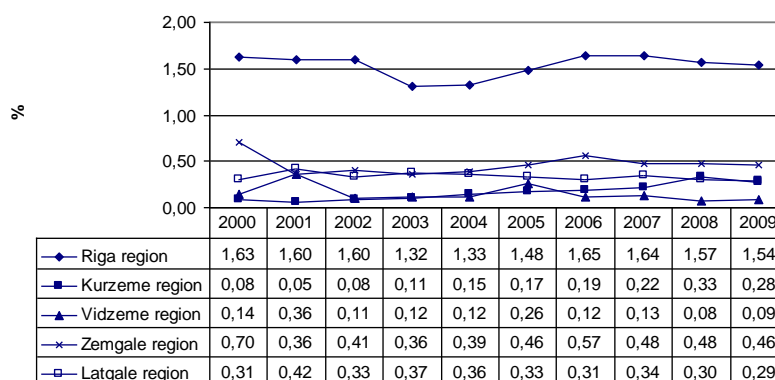
[authors' calculations]

	Amount of enterprises performing research	Amount of economically active enterprises
Riga region	**0,77975**	-0,0815
Kurzeme region	**0,988989**	-0,60974
Vidzeme region	**0,910729**	-0,4242
Zemgale region	**0,830284**	-0,15521
Latgale region	**0,935138**	-0,32378

From Table 4 it is possible to see that the conclusion, that the main factor affecting proportion of enterprises performing research among active enterprises is directly amount of enterprises performing research, is true. To achieve higher value of the selected indicator, and in this case higher level of competitiveness, in future researches it is necessary to analyze why exactly amount of enterprises performing research differs among regions, what are main reasons, why amount of such enterprises is relatively low in all regions, except Riga region.

Competitiveness of innovation sphere is also characterized by proportion of employees in enterprises performing research of the total number of workers (15-74 years old) in the region (Figure 15).

Fig.15. Proportion of employees in enterprises performing research of the total number of workers in the region

[made by authors after Central Statistical Bureau data]

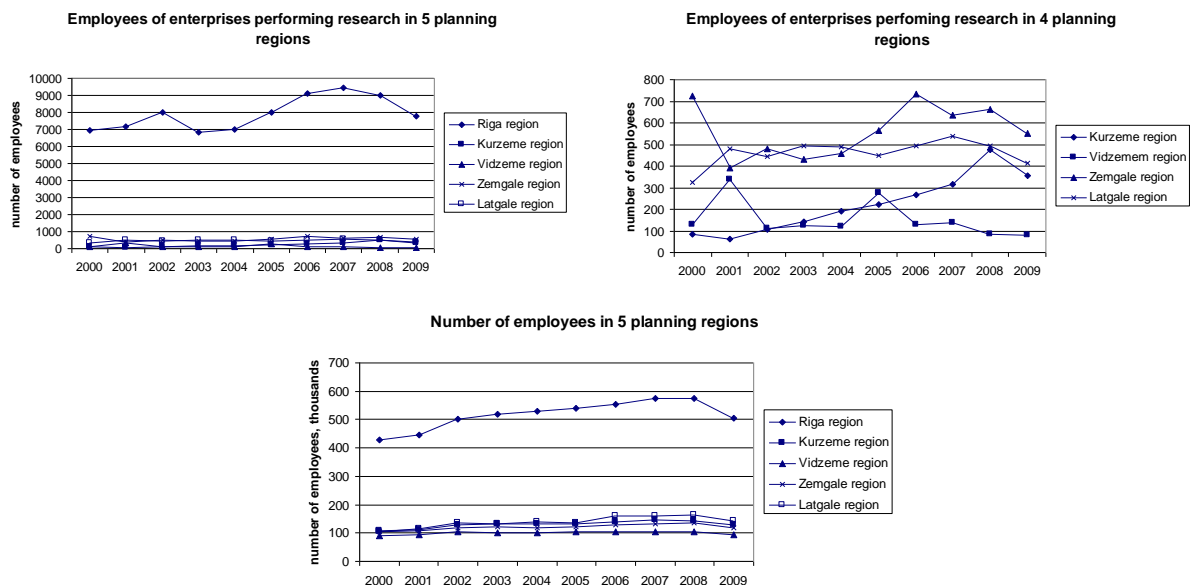|	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Riga region	1,63	1,60	1,60	1,32	1,33	1,48	1,65	1,64	1,57	1,54
Kurzeme region	0,08	0,05	0,08	0,11	0,15	0,17	0,19	0,22	0,33	0,28
Vidzeme region	0,14	0,36	0,11	0,12	0,12	0,26	0,12	0,13	0,08	0,09
Zemgale region	0,70	0,36	0,41	0,36	0,39	0,46	0,57	0,48	0,48	0,46
Latgale region	0,31	0,42	0,33	0,37	0,36	0,33	0,31	0,34	0,30	0,29

From Figure 15 it is possible to see, that in this sphere the most competitive region is Riga region, where the most number of employees are working in the research area. In 2009 in enterprises performing research of Riga region worked 1,54% of workers. The value of this indicator is also considerably higher than in other regions. The last place in 2006-2009 took

Vidzeme region, where less than 0,15% of employees worked in the enterprises performing research.

Likewise the previous indicator, proportion of employees in enterprises performing research of the total number of workers also depends on number of employees in enterprises performing research, as well as on total number of 15-74 years old employees (Figure 16).

Fig.16. Number of employees in planning regions of Latvia
[made by authors after Central Statistical Bureau data]

From Figure 16 it is possible to see that the most competitive region in this area is Riga region. And again values of these indicators are considerably higher than values of indicators of other regions. In Riga planning region there are 8000 employees of enterprises performing research at an average, but in other planning regions values of this indicator is lower than 800 employees. The second and the third places took Latgale and Zemgale regions, but in the last place there is Vidzeme region.

After analyzis of total number of employees it is possible to conclude, that it increased in all planning regions during years 2000-2008, and it would not be the determinative to have an effect on proportion of employees in enterprises performing research of the total number of workers.

However, to evaluate the main affecting factor, the correlation analysis of the above mentioned factors was made (Table 5).

Table 5. Correlation of indicators affecting proportion of employees in enterprises performing research of the total number of workers
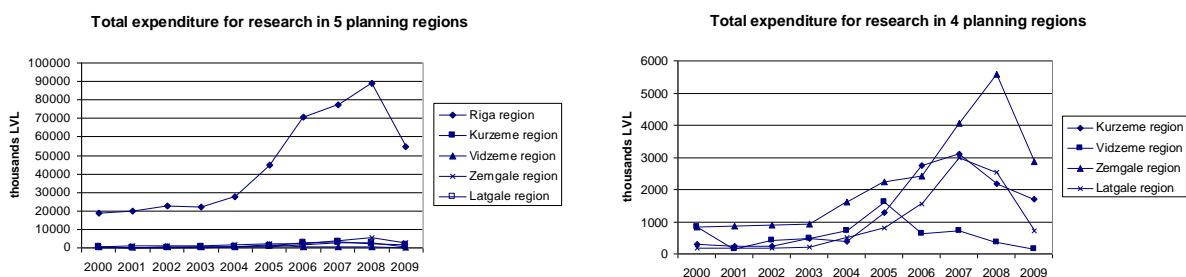
[authors' calculations]

	Employees of enterprises performing research	Total number of employees
Riga region	**0,572625**	-0,11587
Kurzeme region	**0,994618**	0686966
Vidzeme region	**0,993968**	-0,2866
Zemgale region	**0,891865**	-0,1246
Latgale region	0,38733	**-0,40032**

From Table 5 it is possible to conclude, that the main factor affecting proportion of employees in enterprises performing research of the total number of workers, except Latgale region, is employees of enterprises performing research. Total number of employees has no so big effect on the selected indicator.

The third indicator to characterize innovation sphere is total expenditure for research (Figure 17).

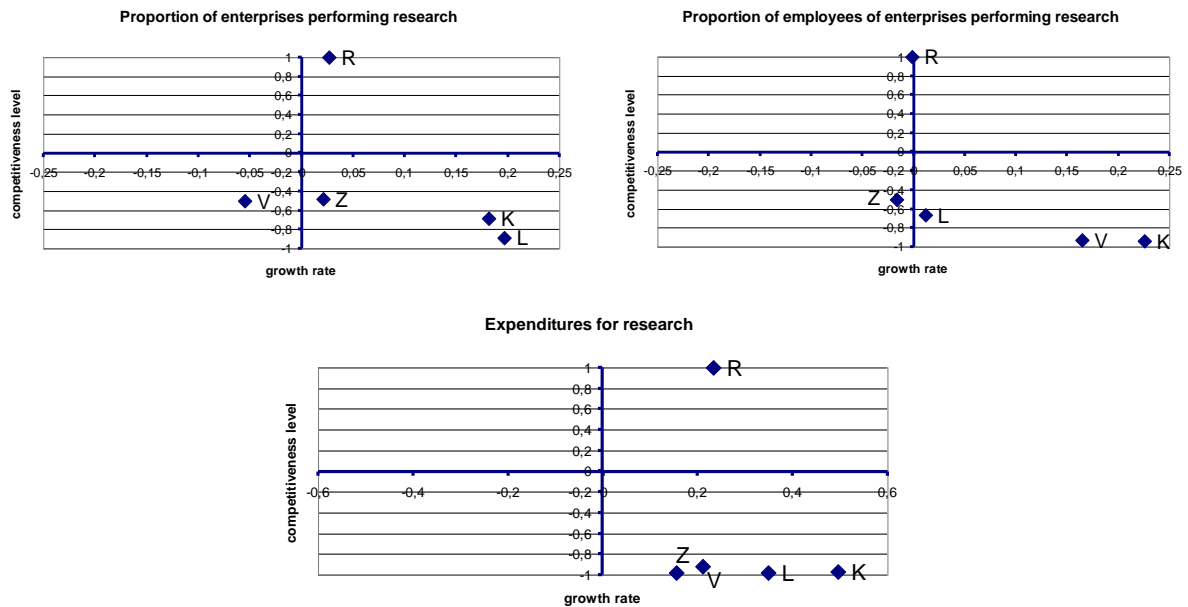**Fig.17. Total expenditures for research in planning regions of Latvia**

[made by authors after 54;110]

From Figure 17 it is possible to see that also in this area the most competitive is Riga region and also values of this indicator for Riga region is considerably higher than for other regions. Expenditures for research are growing with every year, except 2009. In 2009 the expenditures for research in Riga region were 54486 thousands LVL. The most expenditures for research, except Riga region, were in Zemgale region – 2855 thousands LVL in 2009. But it was considerably less than in Riga region. The less expenditures for research were in Vidzeme region.

To evaluate which factors are potentially hindering or facilitating, or which factors are currently ensuring or decreasing competitiveness of regions in innovation sphere, they were put into the matrix for competitiveness level and indicator growth rate (Figure 18).

Fig.18. Placement of indicators affecting innovation sphere in planning regions of Latvia into the matrix for competitiveness level and indicator growth rate

(R – Riga region, K – Kurzeme region, V – Vidzeme region, Z – Zemgale region, L – Latgale region)
[authors' calculations]

The results are obviously summarized in the Table 6.

Table 6.
Factors affected competitiveness of innovation sphere in planning regions of Latvia
[made by authors]

Planning region	Competitiveness currently ensuring factors	Competitiveness currently decreasing factors	Competitiveness potentially facilitating factors
Riga region	Large and increasing proportion of enterprises performing research Large and increasing proportion of employees of enterprises performing research Big and increasing expenditures for research		
Kurzeme region			Small, but increasing proportion of enterprises performing research Small, but increasing proportion of employees of enterprises performing research Small, but increasing expenditures for research
Vidzeme region		Small and decreasing proportion of enterprises performing research	Small, but increasing proportion of employees of enterprises performing research Small, but increasing expenditures for research
Zemgale region		Small and decreasing proportion of employees of enterprises performing research	Small, but increasing proportion of enterprises performing research Small, but increasing expenditures for research
Latgale			Small, but increasing proportion of enterprises

region			performing research Small, but increasing proportion of employees of enterprises performing research Small, but increasing expenditures for research

In the sphere of innovations and research in Riga region all selected factors are competitiveness currently ensuring factors. Competitiveness currently decreasing factors are small and decreasing number of employees of enterprises performing research in Zemgale region and small and decreasing amount of enterprises performing research in Vidzeme region. Other factors are competitiveness potentially facilitating factors, because their values are comparatively low (below the average level) but with a tendency to improve in future. There are no competitiveness potentially hindering factors in innovation sphere in regions of Latvia.

Conclusions and suggestions

After research about innovations at regional level in Latvia, the main conclusions are:

• innovations are one of the most important factors that have an effect on regional competitiveness. By experts view innovations are the 3rd most important factor, but not the 1st . Such result can be explained in the same way as in Global Competitveness Report – innovations are the most important factor for competitiveness in innovation driven economies, but in efficiency driven economies (like Latvia) most important will be efficiency enhancers (Global Competitivness Report, 2013) ;

• innovations are competitiveness currently ensuring factor in Riga region, but in other regions it is competitiveness potentially facilitating or currently decreasing factor. In Riga region there are large and increasing proportion of enterprises performing research, large and increasing proportion of employees of enterprises performing research and also big and increasing expenditures for research. In Riga region there are more possibilities to find funding for innovations, because most of financial institutions, enterprises and population is concentrated in this region;

• there is big difference among performance of Riga region and other planning regions of Latvia. In innovation sphere Riga region has the maximum value of subindex, while other regions show negative results;

• each planning region has both competitiveness facilitating and competitiveness hindering factors, if take into consideration all competitiveness factors.

Ministry of Economy of Latvia has also evaluated main problems in innovation sphere in Latvia and its regions. They are:

- lack of understanding the role of innovations in development of enterprises, increasing of national competitiveness and social welfare;
- low level of private investments in research and development;
- not sufficient development of dedicated innovation infrastructure (innovation incubators, centres of competences);
- not sufficient access to finance resources, especially, start and risk capital;
- not sufficient cooperation among education, research and industry sectors;
- low amount of patents;
- low amount of innovative enterprises;
- low developed cooperation between businessmen in local and international level (LR Ministry of Economy, 2012)

Main suggestions to stimulate innovations and increase level of regional competitiveness in future are:

1) to include stimulation of innovations as one of the main tasks in regional development documents;

2) to increase expenditures for research it is necessary:
   - to increase financing from state and private resources for innovations and research, especially in non-capital regions;
   - to support development of new products and technologies, taking into consideration understanding about intellectual property and its protection;

3) to increase proportion of enterprises performing research it is necessary:
   - to promote transfer of knowledge and technologies to production;
   - to increase capacity of innovations, to develop legislative environment favorable for innovations;
   - to promote cooperation between researchers and private sector;
   - to increase e-commerce and use of modern IT solutions.

The research was done by the support of EU European Regional Development Fund, project Nr. 2DP/2.1.1.2.0/10/APIA/VIAA/003

Literature

1. Amidon   D.M..   Sample   Definitions   of   Innovation.   -
   http://www.providersedge.com/docs/km_articles/sample_definitions_of_innovation.pdf
2. Berziņa I.. Inovāciju būtība un iespējas Latvijā. Radošums, inovācijas: realitāte un iespējas Latvijā. 2011.gada 20.aprīļa Zinātniskā semināra materiāli. – Rīga, RTU Izdevniecība, 2011 – 5.-7.lpp.
3. Cabral R.. Refining the Cabral-Dahab Science Park Management Paradigm, International Journal of Technology Management, Vol. 16, No 8.
4. Central Statistical Bureau of Latvia– http://www.csb.gov.lv
5. Derksen   U.   Inovāciju   veidi.   Inno   Support   -
   http://www.ltp.lv/cd/LV/lv/wso/index.cfm@fuseactionlearnl_id5307pl_id5304.htm
6. Ecorys.   -   http://test.ecorys.nl/www.ecorys.com/html/competitiveness-programme/index.php
7. European   Commission.   Green   Paper   on   Innovation,   December   2005.   -
   http://europa.eu/documents/comm/green_papers/pdf/com95_688_en.pdf
8. European Commission. Innovation Management and the Knowledge Driven Economy – Brussels, Luxembourg, Directorate – general for Enterprise, 2004. – 164 p.
9. Gardiner B., Martin R., Tyler P. Competitiveness, Productivity and Economic Growth across   the   European   Regions.   2004   -   http://129.3.20.41/econ-wp/test/papers/9912/9912125.pdf
10. Helander   E.   How   do   regions   identify   territorial   competitiveness?   -
    http://www.diact.gouv.fr/Datar_Site/Datar_Entretiens2003.nsf/64a47503db30cd8dc1256591003bd380/10f30bdce94b1d04c1256cbe0037cafd/$FILE/ElisabethHelander.pdf
11. Howlett R.J.. Innovation through Knowledge Transfer. – Springer – Verlag Berlin Heidelberg, 2010. – 381 p.
12. Innovation   Zen.   -   http://innovationzen.com/blog/2006/11/17/the-definition-of-innovation/
13. Komercdarbības konkurētspējas un inovācijas veicināšanas programma 2007.-2013.gadam - http://polsis.mk.gov.lv/LoadAtt/file45618.doc
14. Latvian Innovation Portal - http://www.innovation.lv/ino2/eng/
15. Nacionālā   inovāciju   programma   2003.-2006.gadam.   -
    http://www.likumi.lv/doc.php?id=73699
16. National Audit Office. Innovation across central government. – TSO (The Stationery Office), 2009. – 47 p.
17. OECD. Innovation Strategy for Education and Training. Innovation: the OECD Definition   -
    http://www.oecd.org/document/10/0,3746,en_2649_35845581_40898954_1_1_1_1,00.html
18. Pinc D.H.. A whole new mind: why right – brainerswill rule the future. Riverhead Book, 2006. – 275 p.
19. Porter M. Clusters of Innovation: Regional Foundations of U.S. Competitiveness. -
    http://www.compete.org/images/uploads/File/PDF%20Files/CoC_Reg_Found_national_cluster.pdf
20. Reavis   D..   Innovation   definition   –   four   requirements   for   innovation.   -
    http://ezinearticles.com/?Innovation-Definition---The-Four-Requirements-For-Innovation&id=2687046
21. Glor E. Some thoughts on definitions on innovation. The innovation journal. -
    http://www.innovation.cc/discussion-papers/thoughts-innovation.htm

22. Valsts atbalsts inovācijām. LR Ministry of Economy - http://www.em.gov.lv/em/2nd/?cat=30255
23. Й.Шумпетер. Теория экономического развития. Капитализм, социализм и демократия. – Москва: Эксмо, 2007. – 862 с.
24. World Economic Forum. Global Competitiveness Report 2013. - http://reports.weforum.org/the-global-competitiveness-report-2013-2014/#=