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COMPETENCE CENTRES AND *THEIR POSSIBLE IMPACT ON LITHUANIA'S KNOWLEDGE EC*ONOMY DEVELOPMENT

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Abstract

Establishment of Competence Centres is one of the main tasks on the European Union agenda. The article aims to analyse the possible impact such Competence Centres might have in Lithuania. The main purpose of Competence Centre is to encourage science and business collaboration in increasing effectiveness and efficiency of high added value article production. The newly established and currently not wide spread Competence Centres are encouraged by EU: the main goal of Lisbon Strategy is to set up necessary conditions for creation of critical mass in particular research areas. Developing significant European Competence Centres, which would be ready for international collaboration and for attraction of high qualified scientists from all over the Europe, could encourage competitiveness of the region as well as the competitiveness of EU itself. Therefore, this would be a huge step of Lithuania's Knowledge Economy in catching up with the EU innovation leaders. Thus, the article captures: analysis of science and business potential in Lithuania, analysis of success stories of Competence Centres and suggestions on the possible model for boosting the development of Competence Centres in Lithuania.

Keywords:

Knowledge Economy, Competence Centre, Centres of Excellence.

Introduction

The cutting-edge research and technology are the background of knowledge-based economy, moreover – the way to ensure the competitive advantage of the region. Implementing the European industry policy in such competitive sectors as Information and Communication Technology (ICT), nanotechnology, biotechnology, it is necessary to concentrate science and research task forces. Due to this the competence centres could be advantageous.

The key issue in the Lisbon agenda is the establishment of European centres of excellence, which would be ready for international collaboration and to attract highly qualified researchers all over the Europe. Such conditions are necessary seeking to reinforce the role of Europe in the World-wide technology market as well as to initiate the research for solving global problems.

In practical experience, both terms 'competence centres' and 'centres of excellence' are often mixed, hence the paper will provide the definitions and key features distinguishing them.

This article deals with the features Lithuania's knowledge-based economy, also with the situation of competence centres and their possible impact on the development of Lithuanian knowledge-based economy.

The aim of this article is to provide a definition for the term of 'competence centres' and analyse their possible impact on the development of Lithuania's knowledge-based economy.

The objectives of the article were set as follows:

1. To reveal the concept of knowledge-based economy and its evolution in Lithuania;
2. To indicate the role of higher education in developing the knowledge-based economy;
3. To present competence centres and centres of excellence and their main features using the international experience;
4. To forecast possible impact of establishing competence centres in Lithuania.

Methods used: analysis of scientific literature, documents and reports.

The Concept of Knowledge-Based Economy and Its Evolution in Lithuania

Knowledge–Based Economy. The *Lisbon Strategy for Growth and Jobs*[1] launched in 2005 sets a

[1] Common Actions for Growth and Employment: The Community Lisbon Programme. Communication from the Commission to the

comprehensive array of policies and reforms designed to make Europe's regulatory and economic framework more innovation friendly. This includes the crucial objective of increasing research and development spending to 3% of GDP.

Many authors (Drucker (1994), Melnikas (2003), Krisčiūnas, Daugėlienė (2006)) agree that the knowledge accelerates modern life. The knowledge-creation potential in each region can be used to keep competitive advantage.

P.Drucker (1993)[2] in his famous book 'Post-Capitalist Society' analyses the major world transformation from the Age of Capitalism to the Knowledge Society and how it will affect society, economics, business, and politics now and during the years ahead. P.Drucker describes how every few hundred years a sharp transformation has taken place and greatly affected society - worldview, fundamental values, business and economics, and its social and political structure.

Life long learning is the essential feature of new paradigm – so called 'knowledge-based economy'. According to authors K. Kriščiūnas and R. Daugėlienė (2006), usually four main characteristics are used to describe the knowledge-based economy: *human resources, innovation policy, innovative enterprise and information communication technology (ICT).*

Human resources involve education of individuals and employees, their creativity as well as professional qualification. The management of human resources takes very important role in knowledge-based economy; it is not only employment of personnel, firing or taking care of social security, but also the usage of human resources (Jewell, 2002)[3]. Brooks and Nafukho (2006)[4] contend that today's business society must use their employees' capabilities and talent for creating competitive advantage.

Human capacity and their devotion lead to successful organization. Resources like technologies, ICT and other can be easy to duplicate, and the only way to keep the companies' competitive advantage is to use human resources for development of ideas, implementation of innovation (Brooks, Nafukho, 2006).

Innovation Policy. This kind of policy becomes the key part of all EU policy focused on the development of knowledge-based economy, enhancing entrepreneurship in business and research and development (R&D).

The EU can only become comprehensively innovative if all actors become involved – business, public sector and consumers. This is because the innovation process involves not only the business sector, but also public authorities at national, regional and local level, civil society organisations, trade unions and consumers. Such a wide partnership for innovation will create a virtuous circle, where supply of new ideas and demand for new solutions both push and pull innovation (*Putting knowledge into practice: A broad-based innovation strategy for the EU*, 2006)[5].

Therefore, when formatting such policy the systematic view towards achieving complex political solution is necessary. Effectiveness of innovation policy depends much on adjusted tools and reasonable political actions(*European Trend Chart on Innovation, 2004*).

Innovative enterprise. The engine of innovative business is its unique feature to create new products and introduce them into the market. All forms of innovation need to be promoted, for innovation comes in many forms other than technological innovation, including organisational innovation and innovation in services.

C. Dahlman (2004)[6] distincts four types of firms. The lowest level of firms are those firms which are using technologies. Second level stands for firms which acquire or assimilate new technologies. The third level includes firms which have enough skills to upgrade or reverse technologies. Such capabilities rarely can be met in SME. Therefore, the upper level stands for R&D which is mostly presented by large enterprises.

According to Bou-Wen Lin and *Chung-Jen Chen* (2006)[7], the attitude innovation creation has changed – more often innovation is created by a network of companies, not by a single company. In the knowledge-based economy, the competitiveness is based on collaboration between organizations seeking to create innovation. It means that every company needs to specialise and to concentrate its core competence and search for partners which are eager to

Council and the European parliament. COM (2005) 330, 20.7.2005. On-line: http://ec.europa.eu/growthandjobs/pdf/COM2005_330_en.pdf.

[2] Drucker F.P. (1993), Post-Capitalist Society – New York: Harper-Collins, 288p.

3 Jewell, B.R. (2002) Integruotos verslo studijos.- Vilnius, The Baltic Press. , 487 p.

4 Brooks K., Nafukho F.M. (2006), Human resource development, social capital, emotional intelligence. Any link to productivity? - Journal of European Industrial Training. On-line: www.emeraldinsight.com/0309-0590.htm.

[5] Putting knowledge into practice: A broad-based innovation strategy for the EU. Communication from the commission to the council, the European parliament, the European economic and social Committee and the committee of the regions. Brussels, 13.9.2006COM(2006) 502. On-line:http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0502en01.pdf.

[6] Dahlman C. (2004), Challenge of the Knowledge Economy: Towards a Pragmatic Innovation Agenda. Knowledge for Development Program. Santiago, Chile.

[7] Bou-Wen Lin, Chung-Jen Chen. (2006), Fostering product innovation in industry networks: the mediating role of knowledge Integration. -The International Journal of Human Resource Management, 155–173 p.p. On-line: http://web.ebscohost.com/bsi/pdf?vid=22&hid=107&sid=9c2b8a61-a015-4949-9f5e-6db9033f8c4b%40sessionmgr104.

supply complementary services. Enterprises when contended with increasing competitiveness', needs to use supplementary resources from outside organizations, because in such a way product's life cycle is shorter (*Bou-Wen Lin, Chung-Jen Chen, 2006*).

ICT. ICT gives an opportunity to communicate globally, to reach alienated places, to gather and to accumulate, copy and to share the information and many other things (Innovation policy: updating the Union's approach in the context of the Lisbon strategy)[8]. EU promotes research and innovation in ICT, because it is the background for knowledge-based economy.

Knowledge-Based Economy Expression and Tendencies in Lithuania. Lithuania like others post communists countries has passed difficult period of reform. The changes appeared in all spheres of life. That was a great prerequisite for achieving a major breakthrough in the development of Lithuanian Republic.

In 2004 Lithuania became an EU member-state and all Lithuanian companies confronted the big and strong players in EU. Seeking to remain competitive, Lithuanian companies needed to achieve higher quality products. In the process of perfection of the technology, employees have become the key aspect that makes essential difference between the companies.

According to World Bank report (2003)[9], since Lithuanian entered EU, it made progress in a few knowledge-based economy spheres such as ICT as well as improving economic and institutional regime. But the same report said that Lithuania was very weak in education and innovation spheres.

R. Ginevičius and R. Korsakienė (2005)[10] analyze tendencies of Lithuania's knowledge-based economy focusing on its dimensions. According to authors R&D are essential in the innovation creation process. It goes without saying that ICT and globalisation make significant impact on the development of knowledge-based economy.

Lithuania's role in the development of knowledge-based economy appears through participation in EU programmes, lots of information society projects were implemented, many strategic documents prepared (E-Government Strategy, Science and Technology White Book and etc.). Despite of this, various innovation indicators systems shows that Lithuania still lags behind European innovation leaders. According to Summarised Innovation Index (SII) Lithuania together with Slovenia, Hungary, Portugal, Czechia, Latvia, Greek, Cyprus and Malta are devoted to 'catching up' countries (Annual Innovation Policy Trends and Appraisal Report 2004-2005)[11].

According to *Lithuania's Statistics Department* it should be mentioned that innovations were usually created by individual companies. This objects to the *Bou-Wen Lin* and *Chung-Jen Chen* statement we have presented above. During the period 2002/2004 just 10.1 percent of all companies got a financial support from government for R&D activities. Mostly - 6.0% out of 10.1 percent companies got a financial support from state budget and 4.4% from EU.

Some tendencies in Lithuania's knowledge-based economy are introduced in table 1.

Table1. Lithuanian knowledge–based economy reflecting indicators

Indicators	2004	2005	2006
Gross domestic expenditure on R&D (GERD) by source of funds – industry: Percentage of GERD financed by industry	19,90	20,80	-
Level of Internet access – households: Percentage of households who have Internet access at home	12	16	35
ICT expenditure – IT: Percentage of GDP	1,4	1,6	-
Broadband penetration rate: Number of broadband lines subscribed in percentage of the population	2,5	5	8,4

Source: Eurostat

Figures in table 1 indicate that during the period of 2004/2006, there were no major changes. There was a small increase in Gross domestic expenditure on R&D (GERD) by source of funds – industry (2004-19.90 %; 2005 – 20.80 %).

However, indicators representing ICT sector had significant changes: broadband penetration rate increased (from 2.5 in 2004 to 8.4 in 2006). Level of Internet access increased as well: there were 12 % of households who had Internet access at home in 2004, in 2006 – 35%.

[8] Innovation policy: updating the Union's approach in the context of the Lisbon strategy. Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - Brussels, 27 p. On-line: http://europa.eu.int/comm/enterprise/innovation/communication/doc/innovation_comm_en.pdf.

[9] The World Bank Europe Central Asia Region, Lithuania aiming for a knowledge Economy, March 2003. On-line: http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2003/04/25/000094946_03041204014387/Rendered/PDF/multi0page.pdf.

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[11] Annual Innovation Policy Trends and Appraisal Report (2004-2005): The European Innovation Scoreboard. On-line: http://trendchart.cordis.lu/scoreboards/scoreboard2005/pdf/EIS%202005.pdf .

The Role of Higher Education Knowledge-Based Economy in Lithuania

The scientific literature analysis showed that knowledge-based economy focuses on institutions which create intellectual products. Such institutions depend on the societies' capacity to create and encourage life-long learning.

Hence, B. Melnikas (2006)[12] states that creation of knowledge-based society and knowledge-based economy is the essential challenge for the modern society. According to B.Melnikas (2006) knowledge-based economy concurrent with its infrastructure, where the main accent is higher education sector. That's why when establishing knowledge-based society and knowledge-based economy, the focus should be on institutions of higher education sector.

During the 2004/2006 period high education sector in Lithuania involved: 21 high education institutions including 10 state universities, 5 academies, 6 non-state institutions. There were 138516 students studying in high education institutions during the 2004/2005 period. In 2005/2006 there was an increase in number of students – 141771.

There was the Evaluation of Research in Lithuania (1996)[13] made by The Research Council of Norway. The purpose of this evaluation was to help the Lithuania's research authorities in their efforts to develop research in Lithuania.

Despite the many difficulties in Lithuania, the evaluation had identified a number of good, even excellent research institutions and individual researchers, which met international standards.

The main problem mentioned in the evaluation was a pressing and general need for better financing of Lithuanian research. There were the most important measures identified: e.g. to establish a research council system; to reorganize universities and research institutes; to give university teachers more time to do research; to stimulate research personnel to broaden their field of interest and many others.

It is hard to say whether Lithuania's research significantly changed since the Evaluation was made, because we are still dealing with the same problems as 10 years ago. We can see this from R. Ginevičius and R. Korsakienė (2005), where they outline tendencies of Lithuania's knowledge-based economy as follow:

- Lithuania's economy is oriented to traditional business;
- Financing for R&D and IT development is insufficient;
- Cutting-edge technology enterprises still play a minor role in the economy of Lithuania.

Competence Centres and Centres of Excellence and Their Main Features: international experience

Before venturing further into the subject, it is necessary to define the term of 'Competence Centres'. First, difference between terms 'Competence Centre' and 'Centre of Excellence' must be pointed out. There are key features that distinguish these two terms. Competence centres are focused on enhancing collaboration between science and business sectors. Meanwhile, centres of excellence are concerned about concentrating high competence in particular field of science.

It should be emphasized that both - competence centre and centre of excellence are devoted to increasing the competitiveness as well as to concentrating the scientific and technology competence of each region.

Researchers involved in centres of excellence must satisfy a number of criteria. First of all they must be the leaders in their research field and must have publications related to their research. According to L. Čekanavičius, A. Samalavičius (2005)[14], newly gathered research groups or already existing scientific research institutions can become centres of excellence. To get a status of centre of excellence the number of research is not important. The most important thing is qualified scientific research, as well as the creativity of research team and the breakthrough in scientific research.

A simple definition could be: a centre of excellence is a structure where R&D performed meet world standards, in terms of measurable scientific production (including training) and/or technological innovation. In any case, there can be key features listed which should be part of the concept (Action for centres of excellence' with a European dimension):[15]

- a 'critical mass' of high level scientists and/or technology developers;
- a well-identified structure having its own research agenda;
- capable of integrating connected fields and to associating complementary skills;
- capable of maintaining a high rate of exchange of qualified human resources;

[12] Melnikas B. (2006), Aukštojo mokslo institucijos žiniomis grindžiamoje visuomenėje: raidos principai ir prioritetai. On-line: http://web.ebscohost.com/bsi/pdf?vid=15&hid=107&sid=9c2b8a61-a015-4949-9f5e-6db9033f8c4b%40sessionmgr104;

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[14] Čekanavičius L., Samalavičius A. Šiuolaikiniai mokslo plėtros instrumentai: pasaulio patirtis ir pamokos. On-line: http://www.leidykla.vu.lt/inetleid/ekonom/72_2/straipsniai/str2.pdf.

[15] Action for "centres of excellence" with a European dimension. On-line: http://ec.europa.eu/research/era/pdf/centres.pdf;

- a dynamic role in the surrounding innovation system;
- high levels of international visibility and scientific and/or industrial connectivity;

Meanwhile competence centres combine academic excellence with industrial needs, and apply collaborative research results for creating innovative products. As policy instruments, they typically focus on comparatively high capability of industrial and academic participants: typically medium-large companies and high-capability SMEs (Arnold E., Deuten J., Giessel J., 2004)[16].

Competence centres have some recognisably special features relating to their role. For one – they are usually funded by three partners: industry, university and a state agency. For this reason they are very favourable in EU, because they are one of the means in reaching the aims of Lisbon strategy - increasing research and development spending to 3% of GDP (where the input of government should be 1/3 and industry contribution should be 2/3).

Moreover, competence centres are intended to have an effect on university resource allocation and strategy, in addition to reinforcing university-industry links. They involve long term contractual arrangements, requiring a much bigger commitment than traditional project by project funding of collaborative R&D. They create new on-campus structures, and therefore pose new organisational and structural demands to the universities (*An International review of Competence Centre Programmes*, 2006).

Many countries have chosen support schemes for competence centres, for example USA has *NSF Engineering Research Centres*, Sweden has *VINNOVA's Competence Centres*, Hungary has *KKK programme*, and Austria has *K plus Competence Centres*.

Every mentioned programme of competence centres emphasizes importance of science and business collaboration as the prerequisite for boosting regions' competitiveness.

Sweden's competence centres programme VINNOVA is an instrument of innovation and research policy. Programme of competence centres trained people efficiently, produced large networks and improved the way members work together on R&D questions. It helped in providing the gradual change in university-industry relations needed to build a real 'knowledge society' and strengthened the knowledge communities that are core to innovation systems. Its primary outputs are knowledge, capabilities and network relationships.

Meanwhile *Danish National Research Foundation* is responsible for approving and financing of competence centres (Čekanavičius L., Samalavičius A., 2005). The purpose of such foundation is to identify and finance the research teams which are eager to explore the cutting edge scientific research. Such competences centre gets grants for five years. The competence centres are establishing in already existing scientific institutes, universities and other states research institutions. After five years a group of experts evaluate the competence centre, and then it is decided whether the financing will be prolonged. The main reason to launch the K*plus* programme was the low level of science industry co-operation in Austria. K*plus* aims at bridging the gap between fundamental research carried out by universities and industrial R&D. Other reasons to launch the K*plus* programme were the following deficiencies in the Austrian innovation system.

- Short term R&D planning in industry.
- Dominance of SMEs in R&D in Austria.
- Lack of critical mass within the knowledge infrastructure, especially the universities.
- Low international visibility of many Austrian R&D capabilities.

Estonian experience. Estonia has two programmes launched in order to booster the Knowledge based Estonia. One of them is *The Competence Centre Programme*[17] aiming to improve the competitiveness of enterprises through strategic co-operation between the science and industry sectors in Estonia. *The Competence Centre Programme* goals are:

- Strengthen industrial R&D capabilities in a mid-term perspective;
- Facilitate R&D concentration in a specific field of technology or on the basis of different fields;
- Enhance mid-term R&D planning and management capabilities;
- Increase the number of R&D specialists oriented to industry needs and to increase the mobility between the science and industry sectors;
- Become visible and attractive for foreign partners.

Competence centres are R&D collaboration of scientific and industrial partners (incl. international partners) which receives public co-funding for the building of intensive longer-term science-industry links through proposed three years R&D plan.

The Competence Centre Programme came out from the initiative Ministry of Economic Affairs.

[16] Arnold E., Deuten J., Giessel J. (2004), An International review of Competence Centre Programmes. Technopolis group. On-line: http://www.rcn.no/CSStorage/Flex_attachment/Hovedrapport.pdf.

[17] Estonia Inovative IT sollutions. On-line: http://www.esis.ee/ist2004/38.html.

Meanwhile, the Ministry of Education initiated the Estonian Programme for Centres of Excellence in Research aiming on establishing conditions for high-level research compatible with the strategy of research and development in Estonia as wel as encouraging Centres of excellence to join the international network according to the European Union's research policy;

Establishing Competence Centres in Lithuania

According to *European Trend Chart on Innovation (2004)*[18] the Lithuania's innovation system performs rather weakly compared to Western Europe. On the other hand, Lithuania shares many of the challenges as well as the strengths of its Baltic neighbours Estonia and Latvia. The main challenge lies in the group of indicators related to knowledge creation both in terms of inputs (rates of public and business expenditure on R&D) and outputs (US and European patent applications). Although the level of public expenditure on R&D is almost twice as high as that of Latvia and more or less similar to that of Estonia, it remains well below the EU25 average. Further, the level of business R&D expenditure is among the lowest in the EU25. However, there is evidence of a positive upward trend, with both public and business R&D expenditure increasing in absolute terms since 2000.

Creating effective links between the R&D sector and firms is the most important challenge for Lithuania. In this process competence centres must play an important role, bearing in mind that centres of this kind have been successfully introduced in other European countries (e.g. Sweden, Austria, Hungary and etc.) and can act as important structural and stable bridges between science and industry.

Lithuania should take into account the experience of Estonia, because it learned from international good practices, via international experts.

The preparation work for establishment of the Competence Centres should be done (see Figure 2). Firstly the Feasibility study concerning the establishment of competence centre in Lithuania should be made. Following this the guidelines for competence centre program should be prepared.

All above should be done considering the interest of business, science and government.

It can only be speculated what the impact of implementing Competence Centres Program in Lithuania could be. But having in mind international experience, discussed in chapter 3, we could forecast that the status of R&D in Lithuania could improve, as well as the links between science and business. More scientists would get involved into a business sector. Moreover, funding of R&D by source of industry could increase, as the international experience showed. All mentioned are prerequisites for developing Lithuania's knowledge-based economy.

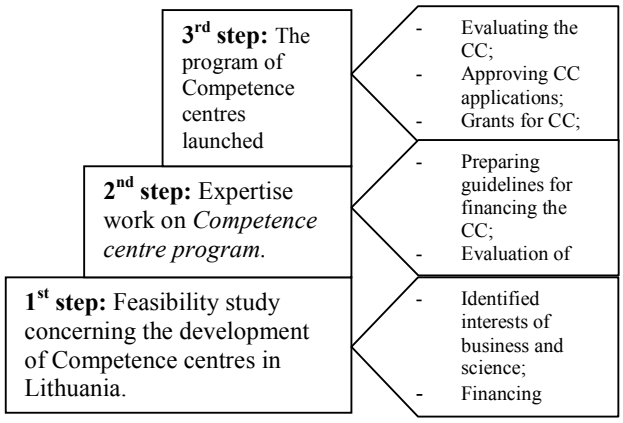

Figure 2: The preparation work for launching Program of Competence centres (CC)
Source: made by authors.

Conclusions

In conclusion it must be mentioned that knowledge-based economy is based on many things such as scientific research, human resources, innovative business as well as innovation policy. All these areas are relevant to ICT.

Effective national innovation policy usually becomes one of the key factors for developing knowledge–based economy. And it is described as system which involves science, business and government sectors one of the innovation intermediates, including, science and technology parks, business incubators, technology transfer institutions and innovation centres.

High education institutions are important in knowledge-based economy, because of its purpose to create and disseminate of knowledge using various societies' intellectual properties creation potential.

Knowledge-based economy depends much on business and science collaboration. Having in mind that in Lithuania the links between science and business are particularly weak, the program for competence centre would be useful, as it is in such countries like Sweden, Austria, Hungary and etc.

Seeking to establish competence centres in Lithuania some prerequisites must be met. First of all, feasibility study for competence centre program must be made, secondly guidelines for financing and evaluation of competence centres must be prepared.

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