IMPACT OF HUMAN CAPITAL ON DEVELOPMENT OF INNOVATION ECOSYSTEM IN LATVIA

Mikus Dubickis[1], Bc.oec.; **Elina Gaile-Sarkane**, Dr.oec.
Faculty of Engineering Economics and Management, Riga Technical University

Abstract. The aim of the proposed scientific research is to determine whether Latvia (particularly Riga) has a potential for the development of human capital based innovation ecosystem. The paper is based on the study of definitions, statistical data, and field analysis. The authors analyse and show the significance of innovation ecosystem for sustainable development of innovation in Latvia. A part of the research results was also presented in the project "Human Capital and Innovation: Employment Policies in Local and Regional Innovation Networks for Talent Attraction and Better Job Opportunities", funded by the INTERREG IVC programme.
According to the research results, Riga has a good potential for attraction of local and foreign human capital and development of efficient innovation ecosystem.
Key words: national innovation system, innovation ecosystem, innovation environment, human capital, employment.
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Introduction

Every commercial success starts with an idea for a new product or service. Innovations have been said to be generated by companies that want to satisfy customer needs, yet, also by user innovators who generate new products or solutions for their very own needs (von Hippel E., 1988, 2005). New idea can turn into innovation only in corresponding environment that is often called innovation ecosystem. Innovation ecosystem can be absolute only in balanced environment in which all stakeholders are involved for sustainable growth. Functioning of the national system of innovation shall ensure its elements and performance of innovation ecosystem. On the basis of convergence of innovation system elements, it is necessary to determine the cornerstone of the system and its impact on the development of the system to promote economic growth, and the development of regions and economics.

Research results and discussion

1. National innovation ecosystem

Today's competitive business environment requires more and more attention to planning, forecasting and analysing business, especially for the development of innovation. Many authors of scientific publications have focused on the topics of innovation development but not many of them have paid attention to innovation ecosystem as a source of innovation activity. The understanding of innovation ecosystem is very close to business ecosystem, what one can confirm by comparing definitions.

The beginnings of innovation planning are dating back to the 1960s, when it started developing alongside the other theories. There are various definitions in scientific and popular literature giving insight in a meaning of "National Innovation System" (Table 1).

After examining the most crucial studies and definitions of "National Innovation System" elaborated before the beginning of the 21st century, the authors concluded that these studies mainly reflect the following key elements as fundamental of innovation system: institutions, individuals, technologies, market, processes, and competencies. Also it is obvious that human capital plays a central role in all the definitions mentioned in Table 1.

Most of the above mentioned definitions characterise the innovation system, while the meaning is very close to the existing definitions of business ecosystem (Table 2).

Business ecosystem and innovation ecosystem is very close in meaning according to the most popular definitions. For example, Jackson has given the following definition of innovation ecosystem:"...the economic rather than the energy dynamics of the complex relationships that are formed between actors or entities whose functional goal is to enable technology development and innovation" (Jackson D.J. 2012). According to this definition, the key elements in innovation ecosystem are institutions, individuals, and technologies. At the same time without any doubts, the human capital plays a significant role in the development of innovation.

Luoma-aho and Halonen have mentioned that innovation ecosystem is "a permanent or temporary system of interaction and exchange among an ecology of various actors that enables the cross-pollination of ideas and facilitates innovation" (Luoma-aho V., Halonen S. 2010). From this definition one can conclude that actors (and actors usually belong to a category 'human capital') are the key element of successful innovation ecosystem.

By analysis of findings of many thought leaders like Adner R. (2006); Subramanian V. (2012); Moore J. F. (1993); Jackson D.J. (2012); Engler J., Kusiak A. (2011); Mercan B., Goktas D. (2011) etc., the authors concluded that human capital played the most significant role in the development of innovation ecosystem.

Accordingly, the following **research question** was proposed: Does Latvia have a potential for the development of on human capital based innovation ecosystem?

For getting answers on the research question, the authors did statistic data analysis and conducted the field research.

[1] Corresponding author. *E-mail: dubickis.mikus@gmail.com*

Table 1

National Innovation System: definitions from the literature

Definition	Key elements
"… the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies" (Freeman C., 1987)	Institutions Market Technologies
The "set of institutions whose interaction determines the innovative performance … of national firms" (Nelson R.R., 1992)	Institutions Market
"... the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ... and are either located within or rooted inside the borders of a nation state" (Lundvall A.-B., 1992)	Market
"... the national institutions, their incentive structures and their competencies that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country" (Patel P., Pavitt K., 1994)	Institutions Competencies Technologies Market
"A system of innovation is that set of distinct institutions which jointly and individually contributes to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies" (Metcalfe S., 1995)	Institutions Individuals Technologies Knowledge Market
"The system of organisations and actors whose interaction shapes the innovativeness of the national economy and society" (Nieminen M., Kaukonen E., 2001)	Institutions Individuals
"All the actors and activities in the economy which are necessary for industrial and commercial innovation to take place and to lead to economic development" (Arnold E., Boekholt P., 2002)	Institutions Individuals Market
"At its simplest, an innovation system is the groups of organisations and individuals involved in the generation, diffusion and adaptation, and use of knowledge of socio-economic significance, and the institutional context that governs the way these interactions and processes take place" (Hall A.J. et al., 2003)	Institutions Individuals Market
"Innovation systems approaches view innovation in a more systemic, interactive and evolutionary way, whereby new products and processes are brought into economic and social use through the activities of networks of organisations mediated by various institutions and policies" (Hall A.J. et al., 2004)	Institutions Market Processes.

Source: authors' construction based on literature

Table 2

Business Ecosystem: definitions

Definition	Key elements
"Describes the structure and behaviour of a network of high-tech organisations that share a key technological platform and the ways individual firms can flourish in such an environment" (Moore J. F., 1993)	Institutions Technologies Individuals
"The network of organisations – including suppliers, distributors, customers, competitors, government agencies and so on – involved in the delivery of a specific product or service through both competition and cooperation. The idea is that each business in the "ecosystem" affects and is affected by the others, creating a constantly evolving relationship in which each business must be flexible and adaptable in order to survive, as in a biological ecosystem" (Investopedia, 2012)	Institutions Individuals Market Interdependency
"A network of interlinked companies, such as suppliers and distributors, who interact with each other, primarily complementing or supplying key components of the value propositions (benefits for customers) within their products or services" (Subramanian V. 2012)	Institutions Interdependency Market

Source: authors' construction based on literature

2. Statistics on regional innovation

A comprehensive innovation level analysis among the EU Member States has been included in the Innovation Union Scoreboard 2011 which characterises Latvia's strengths and weaknesses in the area of innovation and growth of innovation indicators. Among all the EU Member States Latvia has the lowest level of innovation, thus, Latvia is grouped with some other countries under the category of "modest innovators" (European Commission, 2012). According to The Information

Technology and Innovation Foundation survey conducted among 40 countries worldwide, Latvia takes the 31st position in terms of creating, implementing and developing innovations (The Information Technology …, 2009). However, according to the World Bank Knowledge Economy Index, in 2012 Latvia takes the 37th position out of 146 countries, just as 12 years ago (The World Bank, 2012).

According to the calculations of the Central Statistical Bureau, the number of innovative enterprises in Latvia has decreased in the period after 2009, namely, if there were 707 enterprises in the sector of industry in 2006-2008, and then in 2008-2010, the number had reduced to 364 which constitute only 19.2% of the total number of enterprises in industry in Latvia. Likewise, the total turnover of innovative enterprises has reduced from LVL 68.9 to 62.3 million. Total expenditure on innovation has decreased significantly between 2008 and 2010, i.e. from LVL 210.3 to 47.0 million respectively, which shows a trend to save on machinery and equipment. The number of workforce employed by innovative enterprises in Latvia has decreased from 54.1% in 2008 to 47.3% in 2010 (Central Statistical Bureau …, 2010).

Latvia has the lowest research and development activity in the EU (0.22% of the total GDP in 2010); also income from licensing and patents is relatively low (European Commission, 2012a). In terms of the EU fund distribution between Latvia's regions, Riga Planning Region had received the largest portion of the envelope (total of LVL 291.4 million distributed between 1301 projects) in the period between 2007 and 2011. Also in terms of the EU funds contribution to innovation and entrepreneurship, Riga Planning Region takes the leading position with LVL 62.5 million (Ministry of Environmental …, 2012).

According to the statistics, the number of scientific institutions and scientific personnel had increased in 2010-2011 (from 319 in 2010 to 468 in 2011). Funding allocated to science and research has almost doubled since 2009, namely, it has increased from LVL 59.9 million to LVL 99.4 million in 2011. Although funding earmarked for the entrepreneurship has reduced, the general trend is positive (Central Statistical Bureau …, 2010). However, it should be taken into account that funding in Latvia in comparison with other European countries is insufficient to ensure higher competitiveness. Innovations can only be generated through developing education, science and research, which, of course, require appropriate investments.

The demographic forecasts for Riga and Pieriga 2030 (Eglite P. et al., 2012) are not overly optimistic. However, in comparison with the overall situation in Latvia, these regions are expected to maintain a relative stability in terms of population. It is expected that the population will drop significantly both in Riga City and nationwide by 2030.

3. Methodology of the research

The research is based on the study of literature (Section 1) and statistical data analysis (Section 2) as well as a consequent proposition of the research question. The research was conducted to obtain the potential of human capital as a main part of innovation ecosystem. The interview method (Section 4) was chosen as the most appropriate method for collecting detailed information in a short time and graphical method was used for visualisation of the results of interviews.

Crawford and Benidetto about the interview method have mentioned: "The most common method by far is direct, one-on-one interviewing. Sometimes this is a full scale very formal and scientific survey. Other times the discussion with lead users who often are first to sense a problem... " (Crawford C.M., Benidetto C.A.D., 2005). Creating of high quality information channel directly from the customer (target audience can be also included under the meaning "customer" – the authors' remark) and gathering of data involves contact with customers and experience with the use environment of the produce. Three methods are commonly used: interviews, focus groups, and observing the product in use (Ulrich K.T., Eppinger S.D., 2007). Interviews are usually conducted in the customer's environment and typically last one or two hours. Research by Griffin and Hauser shows that one 2-hour focus group reveals about the same number of results as two 1-hour interviews (Griffin A., Hauser J.R., 1993).

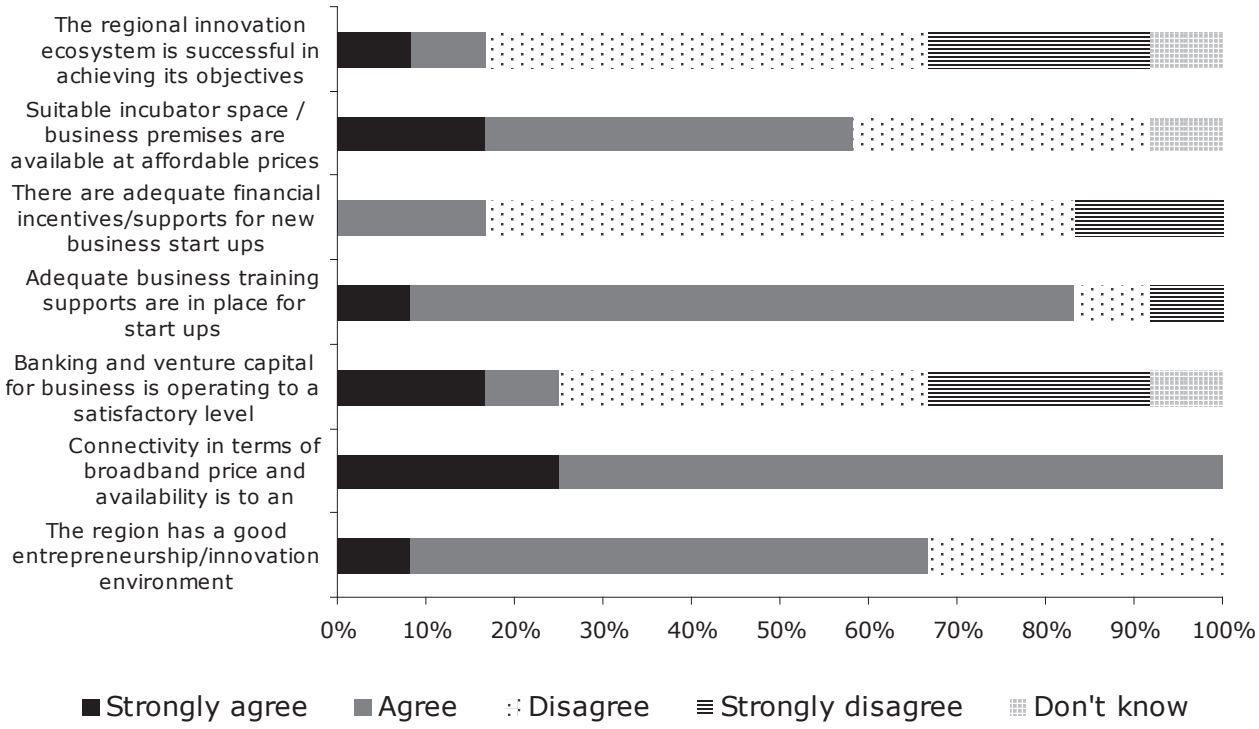
Ulrich and Eppinger have pointed out that "interviews are usually less costly (per hour) than focus groups, and because an interview often allows the product development team to experience the use environment of the product, we recommend interviews to be the primary data collection method" (Ulrich K.T., Eppinger S.D., 2007).

Twelve structured interviews were carried out with four representatives of the education and research sector, four businesspeople and four policy-makers to obtain expert opinions on the attraction of highly qualified human capital and the innovation system in Riga. Seven questions were stated for interviews. The main conclusion on innovation ecosystem in Latvia (Riga) was developed on the basis of interviews (part of the research results was also presented in the project "Human Capital and Innovation: Employment Policies in Local and Regional Innovation Networks for Talent Attraction and Better Job Opportunities" funded by the INTERREG IVC programme). Results and conclusions from the interviews are presented further.

4. Results of the field research

With the aim of characterising business innovation and the business environment in Riga experts were asked to assess the regional innovation ecosystem, the availability of business premises and broadband services, financial and educational support for new entrepreneurs, availability of banking services and venture capital as well as the business and innovation environment as a whole (Figure 1).

More than half of the experts (67%) agreed or fully agreed that Riga had a good business/innovation environment. However, only 17% agreed or fully agreed that the innovation ecosystem successfully achieved its goals, 50% disagreed and 25% fully disagreed with this statement, thus, indicating a crucial difference between the business environment and that of innovation, and pointing to the prerequisites of the innovation environment and the results achieved. A little over half (58%) of the experts agreed or fully agreed that business premises were available for adequate prices. In turn, 75% agreed and 25% fully agreed that communication services, considering the price and availability of broadband,



Source: authors' construction based on the data of interviews

Fig. 1. **Assessment of business innovation and the business environment in Riga**

were adequate, thus, acknowledging this as the region's strongest aspect of those assessed. In general, 83% of the experts agreed or fully agreed that business training support for new entrepreneurs was adequate (8% disagreed and another 8% fully disagreed with this statement). However, the experts had the opposite opinion regarding financial support for new entrepreneurs – 83% thought that it was inadequate and only 17% thought it to be sufficient. The experts' assessment of the availability of banking services and venture capital for businesses was ambiguous. The experts pointed out those banking services that are more readily available than venture capital.

In order to determine the attractiveness of Riga as a place of employment and residence for highly qualified human capital, experts were asked to assess transport and accessibility, education and research opportunities as well as culture and entertainment options. The experts described protection and personal safety, opportunities for families, living costs, quality of life, and environment. Of the given factors that affect the attractiveness of Riga as a place if employment and residence for highly qualified human capital only the culture and entertainment options can be considered as a clear strong-point – 25% of the experts assessed this factor as excellent, 67% thought it good, and 8% viewed it as average. Other strong-points include transport and accessibility (half of the experts rated it as good and the other half – as average), protection and personal safety as well as quality of life and environment which were rated similarly (58% - good, 42% - average). Opinions differ regarding opportunities for families and living costs. However, education and research opportunities may be considered a weak spot – only 42% assessed this factor as good or excellent, while 58% thought it to be average or poor.

Answering the question on Riga's attractiveness, experts highlighted several problems hindering the attraction of highly qualified human capital to Riga and Latvia as a whole, although Riga received a rather positive rating compared with the overall situation in the country. Insufficient social guarantees, relatively high prices of goods and low quality of health care were stated as the weak points.

"Education and research opportunities are good but there is no information about it in the mass media/ society. Foreigners cannot understand the price of local public transportation, nor which public transport goes where. Social guarantees are poor" (Business sector).

Riga is highlighted as the country's cultural, education and scientific centre which has relatively more chances for attracting highly qualified human capital. Riga is described as a city of culture in the European context. Established infrastructure, higher salaries and more chances for finding work are the factors stated in favour of Riga in comparison with other regions of the country. However, Pieriga (Riga surrounding, further in the text Pieriga), is a significant threat to Riga's standing.

"Many inhabitants move to Pieriga where kindergartens and other facilities are available. Salaries are higher in Riga compared with other regions in Latvia, which makes it more attractive. It is also easier to find work in Riga, if one wants to. There is too little information on the opportunities for families and there is also an imbalance between the level of costs of living and other expenses. For example, education should be made available for a lower price so that the education level of society could

*be capitalised upon to achieve a better earning capacity" (*Policy-maker).

The experts assessed new employment opportunities for highly qualified and talented individuals in the government and state administration, education/ scientific institutions as well as in local and multinational enterprises. In total, 92% of the experts were of the opinion that new employment opportunities for highly qualified and talented individuals were more often available in multinational enterprises (*frequently* – 42%, *occasionally* – 50%) and local enterprises *frequently* – 17%, *occasionally* – 75%), rather than in education/ scientific institutions (*frequently* and *occasionally* – 50%, *rarely* – 50%) and the government and state administration (*occasionally* – 17%, *rarely* – 67%). Overall the expert assessment shows that new employment opportunities for highly qualified and talented individuals are offered relatively rarely.

Regarding the attraction of highly qualified human capital to Riga as a place of employment and residence, the experts assessed the possibilities to obtain visas or work permits, language skills (how an immigrant will be able to learn the local languages), support and physical considerations, quality of employment, salary and working conditions as well as future career prospects as the strengths and weaknesses of the region. The expert assessment shows that there are no factors that can be considered clear strengths or weaknesses of the region. Relative strengths are physical considerations (*strong* – 75%) and language skills (*strong* – 67%), whereas relative weaknesses are salary and working conditions (*weak* – 58%), support and quality of employment (*weak* and *very weak* – 50%), and the possibility to easily obtain a visa or work permit (50% of those who rated this factor rated it as *weak* or *very weak*). The rating of future career prospects was the most ambiguous – 50% thought it to be a strength and 50% - a weakness.

Conclusions, proposals, recommendations

Summarising results of the study, the authors concluded that human capital was one of the most important components of the innovation ecosystem. It was confirmed by the analysis of definitions as well as by the research conducted by the authors. Main conclusions of the field research are:

— in spite of Latvian innovation backwardness (among all the EU Member States, Latvia has the lowest level of innovation) in the European research area, Latvia and particularly Riga, has very good potential for further development;

— interview results showed that Riga had a good potential for attraction of local and foreign human capital (experts highlighted Riga as the country's cultural, education and scientific centre which had relatively more chances for attracting highly qualified human capital than other regions in Latvia) confirming that there was as place for the development of efficient innovation ecosystem;

— The research results also show that there is a gap in communication between state officials, municipality, and general population in various aspects. It should and can be improved, especially because the part of the research results was also presented to the City Development Department of Riga City Council.

The research confirmed that human capital had tremendous impact on innovation ecosystem development and there were possibilities to continue research on this topic.

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