Innovative clustering and its development factors as a source of Latvia’s competitiveness

Abstract. Small countries with transition economies have to choose their own path of economic development. Nowadays, the economic model of the EU countries implies the volume of the venture capital of 0.3% of GDP per year, i.e. the required volume of venture capital in Latvia is EUR 90 million per year, which implies a tenfold increase. The authors consider the influence of intellectual potential, free economic zones and venture capital as development factors of innovative clustering in terms of Latvia’s competiveness. The undertaken modelling confirms a stronger impact of the development of clusters on innovations and intellectual potential (IP) in comparison with the other positions. The positions of «Venture capital» and «Higher education and training», or IP, have a significant impact on the development of clusters, while the development of clusters impacts GDP and innovations which, in turn, affects the level of Latvia’s competitiveness.

Keywords: Innovation; Innovation cluster; Intellectual potential; Venture Capital; Competitiveness; Latvia

JEL Classification: R11; R58

DOI: https://doi.org/10.21003/ea.V168-06

1. Introduction

Contributing to the flow of capital, resources and labour, and enhancing technological progress in the world, the globalization process erases boundaries of states, reducing their self-identification. Multinational corporations are increasingly using resources of the developing countries, which results in environmental degradation and impoverishment of the population. Such corporations further their interests in the governments of host countries, which leads to corruption. Also, developed countries ensure growth of national economies partly due to resources obtained from developing countries. Consequently, for states lacking the desired level of competitiveness, globalization is an inclusive process having a negative economic impact, when economic development is possible only under the condition of having an improved mechanism to protect the country’s economy. This becomes possible due to a special qualitative system of its components: finances, education, public management, innovativeness and social cohesion, when innovative clustering based on intellectual potential, investments, venture capital and free economic zones is able to bring the economy of Latvia to the desired level of development and competitiveness.

2. Brief Literature Review

The classification of innovations proposed by authors such as P. N. Zavalin, A. V. Vasilyev [1] and A. I Prigozhin [2] allows us to not only form a view of the diversity of this concept but also to understand its functionality, its concept, its impact on the internal and external environment, and its dependence on many factors.

V. Nusratullin [3] describes intellect as a powerful source of energy of the material world. According to S. R. Paseka [4], the dominant role of the intellectual potential is able to enhance the labour process.

L. Plakhova [5], A. Dyrdonova [6], A. Skoch [7], J. Hauknes [8], E. Bochkova [9] studied the issues relating to the determination of cluster efficiency.

3. The purpose of the article is to study a relationship between various factors of innovative clustering of the regional economy, contributing to the improvement of Latvia’s competitiveness and investment attractiveness.

4. Results

On the one hand, innovations create new workplaces, contribute to the intellectualisation of labour and increase the level of education and culture. On the other hand, they cause...
unemployment which may threaten the economic security of the country. According to the authors’ opinion, the concept of innovation is best classified in the tables by P. N. Zavlin, A. V. Vasilyev and A. I Prigozhin. The classification of innovations allows focusing on some aspects relevant to innovations in the field of economic security of the country according to the speed of introduction, and the use of intellectual potential and its impact on social development (Table 1). It provides a different approach allowing us to draw conclusions in a different scientific context.

Based on the above, it is possible to consider innovations in fields such as import substitution, terms of introduction of innovations, economic security of the country, social background and society development. Clustering gives an opportunity to identify more promising innovations contributing to the emergence of favourable economic processes within the state.

**Intellectualisation of the triple helix of the cluster**

At the heart of any activity lies the understanding (intellect) of its direction and sense. Without the intellectual potential, it is impossible to identify the essence of what is happening in the country and to lead economic processes. As far as the dominant role of intellectual potential is recognised and confessed, we create conditions for the growing intellectualisation of labour activity, increasing the need in gaining knowledge, development of new knowledge and applying knowledge in the creation of new types of products, goods and services. S. R. Paseka considers that high-tech enterprises needed intellectually advanced employees rather than capital investments [4]. Innovative clusters, as a symbiosis of three structures, i.e. business, the state and science, represent a complex structure of interaction, where intellectual potential (IP) expresses itself depending on both the set values and the degree of given freedom.

Let us mark changes in Figure 1. Intellectual potential fills the cluster, giving it the basis. It predetermines its quality, saturation and volume and is able to change the size and activity of the cluster, as well as to extend the period of its life cycle.

V. Nusratullin considers that there has always been an important productive force in the economy, which is intellect, and a source of development and movement, which develops the achievements of scientific and technological process [3]. Nature keeps men of intellect free from physical labour in every possible way, giving such men more opportunities to be involved in mental activity, passing physical work to machines. Intellect has accelerated human evolution and human society, as well as its most important component, which is the economy. Extracting from the environment a certain amount of physical energy, man is able to transform it into intellectual energy, which is a special kind of energy, that cannot be described within the frameworks of physics or thermodynamics because the thinking ability of man is immeasurable and depends only on the physical state of man who is the bearer of the thinking ability. Thus, intellect is a powerful source of energy in the material world, where the development of clusters, and especially innovative ones, is impossible without the basic environment determining development and known as intellectual potential which, in its turn, depends not only on public policies, but also on the state of education and health-care of the country. Absorption of intellectual potential by the innovative cluster (IC) depends on the quality of public policies or management. The stance of the state policy towards the formation of the strategy of innovative clustering reveals many aspects of the economic development of Latvia. Innovative clusters, both existing and emerging, are actively changing the content of the economic activity of the country, increasing the country’s economic development and competitiveness. Yet, the clustering process as a way of Latvia’s innovative development is too slow [10].

As the basis for the development of innovative clustering, the intellectual potential of Latvia accounts for 4,000 scientists [11], of whom only 3-3.5 thousand are currently working as scientists, which is 75-88%. However, in order to raise the country’s GDP per capita per annum by USD 200, it is necessary to have 95% of scientists working in the field (Table 2).

**Impact of venture capital on the development of clusters**

Since venture capital is an important factor of development of clusters, let us consider the interrelation between the development of clusters and the availability of venture capital in the Baltic states and some developed countries of the EU, with the use of indicators of the Global Competitiveness Index [13]. Using the example of developed countries (Italy, France, Norway, Denmark, Sweden, the Netherlands, Spain, Austria, and Belgium) and the Baltic states (Latvia, Lithuania, Estonia), the models of innovative clusters were classified in the tables by P. N. Zaitseva, E. and Stradinya, S. (Table 2).

**Table 1: Classification of innovations**

<table>
<thead>
<tr>
<th>Classification feature</th>
<th>Classification of innovation groupings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Innovation type</td>
<td>Services, products, processes, methods, relations</td>
</tr>
<tr>
<td>2. Innovations as a factor impacting import substitution</td>
<td>Neutral, positive, 100%</td>
</tr>
<tr>
<td>3. Terms of introduction of innovations by the degree of the use of intellectual/innovation facilities</td>
<td>Complex, medium, easy</td>
</tr>
<tr>
<td>4. Impact on the economic security of the country</td>
<td>Protective, ineffective, neutral, negative</td>
</tr>
<tr>
<td>5. Impact on social background including the rate of well-being, unemployment and additional benefits</td>
<td>Negative, neutral, positive</td>
</tr>
<tr>
<td>6. Impact on social development including intellectual development and education</td>
<td>Negative, weak, medium, average, strong</td>
</tr>
</tbody>
</table>

**Table 2: Some aspects of intellectual potential, venture capital and clustering in Latvia, requiring adjustments**

<table>
<thead>
<tr>
<th>Name</th>
<th>Latvia</th>
<th>Development of EU countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenses on science</td>
<td>0.6-0.7 % of GDP</td>
<td>5-6 % of GDP</td>
</tr>
<tr>
<td>Expenses on education</td>
<td>5-7.6 % of GDP</td>
<td>5-9 % of GDP</td>
</tr>
<tr>
<td>Working scientists</td>
<td>75-88%</td>
<td>3-3.5 thousand out of 4000</td>
</tr>
<tr>
<td>Percentage of scientists of the total population</td>
<td>0.21%</td>
<td>0.44%</td>
</tr>
<tr>
<td>Clustering</td>
<td>35%</td>
<td>70%</td>
</tr>
<tr>
<td>Volume of venture capital</td>
<td>About 0.03% of GDP</td>
<td>About 0.3 % of GDP</td>
</tr>
<tr>
<td>Number of employees in clusters</td>
<td>20-30%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: Compiled by the authors based on [12]
Sweden, Finland and Denmark, as well as developing countries (Latvia, Lithuania and Estonia), let us calculate the total variability - venture capital and the level of development of the relevant clusters (Table 3).

The dependence of the development of clusters on the availability of venture capital is observed more in the developing clusters of the Baltic states, including Latvia, in comparison with some developed countries like Italy, Sweden, Finland and Denmark (Table 4). This proves a great need of the venture capital for the development of clusters of these countries. The difference between the developed and developing countries is about 40%, with about 7% for Latvia.

The availability of venture capital for innovative clusters is necessary because of the uncertainty in the economic path of Latvia, as well as because of the amount of financing from the state and the EU. Yet, one of the major deficiencies of the venture capital investments in Latvia is the underdevelopment of venture capitalists in the country [14]. To provide successful innovative clustering, the development of the venture market in Latvia should be carried out with the qualitative supervision from the part of the EU.

Latvia has potential not only for the development of the existing innovative clusters, using the venture capital, but also for the development of innovative clusters, since there are benefits such as a favourable environment in terms of financing on the part of the state and the EU, market of the innovative products in the EU and other countries and relatively developed infrastructure (intellectual, innovative, etc.). However, the tax policy of the state neither welcomes nor encourages these conditions of development as free economic zones and venture capital, is able to transform the region/country in accordance with the required result, i.e. lead it to the necessary level of social and economic development.

Having examined some of the positions of the authors (L. Plakhova, A. Dyrdonova, A. Skoch, J. Hauknes, E. Bochkova) regarding the determination of the efficiency/power of the cluster, we suggest methods to calculate the indicator of social and economic efficiency of the innovative cluster (IC) of either the region or the country, which includes the calculation of 11 coefficients (Table 5). More precise efficiency of IC can be traced through the use of options such as venture capital, FEZs, registered patents, the import-export ratio, etc. The socio-economic indicator of the efficiency of the innovation cluster is calculated as the arithmetic mean of the sum of the eleven suggested coefficients:

$$C_v = \frac{C_{vs} + C_{ic} + C_{ic} + C_{ip} + C_{ps} + C_{ps} + C_{sr} + C_{sr} + C_{vc} + C_{vc} + C_{fez}}{11},$$

The value of each coefficient is in the range from 0 to 1 (0 ≤ C < 1). Consequently, the power indicator of the cluster will take the value from 0 to 1 (0 < C < 1). Each coefficient can be calculated both independently and together with the other indicators for the total calculation of the effectiveness of the cluster.

Let us consider the coefficient (10) of the ratio of the attraction of venture capital (Cvc1) of the cluster to the attraction of venture capital in the region/country (Cvc2). Based on the research above, the economy of Latvia is clustered at the rate of 35%, therefore it is possible to calculate the coefficient from 2007 to 2015, when the investments of the Latvian public venture funds accounted for EUR 34.6 million [16]:

$$C_{vc} = \frac{C_{vc1}}{C_{vc2}} = 12.11/34.6 = 0.35.$$
With the increased attraction of venture capital in Latvia, there occurs an increase in the national income, since even a small increase in investments, as well as their decrease, causes significant changes in the growth of the national income [17].

Thus, the revenue graph of the state increases by EUR 80 million. The multiplier effect will increase this indicator by 2-4 times, while the profitability of the enterprises involved in the FEZs (within the IC and VC frameworks) increases by 30%, which allows investors to withdraw from the projects within a period of 5-7 years obtaining 100% profit.

**The interrelation of the examined factors**

Based on the above research, we determine the correlation index between Latvia’s indicators in the Global Competitiveness Index 2011-2016 such as innovations, availability of venture capital, higher education and the level of development of clusters in Latvia (Table 6).

This research confirms the impact of the development of clusters on the position «Innovations». Also, the availability of venture capital, higher education and training positively affect the level of development of clusters. We have noted a stronger impact of the development of clusters on innovations and intellectual potential in comparison with the other positions (Table 7).

Let us calculate the multifactor correlation between the index of competitiveness of Latvia (I) and VC (X3), IP (X2), CD (X1) of Latvia (Figure 2 and Table 8).

**Tab. 7: The indicators of the research of interrelation of venture capital, innovations, development of clusters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Coefficient of determination / overall variability</th>
<th>Average coefficient of elasticity</th>
<th>Average error of approximation</th>
<th>Correlation index</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC - Innovation (I)</td>
<td>0.00455 / 0.00455%</td>
<td>-0.0394</td>
<td>2.08</td>
<td>-0.0674</td>
</tr>
<tr>
<td>Development of cluster (CD) – Innovation (I)</td>
<td>0.5115 / 51.15%</td>
<td>0.312</td>
<td>1.18</td>
<td>0.715</td>
</tr>
<tr>
<td>VC – Development of cluster (CD)</td>
<td>0.136 / 13.60%</td>
<td>0.275</td>
<td>3.13</td>
<td>0.369</td>
</tr>
<tr>
<td>Higher education and training (IP) – Development of cluster (CD)</td>
<td>0.7126 / 71.26%</td>
<td>0.449</td>
<td>1.14</td>
<td>0.844</td>
</tr>
</tbody>
</table>

Source: Developed by the authors

**Fig. 2: Final interrelation between the development of clusters, venture capital, intellectual potential, innovations and GDP**

Source: Developed by the authors

Thus, based on Tables 8 and 9, the positions of VC and IP have a significant impact on the development of clusters, while the development of clusters impacts GDP and innovations which, in turn, affects the level of Latvia’s competitiveness.

**5. Conclusions**

Under conditions of globalisation, an increase of competitiveness due to the strengthening of the innovative clustering of the economy for small states the open economies is
a necessity. Due to the qualitative public management, such states trigger mechanisms helping to preserve their national identity and improve the socio-economic situation.

The Latvian innovative clustering, together with other factors boosting the country’s development such as free economic zones and venture capital, allows the region/country to obtain the required results by increasing intellectual potential and improving public management. This, in turn, leads to the necessary level of social and economic development, which raises the level of the country’s competitiveness.

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Received 27.10.2016

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