

Methodological support of the process diagnostics in the innovative cluster formation

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Abstract —The need for the transformation processes within the economic space in terms of its forms and principles is defined as one of the priorities of regional development and requires availability and application of the up-to-date strategic planning tools providing favourable environment for the major investment projects and economic empowerment in the region by means of concentrating financial and material resources as well as free movements of human capital. In this respect it is viable to consider methodological support of the innovation activity diagnostics and process diagnostics in the innovative cluster formation.

This study offers an approach to the innovative development diagnostics and process diagnostics in the innovative cluster formation in the region based on calculating the innovative clustering index in the region, which allows developing an algorithm of instant diagnostics of the cluster forming processes in the system of the innovative development of the region; the task of the algorithm being parameter estimation of the innovative clustering in the region.

The regions within the territory of the Republic of Crimea have been grouped according to a set criterion and the regulatory impact on the target groups of territories has been explained in relation to their innovative development and long-term plans of governmental, regional and sectoral management.

Keywords – cluster, innovations, innovative cluster, innovative development, diagnostics, cluster formation, region, territory.

I. INTRODUCTION

Currently, sustained economy in the country and its further development depend on its efficient development in the regions. The economic development being decentralized, its scale and course of changes in the regional economic complexes are conditioned by the priorities and strategic vectors of the innovative development in the regions. Today, in the global community, the dynamics of such changes relies on the innovative clusters. The processes of clustering in the innovative development of the region create healthy environment for generating innovations, stimulate production processes in making innovative products and, in general, increase competitiveness of separate structures within the cluster and have a positive impact on the regional development. Hence, it should be mentioned that formation of the innovative development system in the regions based on the clustering processes makes the foundation of the consolidated economic space of the country, and being the basis of

innovative development in the regions, innovative clusters play the key role in its genesis.

The innovative trajectory of Russia's national economy development as the only possible vector of the economic growth under the conditions of global competition predetermines relevant changes in the economy, i.e. in social life, intellectual sphere and human resources. New manifestations and active forms of innovative development appear and spread in the regions prompted by the processes of globalization, clustering, promotion of various information technologies in business cooperation, etc.

Therefore, it is important to put an emphasis on the realization of the fact that innovation is a competitive product that cannot be produced and made use of without availability of an adequate professional competence [1, 2].

The study involves the research of the key concepts and peculiarities of the innovative development in the region within the framework of the clustering processes, which allows for making a hypothesis that a cluster is a special-purpose association of enterprises, organizations and highly-skilled professionals targeting development, adoption and implementation of innovative cluster initiatives. The participants of the innovative cluster appear to be stakeholders in the system of the innovative development of the region.

Thus, the world globalization trends and growing international competition define the importance of intellectual work development as well as reactivation of inventive work and rationalization processes at the manufacturing facilities [3].

Innovative economy as a management category is subject to a certain conformity as it is both formally and informally focused on the approval and spread of innovations, innovative work, innovation technologies, innovative forms of cooperation and specialization, innovative clusters, innovative image and innovative culture [4].

The processes of cluster formation in the innovative development of the region require coordination between the economic, sci-tech and technological complexes. For this reason, finding solutions to the problems of innovative cluster formation and development is getting more and more prioritized.

The processes of cluster formation are expected to originate from the creation of regional innovative systems. At this point, the main emerging problem lies in coordinating the economic interests, performance of the government and of the businesses in the region for the purpose of finding a quick and efficient solution. The primary goal for finding the solution should be instant diagnostics of the innovative activity and innovative cluster formation processes in the region.

II. MATERIALS AND METHODS (MODEL)

To our reckoning, the tool of innovative cluster formation that provides for the relevant economic conditions is comprised of the analytical basis of the institutional mechanism of strategic decision-making and diagnostics whose objectivity depends on a number of factors, specifically the major ones being the informational complex, the analytical complex and both methodological and practical measures [5].

The goal of the diagnostics lies in having qualitative and timely information on the processes of systemic development of the innovation activity, its regional specifics, conflicts and problems.

TABLE I. STAGES AND FEATURES OF THE PROCESS

Stage	Features
Stage 1. Setting goals and tasks of the diagnostics	1. Setting the goal of the innovative activity diagnostics in the region. 2. Setting the tasks of the innovative development of the region based on the set goal. 3. Defining the indices of the innovative activity in the region.
Stage 2. Formation of the informational complex	1. Information system implementation. 2. Information deviations / Information filtration. 3. Information analysis.
Stage 3. Formation of the analytical complex	1. Diagnostics of the innovation activity on the macro- and micro-levels.
Stage 4. Defining methodological and practical measures	1. Making a diagnosis: bottlenecks detection and finding the development reserves of the territory development when forming innovative clusters.

The major tasks within the frame of the methodological support of the diagnostics include: development of contents, structure, indices, organizational procedure and carrying out of instant diagnostics of the innovative clustering in the region with the observation of the following points:

- preliminary estimation of the innovative clustering and innovation potential of the region;

- estimation of the instantaneous indices and development potential of the elements of the innovative infrastructure of the region;
- elaboration of the urgent measures to be taken in order to create the absent elements and strengthen the available elements of the innovative environment.

Scheme representing the analytical basis of the organizational and economic mechanism defining strategic decision-making in terms of innovative cluster formation

This research offers an algorithm of instant diagnostics of innovative clustering which involves a few stages:

Stage 1. Rationalizing the instant diagnostics practicability and selecting the estimation parameters of the innovative clustering.

It should be mentioned that the statistic data on the innovative activity in the Republic of Crimea is not complete and does not fully conform to the requirements of the analysis, forecasting, planning, business motivation technologies and clustering politics elaboration in the regions, sectors and the country. Thus, the need to reveal the real environment of innovation activity and available statistic data allow for the instant diagnosis of the innovative clustering on the basis of the innovation activity index of the region.

The innovation activity index is a relative ratio characterizing the innovation activity of the region from the point of view of human resources (the staff involved in the scientific and innovative work), results of the innovation activity and potential available in the region.

Stage 2. Defining the innovative clustering indices and formation of the information database.

The innovative clustering indices [6] can be traced via the analysis of the available data on the state and dynamics of the innovative development of the Republic of Crimea and its regions. In this research it has been suggested to calculate the estimation indices of the innovative clustering as the human resources coefficient, innovation activity coefficient and innovation potential coefficient as per each region, which are supposed to mold into the region’s innovative clustering index (1):

$$ICIR = \sum_{ij} = 1 K_{ij} \quad (1)$$

where ICIR is the innovative clustering index of the region;

K_{ij} is the integral component of the innovation activity indices of region j.

Broad indicators of the instant diagnostics of the innovative clustering in the region are as follows:

- Human resources coefficient shows the level of employment in the innovation activity of the region and, to a large extent, reflects its intellectual potential.
- Innovation activity coefficient shows the concentration of the innovatively active enterprises, i.e. the number of organizations involved in the

innovation activity as well as the extent of the innovative product adoption by such organizations.

- Coefficient of innovation potential shows the capability of the region to make and use innovative products that appear to be the result of the scientific organizations' activity in the region.

Stage 3. Formation of the information database required for the instant diagnostics according to the set parameters and indices.

Stage 4. Defining methods and tools of data collection: statistics collection and making inquiries for information according to the indices.

Stage 5. Analysis of the received data (processing and systematization).

Stage 6. Instant diagnostics according to the set parameters.

Stage 7. Making recommendations on the innovative clustering formation processes in the innovative development of the region.

III. RESULTS AND DISCUSSION

The table below shows the coefficients forming the innovative clustering indicator of the region in 2018 calculated according to the abovementioned formula.

TABLE II. GROUPING OF TERRITORIES OF THE REPUBLIC OF CRIMEA ACCORDING TO THE INNOVATIVE CLUSTERING INDICES (CALCULATED BY THE AUTHORS)

Region	Innovative clustering index	Zone
Simferopol	14.3	High
Sevastopol	12.8	
Kerch	6.48	Average
Bakhchisaray District	1.25	Low

This paper should give sharper focus to the features of the innovative cluster via the example of the city of Sevastopol where the innovative industrial cluster of mechanic engineering and programmable electronics of Sevastopol is being formed. Design of the innovative industrial cluster in precise engineering in Sevastopol is explained by the city's traditional and historical pertinence to this industry, its impact on the industrial specialization of the city in terms of the territorial labor differentiation and by its untapped potential. The mechanic engineering cluster sets a goal of making conditions for the rapid development of the industry in the city on the basis of the available innovative mechanic engineering competences (educational, scientific, industrial and experimental). The planned target amounts to 16 billion rubles of produce by 2020. OOO "Sevastopol electrical engineering plant" has become one of the cluster participants and has already started processing its first production orders [7-9].

The next step is ranging the regions of the Republic of Crimea according to the received indices while ranking them. For this purpose the grouping has to be made according to the

three zones in increments of five at the following intervals of the innovative activity development in the region:

- zone 1 – up to 10.00 and higher – the territories are actively engaged in the innovation activity, adopt it in their production processes and have a high potential of innovative development, i.e. have intellectual and material resources necessary for the sustained innovation activity development. The territories staying within this interval refer to the zone with high innovation activity;
- zone 2 – from 10.00 to 5.00 – territories that, though constantly engaged in the innovation activity, face certain difficulties; innovation activity in the regions of this group is developed but fails to take the leading position among the sectors of the region; thus it either performs a servicing function or takes on a complimentary role in a certain industry. The regions falling within the interval are in the average zone of innovative clustering;
- zone 3 – 5.00 – 1.00 – territories that do not prioritize innovative development and where it has just started to develop or remains at a low level and requires elaboration of special programmes to make a drastic change in the innovation activity and investments. Such territories make a zone of innovative cluster formations with low innovation activity.

Adoption of the new regulatory measures is expected to change the models of the innovation activity development, innovative environment in terms of space according to the and economic and social interests of the regions and activation of the innovative clustering processes. The regions considered in this study require specific political, strategic and tactical measures as per each group [6].

The strategic mission of innovation management and its regulation in the market environment lies in choosing the best mode of management effect accumulation. On the level of innovative projects, the tactical mission is to join forces in order to focus on the implementation of innovative projects and provide the key resources for the innovations.

IV. CONCLUSION

Within the frame of this scientific study, it is noteworthy that the Republic of Crimea has sufficient potential for the innovative cluster development, which also concerns a fair number of trained staff with PhD degrees that may contribute to the implementation of the strategy of innovative development. The increased innovation activity of the manufacturing enterprises shows positive dynamics as well as that of the enterprises that have already implemented their projects.

Increasing gross expenditures on the innovation activity as well as budget expenditures on the research and projects prove the viability of innovative cluster development in the future.

The groups of clusters referred to in this study contribute to the formation of a new vision as for the innovation activity support, conceptual approaches to the regulation of the cluster forming processes, defining the new forms of innovative integrative processes within the global community and management technologies applicable for business incubation and business acceleration, etc.

Such kind of diagnostic research requires:

- setting priorities in establishment and support of cooperative connections between enterprises, organizations and educational establishments;
- setting special IT-platforms providing for the cooperation on the level government – business – science and focused on the support of the innovative clusters;
- establishing institutions providing support for cluster formations taking into account the specifics of the regional innovation environment.

Thereafter, applying the method of instant diagnostics of the innovative clustering in the region resulted in the following:

A) Objective estimation of the clustering processes in the innovative development of the region in several fields, i.e. innovative infrastructure development based on the sci-tech potential of the region; increased efficiency of the scientific results commercialization (in higher educational establishments and scientific organizations of the region); collecting data on the potential of innovative cluster formation in the regions of the Russian Federation.

B) Elaboration of the key rules and methodological support of instant diagnostics: simplicity of use due to the estimation of the globally acclaimed parameters when forming the regional innovative environment and accessibility in the statistical statements; completeness reflected in the estimation of the results of the innovative activity and making decisions about methods and mechanisms of forming innovative clusters; functionality defined by the possibility of providing better functioning of regional administrative bodies, including motivation, control and organization of the activities of the regions as parts of the innovative sector or defined as a special managerial function to detect potential and resources for the innovative development of the region.

Thus, the priority of the innovative activity in the Republic of Crimea having been declared, it is required to accelerate the development and implementation of the cluster concept while taking into consideration the global experience and actively promoting such concept.

The cluster approach is capable of increasing competitiveness of the local businesses and having a positive

impact on improving effectiveness of the economic policy implemented by the authorities in the regions. Formation of innovative clusters in the domestic economy appears to be the only acceptable way out of the crisis situation that may increase the economy's competitiveness compared to the well-developed players on the global market and provide for the quick and efficient initiation and implementation of innovative projects, new knowledge, scientific discoveries and inventions.

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