INNOVATIVE ECONOMY: TRENDS AND EVALUATION OF THE EFFECTIVENESS OF INNOVATIVE PROCESSES

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Summary: In scientific view, an innovative economy is an economy that is based on knowledge, new achievements in science, technology and highly intellectual capital. The article defines the main components of the innovative economy, each of which reaches a competitive level according to international criteria: first of all, it is innovative potential; institutional innovation system; innovative infrastructure and highly organized forms of interaction of economic entities, including innovation centers, technoparks, technopolises, clusters, venture business and others; favorable environment for human capital growth. In the course of the study, we have given scientific credence to the indicators of innovative development of economy, criteria and indicators for assessing innovative nature of production, innovation activity at the levels of enterprises, organizations, territories, as well as indicators of innovation commitment of economy and the effectiveness of innovative processes.

**KEYWORDS:** INNOVATIVE ECONOMY, INDICATORS OF INNOVATIVE ECONOMIC DEVELOPMENT, CRITERIA, INDICATORS OF INNOVATION LEVEL, EVALUATION OF INNOVATIVE PROCESSES EFFECTIVENESS

**Introduction**

Innovative economy is a non-alternative vector of business development, both for separate territories and the whole country, as it ensures their competitiveness in production and in the world markets. Practices of implementing innovative strategies in recent years have shown a lack of administration and investment in certain programs. Innovative economy requires creating the development basis in the unity of the productive forces and production relations in the framework of the general economic environment. At present, the processes of developing innovative economy are constrained by the problems of science financing, modernization of facilities in scientific laboratories and institutes, as well as the problems of training innovative specialists. Undoubtedly, the lag in scientific and technological support of educational process, in its interaction with production, insufficient innovative activity of business in this direction, its low financial capabilities – all have a negative impact. Since innovative processes require investments, in this regard, in the process of their analytical evaluation it is necessary to assess not only the innovative potential and innovative activity of economic entities, but also their economic effectiveness on the basis of integral approach, which requires developing a system of indicators and algorithms for their calculation.

**Materials and methods of research**

Theory and methodology of the study are based on fundamental works of domestic and foreign economists in the fields of regional economy, distribution of productive forces, theory of integration, concept of national systems of innovation, theory of clusters. The database of the research has been formed from the official data on economic potential of the Russian regions, in particular, the Altai Territory and the Republic of Kazakhstan, the achievements of science and education, their realization in practice, presented in official statistical editions, on the Internet; materials of personal observations of the authors. The main research methods are as follows: monographic, system analysis, statistical, abstract-logical, economic-mathematical, system modeling, expert assessments. The research is based on dialectical, system, cluster, business process approaches.

**Results and discussion**

Studies have shown positive dynamics and acceleration of innovation processes not in all regions of Russia. In the Siberian Federal District, the share of organizations engaged in technological, marketing and organizational innovations in the total number of the surveyed organizations is increasing only in two regions out of twelve – in the Tomsk Region and the Altai Territory (Table 1).

**Table 1. Innovative activity of organizations, %**

<table>
<thead>
<tr>
<th>Years</th>
<th>2010</th>
<th>2013</th>
<th>2015</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian Federation</td>
<td>9.5</td>
<td>9.3</td>
<td>9.3</td>
<td>8.5</td>
</tr>
<tr>
<td>Siberian Federal District</td>
<td>8.2</td>
<td>9.1</td>
<td>8.0</td>
<td>7.3</td>
</tr>
<tr>
<td>Altai Territory</td>
<td>8.2</td>
<td>11.3</td>
<td>12.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Novosibirsk Region</td>
<td>5.5</td>
<td>9.9</td>
<td>9.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Tomsk Region</td>
<td>18.4</td>
<td>14.6</td>
<td>12.8</td>
<td>14.0</td>
</tr>
</tbody>
</table>

*Compiled according to the source [1].

Furthermore, indicators of innovative activity of the organizations in those regions exceed average indicators of the Siberian Federal level and the average Russian (Fig. 1).

However, in the implementation of the strategy of innovative economic development, it is important to determine not only the level of innovative activity in organizations, but, to a greater extent, the effectiveness of innovative processes, investment in innovation, ultimately, the effectiveness of the implementation of innovative strategies. The effectiveness of innovative processes is influenced by a large number of factors, which are schematically presented in Fig. 2.
An important factor in the effectiveness of innovation, in our opinion, should be considered the degree of innovation commitment, i.e. demand for innovation results in the economy and society. In modern science and practice, a single integrated approach to the innovation commitment to innovations in all spheres of society has not yet been formed [2,3,4], a model of open innovations requires national adaptation and updating [5,6].

When building a model, on the basis of the concepts of the main innovation systems and the necessary conditions for economic growth of the innovative type, we recommend four main levels: individual; organizational; integrated formations, including territorial clusters; and regional. It has been revealed that the degree of innovation impact on their development is determined by the presence and condition of innovation infrastructure in the region, institutional and organizational conditions, innovation policy. In order to determine the level of innovation and efficiency of innovation organizations, research and production systems and regions, we propose an integral indicator of innovation activity in the region, which can be calculated by the formula:

$$IPa = \sum p_i c_i,$$

where $IPa$ – integral indicator of innovation activity; $p_i$ – weight of the individual $i$-indicator of innovation activity; $c_i$ – points depending on the change of the individual $i$-indicator of innovation activity.

The main indicators characterizing innovation activity are presented in Table 2.

### Table 2. Key indicators of innovation activity in the region

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Calculation formula</th>
<th>Designation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Innovative capacity of industrial production ($I_{ip}$)</td>
<td>$X_1=I_{ip}=C_{ip}/V_{ip}$, where $C_{ip}$ – costs on technological innovations of enterprises; $V_{ip}$ – volume of industrial output</td>
<td>$X_1$</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2. Share of costs for technological innovations in the cost of innovative products of industrial enterprises ($S_{ip}$)</td>
<td>$X_2=S_{ip}=C_{ip}/V_{ip}$, where $V_{ip}$ is the volume (evaluation) of innovative products of industrial enterprises</td>
<td>$X_2$</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3. Share of innovative products in total industrial output ($S_{io}$)</td>
<td>$X_3=S_{io}=S_{ip}/S_{io}$</td>
<td>$X_3$</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4. Innovative returns ($R_{ip}$)</td>
<td>$X_4=R_{ip}=1/I_{ip}$</td>
<td>$X_4$</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5. Share of innovation-active enterprises ($S_{n}$)</td>
<td>$X_5=S_{n}=Q_{n}/Q_{t}$, where $S_{ip}$ is the share of innovative active enterprises in the total number of the surveyed enterprises; $Q_{n}$ – quantity of innovation active enterprises; $Q_{t}$ – total quantity of surveyed enterprises</td>
<td>$X_5$</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6. Share of integrated formations of education, science and production systems</td>
<td>$X_6=S_{ip}=Q_{o}/Q_{t}$, where $S_{ip}$ is the share of integration units in the total number of enterprises; $Q_{o}$ – quantity of enterprises, organizations in integrated formations; $Q_{t}$ – the total quantity of organizations and enterprises in the region</td>
<td>$X_6$</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
To calculate the innovation activity it is necessary to trace the nature of changes in the calculated indicators of innovation activity (\text{"+" or \text{"-"}) and, depending on it, to assign to each indicator the corresponding point (Table 2).

Taking into account the obtained points, we calculate the final integral indicator of the innovative activity of the region according to the basic formula:

\[ I = X_{11}C_{11} + X_{12}C_{12} + X_{13}C_{13} + X_{21}C_{21} + \ldots + X_{61}C_{61} + X_{62}C_{62} + X_{63}C_{63}. \]

(2)

Depending on the obtained value of the final indicator, it is advisable to determine the level of innovation activity of the region through the following criteria:

- the value of the integral indicator of innovation activity varies from 3 to 2.5 – the region has a high level of innovation activity;
- from 2.4 to 2 – the region has an average level of innovation activity;
- from 1.9 to 1 – the region has a low level of innovation activity;
- from 0.9 to 0 – the region has a low level of innovation activity and is unattractive for potential investors.

Thus, the calculation of the integral indicator by the proposed method allows to identify weaknesses and strengths in achieving innovation activity in the region, taking into account the development or slowdown of integration processes in the fields of science, education and production.

Creating conditions for commitment to innovations in economic entities of the region provides a group of activities related to the legal and regulatory support of innovation, regulation of innovation policy, public awareness. The most important role belongs to the human factor, which has the main potential and at the same time – the main danger in creating innovation commitment of economic entities.

Conclusion

Limited opportunities, territorial and administrative isolation of the regions with a peripheral geographical location, including the Altai Territory, as well as other territories adjacent to Kazakhstan, do not allow a fast creation of a highly effective basis for innovative development in each individual territory. While a number of technologies that are of interest for business have been offered by science, business is financing development of only 15-20% of the technologies, and cannot participate in more than 60% of the innovation developments.

Modern innovative production makes it necessary to expand the integration of science, education and production not only in the economic but also in the territorial aspects. Integrated forms of science, education and production become the basis of innovative economic development, and their interaction goes beyond a single administrative unit, extending to the adjacent, cross-border territories. At the same time, the core of development is formed in the form of a cluster representing a localized innovation subsystem of cross-border regions. In this regard, development of theory, methodology and recommendations for the practice of spatial integration of science, education and production, formation of spatially localized innovation subsystems including cross-border areas on the basis of their innovative potential is an urgent problem that has not received due attention in the economic research yet.

Bibliography