RUSSIAN REGIONS’ INNOVATIVE DEVELOPMENT ANALYSIS

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ABSTRACT

The article describes the problem of Russian regions ranging by the indicators of innovation development. Author suggested step-by-step analysis of the regions’ innovation conditions. As the result the homogeneous groups of regions have been found out. Author called them “clusters”. There are five clusters: the capital city, leading regions, active developers, active producers of innovative production and the passive ones.

Key words: region, innovative development, cluster, an indicator, clusters type.

1. INTRODUCTION

The innovation strategies of enterprises depend on the regional conditions as well as on the country’s socio-economic conditions and innovative development. Especially it is very important to take the regional particularity into account for so big and economic diversified country as Russia. Today the attempts to differentiate Russian regions by the innovation development level are made by several scientists. In 2006 two sets of three clusters were marked out by E.Koveshnikova and I.Shchepina: three by innovative potential and other three by innovative potential implementation. The 79 regions were analysed (Koveshnikova, Shchepina, 2006). In our opinion, it is a problem that all clusters, formed by the innovative potential, were heterogeneous. It is difficult to make any conclusions even for the first cluster which included Moscow, Saint-Petersburg, Moscow region and Nizhny Novgorod region because Moscow passes ahead of other regions by completely all parameters. Clusterisation by innovative potential implementation brought to forming of two small clusters (just 12 regions) and one big cluster (67 regions). We do not deny that most of Russian regions could be united into the one big homogeneous group, but this would be inefficient in terms of regions’ innovation policy elaboration. We need to detect the important distinctive characteristics which identify innovation processes in Russian regions. That is why the further analysis is necessary. In the sequel O.Golichenko and I.Shchepina suggested to range regions by the participation in the processes of innovation adsorption and diffusion on different territorial markets. Separate groups (cores) characterised by different innovation diffusion level were marked out of clusters (Golichenko, Shchepina, 2009). As a result the clusterization by other indicators was needed; the quantity of clusters was increased to 4; clusters were considered as independent meso-objects (Shchepina, 2009). First analysis’s clusters were braked out. That let us suppose the further cluster analysis is necessary.

2. THE METHOD OF THE RUSSIAN REGIONS ANALYSIS BY INNOVATIVE DEVELOPMENT INDICATORS

The indicators of innovative development represented in the official statistics were taken for the analysis (Regions of Russia..., 2008). The specific character of Russian territorial organisation was considered. In addition few regions have unstable statistics. That is why we chose 78 regions with stable
socio-economics and innovative statistic indicators. There are 11 indicators. Nine of them show the innovative development in terms of used resources (organisations, personnel, expenditure level); the amount of organisations with R&D (units); the amount of personnel in R&D (persons); the internal costs in R&D (millions of roubles); the amount of researchers with academic degree (persons); the amount of organisations realising innovations (units); the specific weight of organisations realising innovations (%); the technical innovations costs (thousands of roubles); the volume of innovation goods, works, services (millions of roubles); the volume of innovation goods, works, services (%). They are accordingly numerated as 1, 2, 3, 4, 7, 8, 9, 10, 11. In addition there are two indicators which show the results of innovation implementation: the amount of created AMT (advanced manufacturing technologies; units); the amount of used AMT (units). Their numbers are 5 and 6.

The most interesting period for the analysis is the period of 2000-2007. It is a period of favourable business conditions. Russia and its regions as well as organisations in tote had all the resources they need for the innovative development. We analysed the regions’ conditions to the beginning (2000) and to the end (2007) of chosen period. In consideration of different dimension of the indicators we made their normalization:

$$\frac{x_i - x_{\text{min}}}{x_{\text{max}} - x_{\text{min}}}$$  \hspace{1cm} (1)$$

where: $x_i$ – value of the indicator, $x_{\text{min}}$ – minimal value of the indicator in the array, $x_{\text{max}}$ - maximal value of the indicator in the array.

As the positions of the regions were changing during the analysis so we gave the constant number to all of them. All numbers correspond to the regions’ positions in the initial information collection that was formed on the base of the official Statistical Year-Book. We used MS Excel and Statistica 6.1 software to the goals of cluster analysis. The step-by-step approach for clusters selection was used.

Regions in clusters were appointed in Euclidean space. The normalization was made by formula 1. The derived dendrogram let us select at least five clusters, but three of them demonstrated similar trends of the innovative development. So we decided to appoint three clusters. This situation peculiar to Russian regions in 2000 as well as in 2007. As we mentioned earlier, E.Koveshnikove and I.Shchepina confined themselves to consider three clusters one of which consisted of big group of regions. In spite of indicators difference the obtained results were almost the same. In our analysis we obtained the first cluster, consisted of Moscow, the second one consisted of seven developed regions: Republic of Tatarstan, Perm Territory, Moscow region, Nizhni Novgorod region, Samara region, Sverdlovsk region and Saint-Petersburg. The derived result made us to select Moscow as separate cluster and to exclude it from the further analysis.

3. THE INNOVATIVE DEVELOPMENT CLUSTERS’ STRUCTURE

Moscow as separate cluster has all necessary conditions for the regions’ and organisations’ innovative development. Without Moscow the new clusters’ structure was formed in 2000:
- 1st Cluster – Moscow region and Saint-Petersburg;
- 2nd Cluster – Republic of Tatarstan, Perm Territory, Volgograd region, Nizhni Novgorod region, Samara region, Sverdlovsk region and Chelyabinsk region;
- 3rd Cluster contains 68 left regions.

The Moscow region’s and Saint-Petersburg’s leadership expressed by 9 indicators. At the same time they are behind the cluster 2 regions by indicators 8 and 9.

In 2007 the clusters’ structure changed a little:
- 1st Cluster – Moscow region, Nizhni Novgorod region, Saint-Petersburg;
- 2nd Cluster – Republic of Tatarstan, Perm Territory, Samara region, Sverdlovsk region, Tyumen region and Chelyabinsk region. As we can see Nizhni Novgorod region moved to the more developed cluster, Tyumen region entered this cluster and Volgograd region exited the cluster.
- 3rd Cluster contains 68 left regions. Like in earlier stages third cluster has absolute majority of regions. That requires isolating of this group for more detailed analysis of the development trends.
Thereto we exclude the leading group of regions besides Moscow. They are: Republic of Tatarstan, Perm Territory, Moscow region, Nizhniy Novgorod region, Volgograd region, Samara region, Sverdlovsk region, Chelyabinsk region and Saint-Petersburg. By virtue of leading positions of these regions we called them “leading regions”. This group is characterised by high level of economic, industrial and innovative development.

The excluding of the leading regions let us to make the third step in our analysis – dividing the biggest group of regions into separate components. At this step in 2000 the group was divided into three clusters:

- 1st Cluster – Rostov region and Novosibirsk region;
- 2nd Cluster – Republic of Bashkortostan, Udmurt Republic, Krasnodar Territory, Altai, Khabarovsk Territory, Vladimir region, Voronezh region, Kaluga region, Orel region, Tver region, Tula region, Yaroslavl region, Vologda region, Volgorod region, Saratov region, Ulyanovsk region, Tumen region, Kemerovo region and Tomsk region;
- 3rd Cluster contains 47 regions.

The excluding of the leading regions brought to the “new leading group” forming – Rostov and Novosibirsk regions. They are characterised with “capital” trends – cluster passes ahead of other regions by the majority of indicators (1, 2, 3, 4, 5, 6, 7, 9). The first and the second clusters are almost coinciding with each other in the indicators 6 and 9. The second cluster leads in the 8th indicator. The third cluster is falling behind the first and the second by every indicator except the 11th.

In 2007 the clusters’ structure changed:

- 1st Cluster – Krasnoyarsk Territory, Voronezh region, Kaluga region, Rostov region, Saratov region and Novosibirsk region;
- 2nd Cluster – Republic of Bashkortostan, Republic of Mordovia, Udmurt Republic, Chuvash Republic, Krasnodar Territory, Altai, Belgorod region, Vladimir region, Tula region, Yaroslavl region, Vologda region, Kaliningrad region, Volgograd region, Orenburg region, Ulyanovsk region, Irkutsk region, Kemerovo region and Tomsk region.
- 3rd Cluster contains 44 regions.

As we see, in the leading cluster over the period of 2000-2007 entered Krasnoyarsk Territory, Voronezh, Kaluga and Saratov regions. The third cluster is characterised by the lowest level of all indicators.

During the analysis we mentioned the relative convergence of the third cluster with the others by the indicators 7 and 8 (the amount of organisations realising innovations/units; the specific weight of organisations realising innovations/%). One can see the pronounced regularity on the every step – leading regions have low level of these indicators and vice versa. Probably the problem is that they are registered by sample observation and the objectivity of the results could be different depending on the representativeness of sample.

So we excluded these indicators from the analysis and got the clusters’ structure change.

Table 1: Russian regions’ three clusters division (2007, w/o leading-regions, w/o indicators 7 and 8)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Clusters’ average normalised indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1</td>
<td>Cluster 2</td>
</tr>
<tr>
<td>1</td>
<td>0,57159</td>
</tr>
<tr>
<td>2</td>
<td>0,443871</td>
</tr>
<tr>
<td>3</td>
<td>0,450100</td>
</tr>
<tr>
<td>4</td>
<td>0,260385</td>
</tr>
<tr>
<td>5</td>
<td>0,545455</td>
</tr>
<tr>
<td>6</td>
<td>0,318325</td>
</tr>
<tr>
<td>9</td>
<td>0,517410</td>
</tr>
<tr>
<td>10</td>
<td>0,313770</td>
</tr>
<tr>
<td>11</td>
<td>0,093190</td>
</tr>
<tr>
<td>Sum</td>
<td>3,514265</td>
</tr>
<tr>
<td>Regions</td>
<td>3, 4, 6, 17, 35, 38, 39, 40, 52, 63, 66, 68</td>
</tr>
</tbody>
</table>

In the Table 1 we can see the following clusters’ structure.

1st Cluster – Republic of Bashkortostan, Krasnodar Territory, Krasnoyarsk Territory, Vladimir region, Voronezh region, Kaluga region, Yaroslavl region, Volgograd region, Rostov region, Saratov region, Novosibirsk region and Tomsk region. These regions have relatively high level of innovative develop-
ment in 2000-2007. By seven of nine indicators (1-9) and by the sum of normalised indicators it passes ahead the second cluster. This cluster has high innovative development potential, activity in producing and implementing AMT and low level of innovation production. We can describe this cluster as “active developers”.

2\textsuperscript{nd} Cluster – Republic of Mordovia, Belgorod region, Vologda region, Kaliningrad region, Ulyanovsk region and Kemerovo region. It is characterised by following conditions:
- low level of the indicators which describe the innovative potential (1, 2, 3, 4);
- middle level of the innovation producing indicators (5, 6, 9);
- high level of production indicators (10, 11).

In general terms the regions of this cluster we can describe as active producers of innovative production.

3\textsuperscript{rd} Cluster contains 50 regions and can be characterised the following way:
- low level of all indicators;
- the similar level of indicators 1, 2, 3, 4 with the second cluster and 11 with the first cluster;
- high homogeneity of all indicators (0,05 to 0,18).

We can describe this cluster as “passive”.

4. RECOMENDATIONS

The results of step-by-step cluster analysis show us the possibility of the division all Russian regions on five different groups. The first group consists only of Moscow. It differs by its development from all other regions. It falls behind only by the production level. But this seems natural and does not need to be changed – there is no matter to concentrate great values of manufacturing. Vice versa it is necessary to intensify those components of innovative development which are specified by its competitive advantages (first of all – the financial resources). The second group consists of developed industrial regions. In consideration of great manufacturing concentration and as a result strong inertia in production structure the most acceptable strategy is the strategy of allocating of the innovative development zones – zones of innovations generating and implementing. The third group consists of regions with relatively high level of innovation generating. As the innovation production is its weakness, it is necessary to intensify the innovation implementation in those regions. The forth group is notable for low level of innovations generating, relatively high level of innovative production and sufficiently developed industry. It is not necessary to increase the innovation generating volume. It requires long period of time, considerable financial, material and human resources. That could become a problem for the regional strength – innovation distribution. The recommended strategy – the faster production and distribution of innovations which were made in other regions and abroad. The fifth group – the biggest one, consists of majority of Russian regions. It has low and poorly used innovative development potential. The recommended strategy – the forming of innovative growing points with the goals of institutional environment improvement.

REFERENCES


