

Improvement of Instruments of the State Cluster-Based Policy in the Contexts of Economic Entities Interrelation Assymetry

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Abstract: The present article suggests the mathematical-statistic approach to increase state policy justification in the sphere of territorial clusters' development. The author made an analysis of the current tools of the cluster development planning, as well as has improved the system of indicators and has complemented the categorical instrument. It was shown that with the limited resources at the regional level the cluster approach produces the maximal effect. The present article has detected the role of dualistic interrelations of economic entities at the labour market. It was shown that the separation of the state policy onto the social and economical problems of spatial development produces the synergistic effect through the activation of economical growth points and human potential building. By the example of regions of the Volga federal district the author evaluates the algorithm for detection of the economic cluster and mechanisms of socio-economic status improvement.

Key words: Economic cluster • Organized socio-economical processes • Cluster-based policy • Irrationality of economic entities • Competitiveness poles

INTRODUCTION

The market relations as it is postulated in the classical economics are maximum effective in equilibrium conditions. Among the main objects of the state as one of the key agents of interrelations is to provide such equilibrium. But the efforts to maximize the regional development effectiveness are imposed with the set of limitations. First of all, in the market economy conditions the state policy has a quite wide range of the bargaining chips, but each of them has a mediate, probable role in contradistinction from the planned management system. Secondly, the available budget resources and opportunities to attract the investments at the regional level are seriously limited. Thirdly, the emphasis of attention on production processes can lead to the failures in the social sphere and to slow down the human potential growth which is the base factor of competitiveness [19; p.9] at the modern stage of development. Fourthly, the economic efficiency of any market or nonmarket entities is limited by the real irrationality in the human's behavior-its main component.

The form of the regional state policy at limitation of resources is the cluster-based policy focused on the search for the points of growth, development of small and medium-sized companies around the large-scale concerns, labour market state optimization not only from the position of the employer, but also from the position of the employee and, finally, the increase in innovative potential of the field and the region competitiveness. The policy of the cluster-based development includes the criteria and indicators of effectiveness of the cluster foundation as a separate institute of the regional development [6].

MATERIALS AND METHODS

In the present article we are basing ourselves on the current European approach which is called "the competitiveness poles" [1; 15; 20]. This approach is based on the partnership between business, central and local authorities.

In order to identify the economic clusters we suggest *the system of criteria* by which the clusters differ from the intersectoral conglomerates and *the combination of multiply statistical methods*.

The *system of criteria* was built on the set of statistical indicators and fixed threshold values:

- Labor productiveness (ratio of the field GVA to the volume of employment in the region). In economic cluster the labor productiveness on types of economic activities is above the meanregional in virtue of the more improved organization-technical processes usage.
- Local manufacturing content. The economic cluster is characterized by the high concentration and specialization of production and, consequently, the share of the GVA produced in it on a per company basis is above the meanregional. Here the coefficient of the local manufacturing content of the i type of economical activity in the k region [10] is used as a criteria indicator:

$$K_{ik} = \frac{q_{ik}}{q_i} \cdot \frac{Q_k}{Q},$$

where q in the numerator is the volume of the gross value added in i type of economic activity of the k region and in the denominator-countrywise in general Q is the GVA of the k region and GDP of the Russian Federation respectively.

- Production profitability. As the economic cluster is a growth driver of the region, the companies and enterprises included into it have a nonnegative average profitability.
- Attractiveness for employees. The attractiveness of employment in the cluster's enterprises shows itself in the higher-than-anticipated growth of labor remuneration over the productiveness and, consequently, the indicator of the unit labor remuneration [3; 7] shall differ from the average region-wise one to the higher side.
- The investment concentration in the cluster on the background of the meanregional volume. The economic cluster defines the key investment flows into the region and, consequently, the investments per involved in the cluster's fields shall exceed the typical region-wise. The same can be said about the dynamics of the share of investments in the cluster's enterprises in comparison with the general dynamics.
- The level of involvement in the cluster. The core of economic cluster is the large-scale enterprises and, consequently, the average number of the personnel involved in the cluster's enterprises shall differ from

the generally regional one. At the same time the success of the cluster development depends on the survival capacity of new productions, start-ups and innovative companies [22, p.17]. That's why it is so much important to make an assessment of forms of the average staffing number distribution in the cluster enterprises as compared to the generally regional one.

- The organization of the cluster's development. If we proceed from the systems theory [as, for example, 17] and take the economic cluster as a system, then we should follow few special arrangements. Firstly, this is the entirety, i.e. the availability of elements which can be considered as the sub-systems; secondly - the substantial connections between the elements and their properties which on tightness excel the connection with other elements not included into this system; thirdly - the organized nature of the system's elements; and fourthly-the existence of integrative characteristics peculiar to the system in general, but extrinsic to non of its elements in separate. This criterion was assessed using the coherence index/divergence structure [9, p.47]:

$$I_{A,B} = n_A \frac{\sum r_A^2 (1-\alpha)_A}{\sum (1-\alpha)_A} \div n_B \frac{\sum r_B^2 (1-\alpha)_B}{\sum (1-\alpha)_B};$$

$$I'_{A,B} = n'_A \frac{\sum r'^2_A (1-\alpha')_A}{\sum (1-\alpha')_A} \div n'_B \frac{\sum r'^2_B (1-\alpha')_B}{\sum (1-\alpha')_B};$$

where r^2 is a determination coefficient, $1-\alpha$ is a significance value, n is the number of coherence (primed-divergence) elements, A and B are the criteria indicators from items 1-6.

The combination of multiply statistical methods includes the hierarchical (*Ward, Euclidian distances*) and divergence (*k-means*) methods of the cluster's analysis, unidimensional analysis of variance (*ANOVA*) [24].

The logical scheme of analysis is given in the following form:

We will compare the results of the multiply statistical analysis with the indexes of coherence/divergence structure which will lay a point onto the real intersectoral dependence and systemacity in dynamics of each regional cluster development.

The approbation of the approach given above is presented in a special Statistica v.10 package on the example of seventh neighboring regions of Russia for 2006-2011 (Volgograd, Voronezh, Penza, Samara, Saratov, Tambov and Ulyanovsk regions).

RESULTS

As a result of computation we have received the characteristics of the actual state and dynamics of economic clusters in the Volga regions. For this, first of all, the received k-clusters were checked for compliance with the criteria of economic clustering. Secondly, we have made an assessment of the clusters' inner density. Thirdly, we have changed the coherence of economic clusters' development. And fourthly we have examined the equilibrium between the economical (cluster) and social policy (warded benefits).

The results of the analysis are given in Table 1; the detached (found) economic clusters are market with the semibold type:

From all detached k-clusters six were identified by us as economic clusters.

In the *Volgograd region* we can take the cluster No.1 as economic one. It includes the manufacturing, power production, transportation and communication, as well as the providing of various services such as, for example, design and survey works and R&D activities, equipment leasing, marketing and sales activities, etc. We can characterize this cluster as combined one (*industrial-energetic and transportation-logistics*).

The cluster is externally-oriented [13] from the position of sales and distribution outward the region. Speaking from the perspective of conditions at the labor market this cluster is balanced at both, the demand and the supply. At the same time the cluster is oriented onto the attraction of external labor forces and is attractive for professionals of engineering occupation and for the large-scale concerns development in the above mentioned fields. The cluster No.3 consists of the mineral production enterprises and thus cannot be considered as the economic cluster even despite the optimal indicators.

In the *Voronezh region* the cluster No.3 can be taken as the economic one. This cluster consists of agricultural enterprises, mineral production and organizations which provide the heat, power, gas- and water supply. According to the studied criteria this cluster also includes the healthcare. The cluster can be characterized as *industrial-agricultural* one. It has a small share in the regional GRP but owns the competitive levels of indicators. The high density of results is also observed.

The *Penza region* has no clearly expressed economic clusters even despite the performance of most of assumptions by the cluster No.2. This can be explained by the low production profitability on the background of the high production capacity. Though the low density of both

Table 1: The composition and indicators of economic clusters in the studied regions of the Russian Federation*

Region, cluster's No.	Sectoral composition (OKVED sections)	The compliance with the criteria of inner density/criteria of economic cluster						
		Salary of 1 employee	Profitability	Local manufacturing content	Investments concentration	Labor productiveness	Average workforce of the company	TOTAL
Volgograd region 1	D, E, K	+/-	-/+	+/+	-/+	+/+	-/+	3/5
Volgograd region 2	A,B,C,F,G,H, J,K,L,M,N,O	-/+	-/-	-/-	+/-	+/-	-/-	3/1
The Volgograd region 3	C	+/-	+/+	-/-	-/+	-/-	+/+	4/3
Voronezh region 1	A,D,F,G,I,K,L	+/-	-/-	-/-	-/-	-/+	+/+	2/3
Voronezh region 2	A,B,E,F,H,J, L,M,O	/+	-/-	-/-	+/-	+/-	+/-	4/1
Voronezh region 3	A,C,E,N	+/-	-/+	+/+	-/+	-/+	+/+	3/5
Penza region 1	B,C,E,F,G,H, J,L,M,O	-/+	-/-	-/-	+/-	-/-	+/-	3/1
Penza region 2	A,C,D,E,G,I, K,O	-/-	-/-	-/+	-/+	-/+	+/+	1/4
Penza region 3	A,B,E,N	+/-	-/+	/-	+/-	+/-	+/-	4/1
Samara region 1	E,H,I,L,M,N	+/-	-/+	+/-	+/-	+/-	-/-	5/1
Samara region 2	A,B,F,G,H,J, K,M,N,O	/+	-/-	+/-	+/-	+/-	+/-	5/1
Samara region 3	C,D,E,I	+/-	-/+	+/+	-/+	-/+	+/+	3/5
Saratov region 1	C	+/-	-/+	-/-	-/+	+/-	+/+	4/3
Saratov region 2	A,B,F,G,H,J,K, L,M,N,O	-/+	-/-	-/-	+/-	+/-	-/-	3/1
Saratov region 3	A,D,E,I	+/-	-/+	-/+	+/+	+/+	-/+	3/5
Tambov region 1	B,F,G,H,J,K,L, M,N,O	-/+	-/-	+/-	+/-	-/-	+/-	4/1
Tambov region 2	A,D,E,F,G,L,N	+/-	-/+	+/+	+/+	-/+	-/+	3/5
Tambov region 3	E,I,K	+/-	+/+	+/+	/+	+/+	-/+	5/5
Ulyanovsk region 1	A,B,D,F,G,H,J,K,L,M,N,O	-/+	-/-	-/-	+/-	+/-	-/-	3/1
Ulyanovsk region 2	A,D,I	+/-	-/+	-/-	-/+	+/+	+/+	4/4
Ulyanovsk region 3	C,E,N	+/-	+/+	+/-	-/+	-/-	-/+	4/3

* - with "+" are marked the indicators of those variants in each cluster the inner group dispersion of which is significantly lower than the intergroup and the threshold limit of the economic cluster criteria is exceeded.

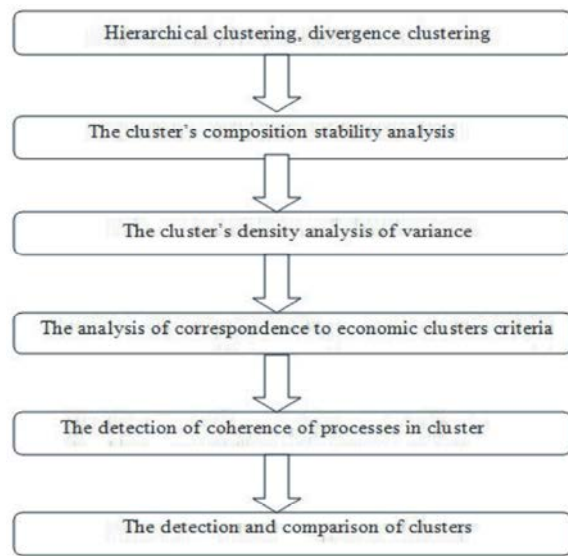


Fig. 1: The study algorithm of economic clustering in the region.

factors and neutral levels of organization certify about a weak economical potential of agricultural enterprises, extracting and production activities, power and trade, transportation, communication and other services, as well as healthcare which make this labor market to be non-optimal from the employer's point of view.

In the *Samara region* the enterprises of extracting, production activities and power production, as well as transportation and communication form quite strong, powerful and mature economic cluster which is characterized by the high organizational, density and development levels. The only one indicator with the meanregional level is the volume of investments per one employee. Obviously it happened as a result of quite large number of adjacent companies of all types in which the capital investments differ a lot from the investments into the large-scale production groups. The Cluster No.3 can be defined as the *industrial* one with the presence of few large cluster-forming "cores" (AvtoVAZ JSC, TsSKB-Progress, Tyazhmash JSC, Electrosheild Group Samara, AVIAAGREGAT JSC, Samara Cable Company, Kuibyshev Azot JSC, Samaratrangaz Ltd, etc.).

In the *Saratov region* the cluster No.1 consists only of mineral production enterprises and thus independently from the high results we cannot take it as the economic cluster. The cluster No.3 is the economic cluster which includes the enterprises of agricultural sector, miner production, power, transportation and communication fields. The high systemacity, organization of processes at

the labor market and quite sufficient density of criteria indicators give us the reason to take this cluster as *agricultural-industrial* one, but still we cannot consider it as the effectively developing cluster and on this ground it's impossible to call it the regional growth driver.

In the *Tambov region* two clusters comply with the criteria of economic clusters. The cluster No.2 includes the enterprises of agricultural sector, mineral production, power, construction and trade fields. It is characterized with quite high indicators of employee's criteria comparing with the meanregional level, but with low indicators from the side of employer. Here we observe the variation in the levels of production recovery, low investment attractiveness, high dispersion on productiveness and labor remuneration. On this basis we can make a conclusion that this type of *industrial* cluster is externally-oriented and is focused on the demand of the region.

The cluster No.3 includes the electrical power, gas and water production and distribution enterprises, companies of transportation and communication fields, enterprises that provide the services on business processes organization (advertising, marketing, management, design and survey works, research and development works, etc.). The low inner-cluster level on profitability and high dispersion on the enterprises sizes proves the balanced but still slow development of this complex as the leading regional horizontally-oriented cluster. We think that there are some backgrounds which will allow us to take this cluster as industrial one with the elements of *innovative-technological direction*.

In *Ulyanovsk region* the cluster No.2 has the potential features of the economic cluster. It includes the agrofood and mineral production enterprises and healthcare facilities. In fact the intersectoral connection of the types of activity mentioned above is represented quite weakly which already does not correspond to the nature of the economic cluster. Another argument in the favour of lack of cluster in the Ulyanovsk region is the low average wage and labour productiveness, low profitability, its density and organization in this *k*-cluster. The regional authorities make efforts to redress the economical policy in consequence of which the indicators of investments per single involved in these fields are quite high (region-wise they compose about 30% from all attracted funds); the high labor productiveness. The social policy is focused on the confinement of the human potential but not onto its building and development.

CONCLUSIONS

The presented instrument of modeling, monitoring and forecasting of results of economical and social policy in the region is capable to unify the state management measures and at the same time to increase their targeting, expedience and timeliness. As in the economical policy the most promising approach is the cluster one, so in the social policy it is necessary to change the policy of adjustment onto the measures of accumulation, human potential concentration and elimination of disbalance in its reproduction.

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