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UDC 332.12 (470.53)

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IDENTIFICATION OF THE LEADING BRANCHES IN THE ECONOMY OF PERM TERRITORY AS POTENTIAL CLUSTERS

This article proposes an approach to the identification of leading sectors of the regional economics, which allows distinguishing perspective regional clusters and their development, will generate a complete cluster structure of the regional economy. Identification of the leading clusters as perspective regional clusters in the economy of the Perm Krai was carried out on the basis of the quantitative Shift–Share analysis and sectoral specialization of the region, which is determined by calculating the index of localization. Statistical base of the research is formed by the materials of the Central statistical database of the Federal State Statistics Service of Russia for 2002-2010 on employment rate, productivity and shipped products in accordance with economic activity at the level of group analysis of the first (high) and fifth (low) level of aggregation. To present the complex of analysis results we built maps of cluster components of the Perm Krai economy, established key regional clusters in the export oriented sector of the region economy. Development of the key regional clusters should become first-priority direction of the economic policy.

Keywords: cluster, region, sector, structural shifts analysis, localization, map of cluster components

Nowadays more and more attention is paid to the research of clusters as tools to increase territories competitiveness, securing formation of centers of investment attraction and innovation activity and publications in the magazine "Economics of the region" prove this [1; 2; 3]. In the majority of the Russian Federation regions cluster approach is declared as one of the basic conditions of effective state regional policy. In this connection a problem of finding perspective regional leaders of sectors for their support by means of cluster policy is becoming relevant.

For the first time the cluster approach is presented in the works of the leading American economist M. Porter, who defined an industrial cluster as "a group of geographically adjacent interconnected companies and associated organizations operating in a particular area, characterized by common activity and mutually complementary» [4, p. 258]. Key features of clusters, according to M. Porter, are geographical localization, interconnection between the firms and technological interconnection of industries. The first feature reflects geographical boundaries of the cluster, the second feature presents the cluster as a special form of a net of interconnected companies and more deep development of connections speaks about the development of the cluster itself and the third feature characterizes polyindustry construction of the cluster.

According to the Methodological recommendations on realization of the cluster policy in the regions of the Russian Federation the following definition is used in the domestic practice: «unification of companies, suppliers of equipment, components, specialized industrial services, research and educational organizations, connected through relations of territorial proximity and functional dependence in the sphere of production and sale of goods and services» [5]. Here we will agree with the opinion of V. L. Bersenev that territorial-production fea-

[1] The research is supported by the Russian Foundation Grant № 11-12-59011a/У.

ture reflects only the frames of economic clustering, whereas the content side of this phenomenon is much wider, especially if we talk about regional level of economic management, which is the basis for realization of the main cluster initiatives [6, p. 79].

Thus, exactly a region obtains particular significance in the study of problems of formation and development of cluster formation. Regional clusters are industrial complexes of locating inside a region interconnected companies, main consumers, specialized suppliers of resources, services, technologies that make up value chain acting in в related industries or areas and strengthening each other competitive advantages and a cluster in general.

According to observations presented in the works of M. Porter [4], E. Papadopoulou [7] and E. Feser with co-authors [8] competitive advantages of a region are defined by competitive advantages of groups of interconnected industries that allow making a conclusion about principal importance of conglomerate identification of industry leaders for identification of perspective clusters in regional economy. T.V. Mirolubova, T.Y. Kovaleva and T.V. Karlina, the scientists of the Perm State National Research University working under the Russian Foundation Grant directed their efforts to solve this task in respect of the Perm Krai economy.

Materials of the central statistical database of the Federal State Statistics Service of the Russian Federation for the period 2002–2010 were used in the study [9]. Data on employment and some cost parameters were used in the study as basic factors («Volume of shipped goods, performed works and rendered services (in actual prices including VAT, excises and similar compulsory payments), thousand rubles», «Gross value added, thousand rubbles», «Gross regional product, thousand rubbles»).

Identification of leading industries was done in accordance with national classification of Foreign Trade on the basis of structural shifts analysis (Shift–Share analysis or factor analysis) in economy of the Perm Krai and evaluation of industries localization level. It is necessary to emphasize that Shift–Share analysis that is widely used by foreign researchers to identify competitive industries [7; 10], has not yet spread enough in the practice of Russian researches on regional themes.

Let's focus on technology of running the Shift–Share analysis.

Analysis of structural shifts performs evaluation of contribution of national, industrial and regional factors in the change of value of the being analyzed variable (employment, turnover, labor productivity, gross value added, etc.).

Evaluation of national factor influence *NS* (e. g. employment growth in the country) on key indices of the regional economy is performed according to the following formula:

$$NS = l^i_{t-1}\left(\frac{L_t}{L_{t-1}} - 1\right), \quad (1)$$

where l^i_{t-1} — employment in *i*-industry in a region in the period $(t-1)$; L_{t-1} and L_t — total number of employed in the country in the periods $(t-1)$ and t accordingly.

Sector factor *IM* is evaluated by identifying the contribution of national growth rates of being analyzed variable in an industry in the change of industry index in a region:

$$IM = l^i_{t-1}\left(\frac{L^i_t}{L^i_{t-1}} - \frac{L_t}{L_{t-1}}\right), \quad (2)$$

were L^i_{t-1} and L^i_t — number of employed in *i*-industry in the country in the period $(t-1)$ and t.

Industry factor fixing influence of national industrial tendencies on the dynamic of industry development in a region reflects quality of industrial structure of regional economy on being analyzed variable, as it can get positive as well as negative values.

Regional factor *RS* as a key quantitative indicator of industry-leaders identification as potential clusters developing in a region allows to find out leading and lagging industries in the economy of a region on the criteria of relative competitiveness: growth rates of being analyzed variable on industry in the country and region are to be compared. It is calculated according to the formula:

$$RS = l^i_{t-1}\left(\frac{l^i_t}{l^i_{t-1}} - \frac{L^i_t}{L^i_{t-1}}\right). \quad (3)$$

Industries that are characterized by high values of *RS* have significant cluster potential and are leading in a region. Industries with stable negative values of regional factor are outsiders of regional economy.

On the low level of statistical data aggregation high *RS* values signalize about formation of cluster core. Thus calculation of *RS* index allows to define regional industry where a group of similar in industry sign leading companies are concentrated [11, p. 38].

Finding total increase of the variable taking into consideration influence of national, industrial and regional factors is done in the following way:

$$SS = NS + IM + RS. \quad (4)$$

Application of Shift–Share analysis in processing rate of average number of workers without external part-time workers and unscheduled part workers on six levels of detailing under OKVED in accordance with fullness of the statistical base gave the biggest impact on the level of group analysis of the first (high) and fifth (low) level of aggregation.

According to the obtained factor evaluations on the high level of aggregation the following sectors of the Perm Krai economy had favorable regional and industrial conditions of development ($IM > 0$, $RS > 0$) in 2002–2010: construction, wholesale and retail trade, state management. Ranging the sectors of the Perm Krai economy according to *RS* value allowed expanding the list of the regional leaders capable to form strong industrial clusters. Thus, processing productions, mining, agriculture and forest industry have regional cluster potential of the Perm Krai apart from the mentioned above activities.

Analysis of intensive factors of economical growth of the Perm Krai allowed defining braches leading on the value of labor productivity, which was calculated on the basis of gross value added. The results of ranging show that there are four stable leading types of economic activity: mining, processing productions, whole-sale and retail trade, transport and communications.

On the basis of the detailed analysis of the structural shifts on employment (low level of aggregation) leading components of potential cluster of the Perm Krai economy were defined, mostly referring to cluster nuclear. For this purpose rating of the first ten foreign economic activities was made, that in 2002–2010 had maximum *RS* value; foreign economic activities that appeared in the rating two time or more were referred to leading cluster components. On the picture there are maps of leading components of potential clusters of the Perm Krai economy for 2009 and 2010. The size of cluster components is shown by index of localization.

The full list of industry leaders made on regional factor of employment growth includes 210 kinds of economic activity.

We offer the approach to build a cluster map that allows making a correct selection of leading cluster components. The selection is done on the basis of influence of industry and regional tendencies in the development of regional economy and accounting of industry specialization of a region that can be measured by index of localization.

It is necessary to clarify that index of localization, which is widely used in the identification of re-

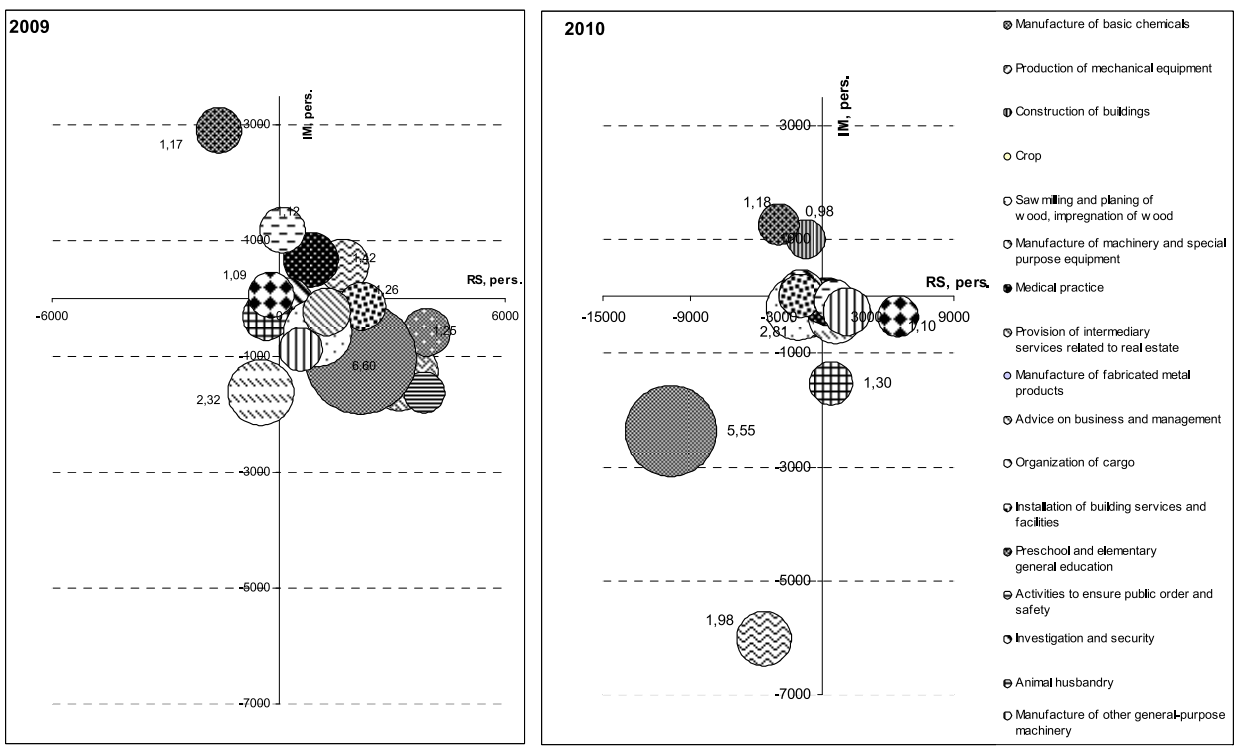

Fig. *Maps of leading components of the Perm Krai potential clusters, 2009 and 2010 (calculated index «Average number of workers without external part-time workers and workers of unscheduled part, people»)*

Table 1

Leading components of potential clusters of the Perm Krai economy, 2009 and 2010 (calculated index «Volume of shipped goods, performed works and rendered services (in actual prices including VAT, excises and similar compulsory payments), thousand rubles»)

Economic activities	RS, thousand rubles		IM, thousand rubles		LQ	
	2009	2010	2009	2010	2009	2010
Animal husbandry	–1443409	118107	2089435	–2089256	1,17	1,29
Manufacture of rubber and plastic products	36238	196808	–369369	–316	0,33	0,40
Collection, purification and distribution of water	–194816	6612991	781049	–7421711	1,37	1,80
Hotels and restaurants	–199759	–501839	–78347	–688824	0,66	0,61
Transportation by pipeline	–162166	4212214	5787359	–7083005	1,73	2,04
Cargo handling and storage	–6171	–197152	–85700	–49572	0,10	0,06
Activities in the field of telecommunications	–551991	2205	1026514	–576918	0,08	0,08
Education	150905	25217	35261	–138512	0,60	0,68
Activities in the field of health	–312645	59395	289026	–588745	1,17	1,31
Collection of waste water, waste, and similar activities	179712	1056221	–8205	–1306606	0,54	0,58
Activities and recreation, culture and sports	92459	145969	–207003	–193774	0,18	0,24

Table 2

Regional clusters in the export oriented sector of the Perm Krai economy

Clusters	Economic activities included in clusters
Forest cluster	Forestry and logging
	Providing services in forestry and logging
	Sawmilling and planing of wood, impregnation of wood
	Veneers, plywood, boards, panels
	Furniture manufacture
	Production of wooden building structures, including prefabricated wooden structures, and joinery
	Production of wooden containers
	Manufacture of pulp, mechanical pulp, paper and paperboard
	Publishing activities
	Printing and services in this area
Petrochemical cluster	Crude oil and natural gas
	Providing services to oil and gas production
	Coke production
	Production of petroleum products
	Manufacture of basic chemicals
	Manufacture of fertilizers and nitrogen compounds
	Manufacture of paints and varnishes
	Manufacture of soap, detergents, cleaning and polishing preparations, perfumes and cosmetics
	Pharmaceuticals
	Manufacture of plastic products
	Transport via pipelines of crude oil and petroleum products
	Transport via pipelines and gas processing products
	Geological, geophysical and geochemical work in the field of mineral resources and reproduction of mineral resources
	Geodetic and cartographic activities
Metallurgical cluster	Extraction and processing of iron ores
	Extraction and processing of nonferrous metal ores
	Production of pig iron, steel and ferroalloys
	Other primary iron and steel processing
	Non-ferrous metals
	Manufacture of fabricated metal products
	Processing of metal waste and scrap
Manufacturing cluster	Manufacture of machinery and equipment
	Manufacture of mechanical equipment
	Manufacture of electrical machinery and apparatus

Conclusion of the Table 2

Clusters	Economic activities included in clusters
	Manufacture of machinery and equipment for agriculture and forestry
	Manufacture of machinery
	Manufacture of machinery and equipment for special purposes
	Manufacture of domestic appliances nec
	Manufacture of office machinery and computers
	Manufacture of electric motors, generators and transformers
	Manufacture of insulated wire and cable
	Manufacture of electric lamps and lighting equipment
	Manufacture of other electrical equipment
	Manufacture of electronic components, equipment for radio, television and communication
	Production of medical and surgical equipment and orthopedic appliances
Building a cluster	Quarrying of stone
	Gravel, sand and clay
	Manufacture of bricks, tiles and construction products, in baked clay
	Production of cement, lime and plaster
	Manufacture of articles of concrete, plaster and cement
	Cutting, shaping and finishing of ornamental and building stone
	Construction of buildings
	Production of finishing work
	Installation of building services and facilities
Agri-food cluster	Animal husbandry
	Crop
	Growing of crops combined with farming of animals
	Production of meat and meat products
	Processing and preserving of potatoes, fruits and vegetables
	Manufacture of vegetable and animal oils and fats
	Dairying
	Manufacture of grain mill products, starches and starch products
	Manufacture of prepared animal feeds
	Manufacture of other food products
	Manufacture of beverages

gional clusters [5; 9; 12], allows comparing regional and national effects, characterizing relative competitiveness of the companies in this or that sector, connected with territorial concentration of industry.

Index of localization on the employment rate was calculated on the following formula:

$$LQ_i = \frac{l_i / l}{L_i / L}, \quad (5)$$

where l_i — employment in i-industry in a region; L_i — employment in i-industry in the country; l and L — total number of employed in a region and the country accordingly.

If index value of localization is more than one единицы the specified weight of the given industry in the industry structure of a region is higher that the analogue country value and thus a industry can have cluster feature. In M. Porter's opinion it is possible to use value of localization index equal to 0,8 [13] as a threshold one.

Slightly different picture of leading cluster components was obtained as a result of factor analysis of index «Volume of shipped goods, performed works and rendered services (in actual prices including VAT, excises and similar compulsory payments), thousand rubles» (table 1).

It is necessary to point out that such industries of the Perm Krai economy as animal husbandry and education are the leading industries according to employment evaluation as well as to turnover rate. However economic growth in animal husbandry cannot be called stable because according to *RS* value for employment animal husbandry was in the list of outsiders two times with the lowest values of regional factor and education is not a traded industry of economy. Besides similar intersection of analysis results achieved in calculation of localization index and estimation of Shift-Share on statistical data about the shipped goods (indicator «Goods shipped by the end of the accounting year, thousand rubles, full range of organizations»).

Factor analysis results, evaluation of industries localization level and their ranging in accordance with regional competitiveness criteria allowed us to define leading industries of the Perm Krai economy, which have strong cluster-forming features and refer to traded sectors of the regional economy (table. 2).

It is necessary to underline that table 2, demonstrating key components of regional clusters in the context of export–oriented leading industries of the Perm Krai economy, includes types of activity principally forming a cluster core. Undoubtedly, for further studies it is necessary to perform diagnostics of cluster structure of the regional economy in general, defining also other elements of cluster: innovative and investment infrastructure, features of internationalization, institutional development conditions, etc. The results of the analysis will be shown in the next articles.

Integrated diagnostics of regional clusters will allow identifying first-priority strategic trends of cluster policy formation in the region, to develop and ground methods of regional economy government with the purpose of developing the existing and "growing" new cluster structures having perspective potential, to develop recommendations to the regional government on successful formation of infrastructure of clusters.

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