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Regional Economic Policy Based on Industrial Sector Clustering in the Context of Sustainable Development

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ABSTRACT

The research presents aspects of industrial development of the state as a promising area of structuring its overall development. The article shows that the clustering of industrial sectors affects mainly the public sector of economy. The authors determined the parameters shaping the need for and feasibility of clustering of national economic sectors and presented the methodological framework for such assessment. In the context of future studies, the methodical framework so developed may be used as a part of regional economic planning.

Keywords: regional economy, management, industry, sectoral development, industrial clustering.

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INTRODUCTION

Amid social and economic destabilization of Russia's positions and lack of resources for further development from the international community, further development of domestic economic environment gains in importance. The operating environment of industrial facilities oriented mostly on domestic market appears to be more efficient when network structures, such as clusters, are formed. With GDP accounting for more than 60% in regions' budgets and more than 30 Russia's regions being at the edge of bankruptcy, measures to encourage industrial production are deemed to be urgent and of current interest.

LITERATURE REVIEW

Development of the cluster-based economy and involvement of clusters in regional (local) and international economic systems has been studied in terms of spatial distribution and innovation transfers. The leading Russian researchers focus on sector analysis of prospects of forming the cluster framework [4, 6, 8-11]. In the regional context, factor-driven assessment efforts to determine overall impact clusters would have on economy of a constituent entity of the Russian Federation [1] gained widespread acceptance. Most studies focus on building practical principles of nationwide integration where public capital prevails [6, 9]. Since integration into the world trade system is imminent and takes place despite any restricting factor, some researchers study issues of building supranational entities [2, 7] and formation of innovative production and their spatial distribution which, again, come down to the tasks of regional economic management [3, 9, 12]. At the same time, studies of the overall economic effect also assume that this environment also attracts private capital [1, 6, 9].

In recent publications, foreign researchers address issues of forming the new economic culture of the society and building macro-state systems [12, 17]. As an instrument, they use a cumulative constant which allows them to take into account both transfer of technological equipment and knowledge-based components [14-16]. Supranational integration, in turn, requires another task to have been accomplished: standard industrial clusters should be in operation [13, 18]. This is explained by the scale of state influence, e.g. member states in the European Union [13] or regional economic systems in China [18].

MATERIALS AND METHODS

The research uses comparative analysis, simulation of economic environment and structural forecasting methods.

Speaking about the current stage of economic development in general and industrial development in particular, it should be noted first that so-called "active industrial policy" has already made its statement in the post-reform Russia, even though our industrial sector lags behind the global industry in many ways, and, unfortunately, this gap is hard overcome. It should be recognized however that virtually all the elements of such policy take place in the Russian industrial development in some or other way. This is especially true for an important phenomenon of industrial development of the modern civilization such as intensive development of industrial clusters. In this respect, the consideration given above can be regarded as unconditional since all advanced countries clearly demonstrates that innovations go directly through the use of processes integrating production and service sectors.

However, convention starts where and when we specifically discuss the development of Russian clusters which is precisely the case in Russia. We agree that clustering, as such, takes place in many cases; however the end product so obtained features a very weak or, quite often, no innovative component. It is in this sense we talk about convention of this expression, and it is the very point where the central problem of future research comes out and that could be defined as follows: why such progressive phenomenon of modern industrial development fails to produce the appropriate effect in the modern Russian economy and how this problem could be addressed.

When it comes to some forms of the overall economic development and industrial development in particular, an institutional network-based approach appears to come to the fore at least in contemporary studies. Many published sources, both monographic and periodical, deal with this aspect of economic and industrial development.

In our research, we do not focus on well-developed essence of this approach and leave out the fact that significant industrial development in any region or country as well as in the world at large may and should be considered exactly as the network development. This obvious and proven thesis, however, makes us to repeatedly raise a question of more practical importance: what are the specific forms of this development which play the most important role in modern conditions and what forms deserve more attention of the theoretical professional community, on the one hand, and practical industrial professionals, on the other. The review of modern scientific literature and periodicals leaves no doubt – clusters are among those forms. It is this fact why we believe it is necessary and important to pay special attention to a few key points which are directly associated with this economic category and, as we believe, should be considered before we investigate the actual content and the structure of this category. Let us study these issues in more detail.

It should be noted first that it is the understanding of the nature and features of clusters that underlie an assumption that various types of resources, such as technology, capital, knowledge, services, human resources, etc., may be pooled in a special way to produce an unconditional and exceptional strong emergent effect. On the other hand, it is clear that when we are talking about pooling those resources and the special way of their pooling, appropriate links, if correctly found, would play a decisive role in successful pooling and, consequently, give exact understanding of how different types of resources interact in practice.

At this point of our analysis, another question should be raised: whether to unreservedly believe that innovative development is driven by pooling of resources or whether we are dealing with a kind of three possible scenarios:

- pooling of resources as such that does not necessarily lead to innovative development;
- pooling of resources giving rise to development and use of innovations in a discrete manner;
- there may be another type of pooling, association and interaction to continuously generate innovative ideas and provide a relatively continuous process of turning the ideas into relevant products/services manufactured/rendered by the relevant industrial companies and their various associations (we certainly do not mean this process involves industrial companies only).

Notably, whatever the pooling of resources may be, as discussed above, there is certainly a kind of a common information space. This point requires special attention as contemporary studies clearly show that the most important aspect of such pooling is efficient use of knowledge distributed among various resources. This, in turn, requires efficient information space so identification, accumulation, exchange and development of knowledge, as such, could take place.

Finally, we would like to note a yet another, however, central point of pooling various resources that can be defined as development, formation and, most importantly, coordination of interests associated with pooling and interaction of such resources.

Thus, we have identified and addressed the critical elements of efficient clustering at the regional level.

RESULTS AND DISCUSSION

The elements we discussed above could hardly cover the whole variety of emerging issues, challenges, and opportunities. If we go down to the level of specific criteria and indicators, basic indicators such as competitiveness of products and services, businesses and industrial sectors at large or a matter of growth of labor productivity, cost reduction, and any other similar systemic results of cooperation and development of heterogeneous resources, represent a very closely interrelated evolutionary space.

The creation of such an evolutionary space requires implementation of certain principles which can subsequently underlie regional clustering. We believe a system of such principles should include:

- unconditional interdependence of centralized government authorities and industrial companies as well as a coordination mechanism to facilitate their interaction;

- long-term relationship and the need to harmonize development strategies of regional industrial cluster members in line with priorities of the national and regional industrial policies;
- geographical unity closely intertwined with the multisector approach;
- establishment of institutional and functional infrastructure of clustering processes;
- natural and essentially central role of special processes to add value based on interactions in technological chains;
- absolute and dominant role of consumers in the cluster;
- ability to create new types of resources; and
- decisive role of the innovative program to bring together cluster members and to make it a flexible and open system.

The cluster strategy would open up significant advantages and opportunities for a region. The obvious advantage is new opportunities for the business sector, government authorities and educational institutions which could work together and strengthen the regional economy. Moreover, the global practice and Ukrainian experience, though limited, demonstrate advantages of cluster-model production systems:

- With entities of various size and ownership form, clusters provide combined production specialization, on the one hand, and flexibility of this process, on the other.
- Clusters increase volumes of production and expand services while the economy of scale reduces the respective unit production costs.
- Cluster-based production organization promotes more extensive use of innovative technologies.
- Cooperation of cluster members strengthens processes of specialization and division of labor, expands inter-company flows of ideas and promotes wider use of the innovative potential of more knowledgeable staff.
- Business expansion brings new jobs and strengthens social responsibility of the business sector.
- With many enterprises focused on production of one product type and delivery of one service type, local natural resources can be used in a more efficient manner.

Analysis of industrial clustering prospects is generally driven by existing technologies and projects implemented. To better understand the processes, we studied sector-specific parameters of clustering based on statistics from regional branches and representative offices of the Federal Service of State Statistics of the Russian Federation. The Russian Federation has specific territorial division. Clusters are formed in two ways: establishment of territories based on the existing infrastructure and development of new areas to promote territorial development. A region used to be a traditional form of territorial association in Russia. Therefore, cluster development in industrial sectors is a matter of regional economy. In 2012, the Government of the Russian Federation identified major areas to be developed in terms of cluster evaluation system (Table. 1).

Table 1. Structural features of clustering the areas of industrial development in the Russian Federation

Constituent unit of the Russian Federation	Significant industrial clusters	Pilot cluster project
Kaluga region	Food industry, metallurgical industry, heavy machinery, pulp and paper industry	Pharmaceuticals, biotechnology and biomedicine cluster
Moscow	Biotechnology, aerospace engineering, information technology, food industry	Zelenograd Cluster (ICT, electronic engineering); Novel materials, laser and X-ray technology (Troitsk)
Moscow region	Food industry, metallurgical industry, biotechnology, aerospace engineering	Dubne nuclear physics engineering and nanotechnology cluster; Puschino territorial cluster biotechnology innovations; PhysTech XXI Cluster (Dolgoprudny, Khimki, ICT, medicine and pharmaceuticals)
Arkhangelsk region	Pulp and paper industry, oil and gas industry, food processing, furniture production	Ship-building innovation cluster in Arkhangelsk region
Saint Petersburg	Food industry, metallurgical industry, information technology, biotechnology	Development of information technology, radio electronic engineering, instrument engineering, communications and info telecommunications in Saint Petersburg

Saint Petersburg and Leningrad region	Food industry, metallurgical industry, information technology, biotechnology, oil and gas industry, chemical industry	Saint Petersburg cluster of medical and pharmaceutical industry and X-ray technology
Nizhny Novgorod region	Metallurgical industry, automotive industry, food industry, chemical industry	Nizhny Novgorod industrial innovation cluster in automotive industry and oil chemistry; Sarov innovation cluster (nuclear technology, supercomputer technology, and laser technology)
Perm Territory	Metallurgical industry, aerospace engineering, chemical industry, oil and gas industry	Innovation territorial cluster of rocket engine engineering Technopolis Novy Zvezdny
Republic of Bashkortostan	Oil and gas industry, metallurgical industry, chemical industry, automotive industry, aerospace engineering	Petrochemical territorial cluster
Republic of Mordovia	Lighting production, food processing, automotive industry, iron and steel production	Energy efficient lighting equipment and smart lighting management systems
Republic of Tatarstan	Automotive industry, metal production, oil and gas industry, food processing, plastics production	Kamsky innovation territorial production cluster in the Republic of Tatarstan (oil and gas processing, oil and gas chemistry, and automotive industry)
Samara region	Automotive industry, aerospace engineering, oil and gas industry, food industry	Innovation territorial aerospace engineering cluster in Samara region
Ulyanovsk region	Automotive industry, aerospace engineering, metallurgical industry, food industry	Ulyanovsk Avia research, educational & production cluster consortium (aircraft and spacecraft production and novel materials)
Sverdlovsk region	Metallurgical industry, heavy machinery, chemical industry, food industry	Sverdlovsk region titanic cluster
Altai Territory	Food industry, metallurgical industry, heavy machinery, automotive industry, chemical industry	Altai biopharmaceutical cluster
Kemerovo region	Oil and gas industry, metallurgical industry, food industry, heavy machinery	Complex coal and technological waste processing in Kemerovo region
Krasnoyarsk Territory	food industry, oil and gas industry, metallurgical industry, chemical industry, aerospace engineering	Innovation Technologies Cluster (closed administrative-territorial unit), Zheleznogorsk (nuclear technology and aircraft and spacecraft production)
Tomsk region	Oil and gas industry, food industry, chemical industry, pharmacy	Pharmaceutics, medical engineering and information technology in Tomsk region
Khabarovsk territory	Aerospace engineering, food processing, iron and steel production, oil and gas, pharmaceuticals	Innovation territorial cluster of aircraft engineering and ship building in Khabarovsk territory

Source: Order No. 457 dd. 13 August 2013 "On Approval of the Level of Co-financing of Expenditure Commitments of Constituent Entities of the Russian Federation through Subsidies from the Federal Budget to Implement Programs for Development of Pilot Innovative Territorial Clusters in 2013"

As shown in the table, the industry clustering is widely distributed throughout the country. However, quantitative and qualitative indicators warrant a comparative study. For this purpose, the comparative analysis requires identification of larger areas. To this effect, let us choose the two objects. A federal district will be used for the purposes of regional research, and a georeference will be used for clusters that involve knowledge transfer or form innovative environment.

Industrial clusters should be implemented in the territory of a federal district, and knowledge-based sectors of economy should also be expanded. Although clusters were grouped in Table 1 by region, processing industries account for 45% only and more than 50% have an innovative component. Therefore, we can conclude that there are cluster projects which are implemented throughout the country and affect knowledge sectors and shape the information-type economy. This will eventually increase a share of economic output to

the share of knowledge economy in developed countries' GDP. Analysis of spatial data of cluster technology implementation in the large-scale production sector shows an increase in profit by 50% over the next 7 years. The analysis is based on the pharmaceutical cluster with innovative structures accounting for 70-80% (Table 2).

Table 2. Profit expected from a cluster with a prevailing knowledge-based element (Ural Pharmaceutical Cluster)

Name	Period										Total for the period
	Year 1	Year 2	Year 3	Year 4	Year 5	YEAR 6	Year 7	Year 8	Year 9	Year 10	
Proceeds from sales	1,505	4,171	9,470	14,604	22,709	25,775	27,610	28,135	28,565	29,012	191,556
Current expenses, including:	866	1,904	4,349	6,742	9481	10,441	11,012	11,226	11,398	11,576	78,993
depreciation	51	76	689	920	920	922	923	923	923	923	7,270
Tax profit/loss	640	2,267	5,121	7,862	13,228	15,334	16,598	16,909	17,167	17,436	112,563
Income tax (20%)	0	453	1,024	1,572	2,646	3,067	3,320	3,382	3,433	3,487	22,385
Net income/loss	640	1,813	4,097	6,290	10,582	12,267	13,279	13,527	13,734	13,949	90,178
Retained earnings, running total	691	2,580	7,366	14,575	26,078	39,267	53,469	67,919	82,576	97,448	97,448
Net margin, %	42.5	43.5	43.3	43.1	46.6	47.6	48.1	48.1	48.1	48.1	47.1
Production profitability, %	73.9	95.2	94.2	93.3	111.6	117.5	120.6	120.5	120.5	120.5	114.2
Current expenditure in earning, %	57.5	45.7	45.9	46.2	41.7	40.5	39.9	39.9	39.9	39.9	41.2

Source: State Program of the Russian Federation "Development of Pharmaceutical and Medical Industry 2013-2020" approved by the Decree of the Government of the Russian Federation No. 2057-r dd. 03 November 2012

These parameters of knowledge-based economy assume involvement of the private business. In our case, public sector clusters should be assessed in terms of their social focus so they could be more effectively involved in the overall development of the state. Thus, the forest processing development cluster in the Republic of Komi is organized to help people to build their private households and will influence the parameters of the social and economic development (Table 3).

Table 3. Prospects of development of social and economic parameters in the Republic of Komi following organization of cluster projects

Indicators	Years				2017 vs. 2015
	2014	2015	2016	2017	
VRI, billion RUR	500.9	500.9-505.4	501.4-508.4	505.4-511.4	0.8-2
VRI growth/decline rate, % vs. previous year in comparable (basic) prices	100	100.0-100.9	100.1-101.5	100.8-102.0	100.9-102.1
Capital investment growth/decline rate, %	90.3	76.3-82.7	88.1-91.3	90.2-92.8	60.6-62.4
Capital investment vs. VRI, %	41.4	31.6-33.9	27.8-28.4	24.8-25.3	(-16.5)-(-16.1)
Industrial production index, %	100.5	101.1-101.6	100.3-101.9	101.7-103.0	
Average monthly growth/decline rate in the Republic, %	109.0	108.8-109.9	108.5-109.0	110.3-101.5	130.1-132.6

Source: Basic Figures of Forecasts of Social Economic Development in the Republic of Komi 2013-2015 [electronic resource] // Ministry of Economic Development of the Republic of Komi [website]. [2013]. URL: http://www.econom.rkomi.ru/econom_rkomi/prognoz/prognoz10_12/.

CONCLUSIONS

To summarize, the cluster projects in the Russian Federation are approved and implemented by public entities only. However, their efficiency is determined by a group of social, financial, and economic indicators as well as by spatial and geographical parameters. Since clusters of any type has their positive impact on the social and economic development of the region, most budget-related issues faced by regions may be resolved by attracting clusters and offering sites for clusters.

- Sustainable cluster development in Russia's industrial sectors may take place mainly in the processing industry.
- Clustering potential will be as high as 50% of the total gross domestic product in the future.
- Operation of interregional clusters contributes to the development of technological innovations.

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