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Article

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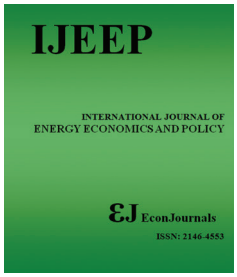

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Model for Forming the Interregional Cluster of the Alternative Energy

Sergey G. Tyaglov[1]*, Anastasia V. Sheveleva[2], Tatyana V. Shurukhina[3], Tamara B. Guseva[4]

[1]Rostov State University of Economics, Rostov-on-Don, Russia, [2]Moscow State Institute of International Relations (MGIMO University), Moscow, Russia, [3]Sochi Institute (branch) of People's Friendship University of Russia, Sochi, Russia, [4]Joint-Stock Company SLC-Rus, Moscow, Russia. *Email: tyaglov-sg@rambler.ru

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ABSTRACT

The relevance of the research is due to the necessity of improving Russia's environmental and economic policy at the present stage and ensuring sustainable environmental and economic development of the Russian economy. One of the main strategic priorities of the latter is the development of alternative energy, which will contribute to higher energy and environmental efficiency as well as to easing the load on the environment. It will also involve optimization of the structure of the country's balance of energy owing to reducing its dependence on the export of organic fuels and to ensuring innovation development of the energy industry for the long term. With regard to this, the paper is aimed at finding the most efficient way for solving the said problem; as one, it is shaping the interregional cluster of alternative energy that is suggested by the authors. The leading approach to studying this problem is the systemic approach enabling an integrated view of the diverse elements (alternative energy, cluster approach, interregional interaction) that used to be considered individually. In the paper, the necessity of developing alternative energy is justified as one of the focus areas for ensuring Russia's sustainable environmental and economic development which requires the relevant material, labor and financial resources, technologies and equipment. In order to generate these, it is suggested to form the interregional cluster of alternative energy based on one of the four presented interregional interaction models, namely, the multilateral cross-sectoral model which is going to incorporate mutually associated sectors of the economy (producer sectors, supplier sectors, and consumer sectors) located in several regions and aimed at solving the shared problems. The materials of the paper are of practical value for the state and municipal authorities of Russia in terms of improving the policy implemented by them within sustainable development. Moreover, the results of the paper can be taken into account in forming an entire range of regulatory instruments and social and economic development programs for Russia in general and its regions in particular.

Keywords: Alternative Energy, Cluster Approach, Interregional Cluster, Region, Cluster Policy
JEL Classifications: C38, Q01, Q2, Q42

1. INTRODUCTION

The questions of developing the alternative energy are becoming quite urgent in the Russian economy. Given the strategically limited reserves, reduction of oil and gas prices, and environmental problems aggravated in the world market, as well as economic and technological sanctions introduced on the part of the USA and European countries in relation to Russia's oil and gas complex, it is now more than ever necessary to diversify the activity of Russian oil and gas companies towards development of the alternative energy.

Russia possesses unique competitive advantages for developing all kinds of alternative energy sources – ranging from geothermal energy (geysers in the Far East) to tidal energy in the north. Moreover, Russia has got vast areas that can be used for implementing the alternative energy projects (for instance, there are the immense shoreline and lands for installing wind

generators). At the same time, mains-free energy is developed in the number of hard-to-access isolated regions; e.g. in the Far East, West Siberia, Nether-Polar Urals, Arkhangelsk region, Murmansk region, Yakutia there are thousands of obsolete isolated diesel electric power plants.

All this creates further incentives for activating projects in the sphere of alternative energy, which allows replenishing the fuel shortage, rendering less expensive the production of fuel, heat and motor oil, as well as improving the country's environmental situation. As a result, what is required is to create the appropriate conditions for scaling up and supporting projects of this kind.

One of the ways for bringing into life this field can be the cluster approach promoting the innovation development and higher competitiveness of both individual regions and the country in general, first of all, at the expense of efficient interaction of the state structures, large companies, smaller and medium enterprises, and scientific research organizations.

The greatest effect will be attained by uniting the potential of various regions in the sphere of alternative energy because it will enable the onset of synergetic effect resulting from the regions' exchanging the material, technical, financial and labor resources, technologies, knowledge and experience among them. With regard to this, formation of the interregional cluster of the alternative energy will be especially important.

2. LITERATURE REVIEW

In the contemporary scientific literature, quite a large number of studies in questions of development of the alternative energy and the role of the latter in ensuring the environmental and economic security of the Russian economy have already been conducted.

Russian researchers consider the alternative energy to be a new global course of anti-crisis development both for the world and for the Russian economy that has long-term strategic reference points, and one of the major factors for Russia's environmental and economic security and sustainable environmental and economic development (Vertakova, 2017; Lipina et al., 2018; Porfiryev, 2011; Sheveleva, 2015; Sheveleva, 2018). The works of a number of foreign scientists deal with exploring the alternative energy as a means for solving social, economic and environmental problems of the national economy (Kuik et al., 2019; Akella et al., 2009).

For Russian scientists, a relevant area of research is studying the cluster approach in economics as an efficient mechanism for upgrading the economy as well as a tool for strategically planning the regional development that ensures the synergetic effect which is distributed between the participants thereof with the help of market mechanisms and which creates favorable conditions for innovations, organization and economic relations, area concentration of production and development of the competitive environment (Gladilin et al., 2018; Egorov and Egorova, 2013). Foreign researchers view the cluster as an institute for ensuring a country's competitive advantage in the world market within which numerous companies simultaneously compete and cooperate while also obtaining the associated economic benefits from that (Porter, 1998; Boja, 2011).

Studies of the questions of cluster formation at the regional level seem interesting too. The cluster form is promising; it is one of the efficient tools of the regional policy, and its development contributes to enhancing the competitiveness of the economies of Russia's regions by increasing the efficiency of regional reproduction cycles, diffusion of innovations, and local growth activation. Integration of enterprises into clusters promotes mutually profitable cooperation between them that helps solve the majority of economic problems and improve the region's quality of life (Galiullina, 2013; Erokhin, 2011; Mustafaeva and Esetova, 2016; Tyaglov and Krasnokutskiy, 2011). Cluster policy can stimulate the regional development and innovations as well as contribute to the update of the regional path (Njøs and Jakobsen, 2016).

It is also studies of the problems of creating cluster formations in energy sector and oil and gas areas that are important. Russian researchers point out that higher efficiency of activity and competitiveness of fuel and energy complex enterprises can be achieved by developing the clusters as they ensure interrelation of economic, social, environmental, political and other aspects of development of the complex. They ensure a balanced use of fuel and energy resources and capacities, too, and the alignment of general state, regional and corporate objectives with the interests of the local community, authorities and business (Manukyan, 2015; Maryina., 2012; Pestov, 2010). The said problems are also discussed in the works of foreign authors (Mans et al., 2008; Larruscain et al., 2014).

As for problems and prospects of development of the interregional clusters, these are detailed less. In particular, in the studies available it is pointed out that interregional clusters have to be formed as a tool for economic development of subjects of the Russian Federation but the foundations for forming them, the mechanism of their functioning, and the resource potential of regions which will allow carrying out the synergetic effect require further research (Bocharov and Lobova, 2012; Nikolaev and Makhotaeva, 2016). The interregional cluster interaction was studied in more detail by Bakumenko (2017) who derived four models of interregional clusters formation as a result of analyzing the potential of interregional sectoral interaction in the focus group of regions.

Cluster approaches to development of the alternative energy are studied to the yet smaller extent. So, in the research by Sagdeeva and Pavlova (2014), the necessity and competitive advantages of applying the cluster approach to functioning of the alternative energy in oil-mining regions of Russia are detailed while the study of Taskaeva et al. (2016) considers the possibility of synergetic effect forming under the mutually complementing use of renewable and non-renewable energy sources within an energy cluster.

In spite of the theoretical and methodological developments, the authors believe it is the problem of development of the model for forming the interregional cluster of the alternative energy that

deserves the closest attention. The authors of this paper put forward the suggestion that for the sphere of alternative energy, it is the interregional cluster formation model developed on the basis of the multilateral cross-sectoral model of interregional interaction that is the most efficient one.

3. RESEARCH METHODS

The objective of the research is to develop the model for forming the interregional cluster of the alternative energy, which will allow solving the problem of limited supplies, enhancing the competitiveness of Russian companies and ensuring the energy efficiency of the economy.

The tasks for the project implementation consist in the following:

1. Justifying the necessity of developing the alternative energy as one of the focus area for ensuring Russia's sustainable environmental and economic advance;
2. Viewing the interregional cluster as a basis for creating the relevant conditions for activating and supporting the alternative energy projects;
3. Finding out the advantages of forming the interregional clusters;
4. Studying the existing models of interregional clusters formation;
5. Suggesting the model for forming the interregional cluster of the alternative energy.

The scientific novelty of the research consists in the following. First of all, the foreign and Russian experience of interregional clusters formation has been studied, which has enabled the authors to find the optimum approaches in this field. Secondly, development of the alternative energy has been considered as one of the major focus areas of solving the strategic problems Russia is facing. Thirdly, it is the cluster approach idea at the regional and interregional level currently being elaborated that acts as a dedicated determinant of the research, with the idea being aimed at the sphere of alternative energy unlike the concepts available.

The approaches suggested are:

1. The creative, specific historical approach to the problem under study; this approach allows giving a grounded explanation to new facts and phenomena, supplementing and making more precise the established views, and not hesitating to manifest scientific courage which must be combined with scientific relevance and far-sightedness;
2. The systemic approach; it allows viewing as a complex a number of diverse parts that used to be considered individually;
3. The axiological approach; this approach is oriented to taking into account the interests of all parties involved (individual companies, the sector, the region, the country in general) when studying the particularities of forming the interregional cluster of the alternative energy.

The interdisciplinary nature of the research implies using the set of contemporary methods: Analysis and synthesis, economic and mathematical analysis (correlation and factor ones) that allow establishing links between various factors of impact and results; logical and cognitive methods, the scientific generalization ones that allow wording and proving the scientific hypotheses.

4. RESULTS AND DISCUSSION

Developing the alternative energy and supporting the projects implementation in this sphere are important measures of the state policy of improving the energy efficiency.

As estimated by the Agency for strategic initiatives, by the middle of the following decade, the new type economy will have got established. In it, the following factors will act as the leading ones of the development:

- Propagation of new technologies and formation of new technological practices that can devaluate the existing productions very quickly;
- New configuration of the global economy; construction of new regulatory spaces that will encompass the borders of propagation of the new technologies;
- The largest social shift entailing the formation of a new type of human – the virtual one, shaping a new reality around oneself, communication means, new stratification etc.;
- Change of the management system on the basis of Big Data technologies, cloud technologies, distributed technologies controlling not only productions but logistics too behind which there are the new type companies to enter the market.

Currently, it is oil and gas complex enterprises that are some of the significant and leading players of the global markets of energy raw materials. However, within the context of the above said, in conditions as most highly developed powers of the world will be looking for ways of reducing the dependence of their economies on the external energy raw material sources, as well as in conditions of the global warming, with its rates accelerated due to combustion of fuel, alternative energy markets will develop.

At present, oil and gas complex enterprises feature quite stable financial and economic situations and dispose of considerable blueprints that allow them to drive scientific research and innovation works towards obtaining cheaper renewable energy sources enabling them to properly compete in this field with other players. Meanwhile, it is important to understand that the emphasis has to be placed not on using already existing technologies but rather it is beginning to develop alternative technologies which will allow forming totally new alternative energy markets in the future and creating conditions for global technological leadership of the oil and gas complex companies within the following 20-30 years that has to be in question.

Therefore, developing the alternative energy contributes to solving the following problems:

- Overcoming the problem of limited reserves of the conventional fuel and energy resources;
- Providing regions where the conventional fuel energy resources cannot be used with renewable energy sources;
- Enhancing energy efficiency of the economy;
- Bringing the environmental problems to the minimum owing to the use of "green" energy sources;

- Improving the competitiveness of Russian companies by diversifying their activity and going out to new niches of the world market.

However, in order to implement the alternative energy projects, the relevant resources, equipment and technologies are required.

With regard to this, it is suggested to create the interregional cluster of the alternative energy incorporating mutually associated sectors of the economy (producer sectors, supplier sectors, and consumer sectors) located in several – not less than two – regions and aimed at solving the shared problems.

The main advantages of forming the interregional clusters consist in the following:

- Shared objectives are achieved by uniting the diverse resource potential of various regions;
- Regions go on to cooperation and mutual assistance among them;
- They can flexibly respond to any change in the market structure and dynamics by including the end consumers into the cluster;
- The problem of overproduction is eliminated, which slows down the inflation processes in the economy;
- Employees engaged in cluster economy are retrained and cross-trained faster and more flexibly;
- The problem of lack of certain resources is solved by diversification of the activity;
- The opportunities of implementation of information technologies are expanded.

During the analysis of the current studies, four models of interregional interaction have been found:

1. Bilateral monosectoral one;
2. Multilateral monosectoral one;
3. Bilateral cross-sectoral one;
4. Multilateral cross-sectoral one.

The bilateral monosectoral model of the interregional cluster implies two regions interacting within one sector (Figure 1).

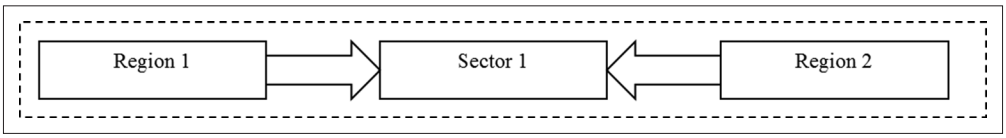
The multilateral monosectoral model of the interregional cluster implies several regions interacting within one sector (Figure 2).

The bilateral cross-sectoral model of the interregional cluster implies two regions interacting in various sectors (Figure 3).

The multilateral cross-sectoral model of the interregional cluster implies several regions interacting in various sectors (Figure 4).

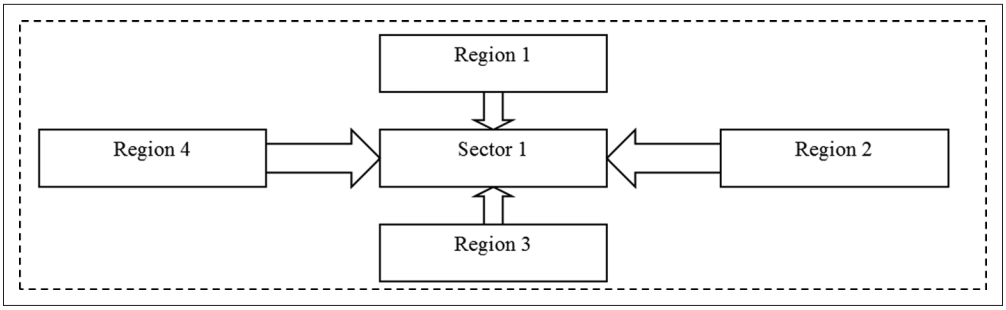
Within this research, the following model for forming the interregional cluster for the alternative energy sphere is suggested

Figure 1: Bilateral monosectoral model of the interregional cluster



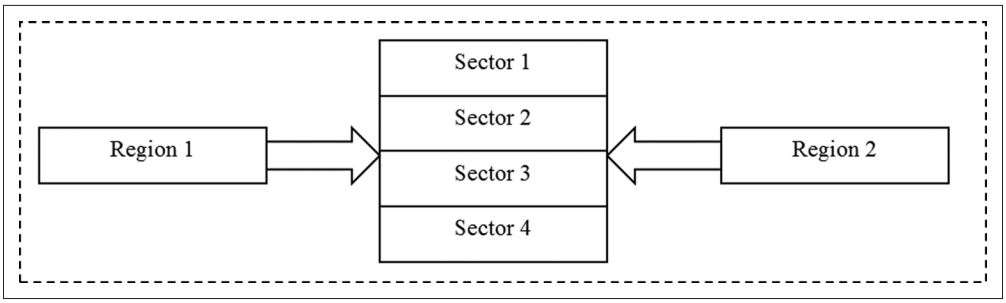
Source: Compiled according to the data from Bakumenko, 2017. p. 94

Figure 2: Multilateral monosectoral model of the interregional cluster



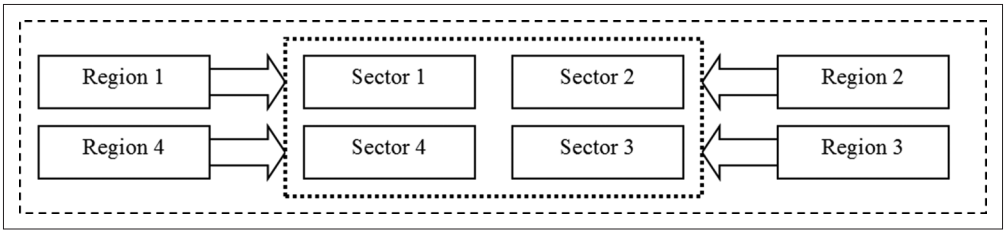
Source: Compiled according to the data from Bakumenko, 2017. p. 95

Figure 3: Bilateral cross-sectoral model of the interregional cluster



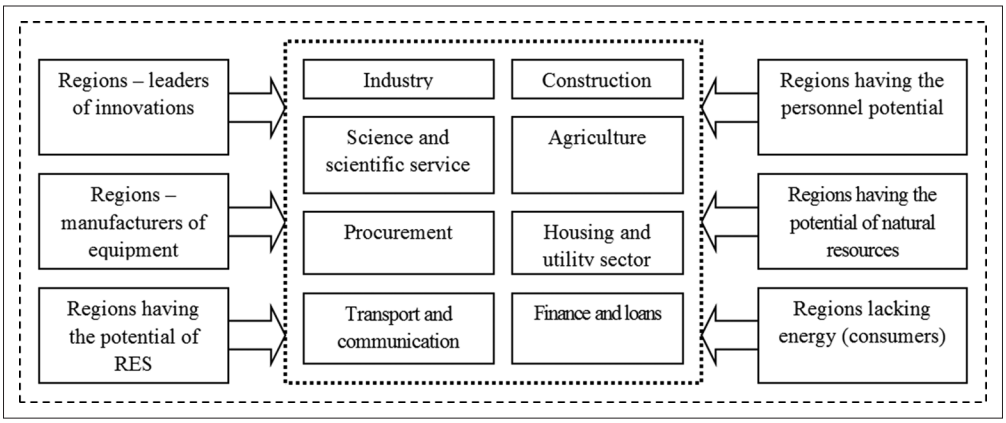
Source: Compiled according to the data from Bakumenko, 2017. p. 95

Figure 4: Multilateral cross-sectoral model of the interregional cluster



Source: Compiled according to the data from Bakumenko, 2017. p. 95

Figure 5: Model of the interregional cluster of the alternative energy



Source: The authors

that is developed on the basis of the multilateral cross-sectoral model given in Figure 4 (Figure 5).

Thus, it is suggested to create the model for forming the interregional cluster of the alternative energy which will incorporate both electric power generation on the basis of RES (wind, solar, geothermal energy and biological fuel) and manufacturers of high-tech equipment, various industries providing the cluster with the required raw materials and supplies, science, education, and sectors that are the key consumers of energy.

5. CONCLUSION

Aggravated strategic challenges and threats for the conventional energy increase the expedience of diversifying the activity of oil and gas companies towards development of the alternative energy. Implementing the projects in this sphere is important from the standpoint of energy supplying to isolated and remote regions of Russia; it will allow replenishing the shortage of fuel, rendering the production of fuel, heat and motor oil less expensive, as well as improving the country's environmental situation.

However, for developing the alternative energy, the relevant material, labor and financial resources, equipment, knowledge and technologies are essential. With regard to this, it is suggested to form the interregional cluster of the alternative energy designed to ensure the necessary conditions for implementing the alternative energy projects.

At the present stage, the entire world sees rapid development of the cluster approach and establishment the cross-sectoral and interregional interaction within it. An interregional cluster implies interaction of two or more regions in two or more sectors of the economy, which creates a certain effect of synergy and helps efficiently achieve the objectives owing to uniting the resource, technological, financial, and personnel potentials of various regions.

The analysis of the current studies has allowed singling out four main interregional interaction models: The bilateral monosectoral one within which two regions interact in one sector; the multilateral monosectoral one implying the interaction of several regions in one sector; the bilateral cross-sectoral one as two regions interact in various sectors; and the multilateral cross-sectoral model in which there are several regions interacting in various sectors.

According to the authors, it makes sense to form the interregional cluster of the alternative energy relying on the multilateral cross-sectoral model. In this case, such key balanced elements as energy generation, production, consumption, industry, R&D and education that are developed in a certain region to the greatest extent get united, which will yield the synergetic effect at the account of sharing the material and technical, financial and labor resources, technologies, knowledge and experience among the regions and allow implementing the alternative energy projects in the most efficient way. In its turn, this will contribute to ensuring the sustainable environmental and economic development of the Russian economy.

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