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CLUSTER APPROACH TO ECO-ORIENTED INNOVATIVE DEVELOPMENT OF THE REGION

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Abstract

The article investigates the prerequisites and development trends of environmentally-oriented innovative processes in the conditions of the Baikal region. The regional policy in the field of environmentally-oriented innovative development is analyzed. The possibility of using a cluster approach in the development of the Baikal socio-ecological-economic system, based on the regulation and consideration of environmental and economic consequences in the implementation of innovations, is being studied. The most promising directions for the development of eco-clusters are highlighted: the development of organic agricultural production; niche occupation of highly specialized ethno-, eco-, and agro-tourism; promoting the emerging East-Medical biopharmaceutical cluster. The first direction may become the basis for the formation of an inter-regional agricultural cluster, the second direction may become the basis for a tourist-recreational cluster, the third direction may become the basis for an inter-regional Baikal pharmaceutical cluster, within the framework of which the creation of the “Baikal-Bio” industrial park is planned. The conformity of the strategies for long-term socio-economic development of the constituent entities of the Russian Federation included in the Baikal region with the principles of environmental-oriented innovation development. An analysis of regional policy showed that in the Republic of Buryatia optimal conditions have developed for becoming a testing ground for testing mechanisms and tools of cluster development taking into account environmental factors. The authors found that, taking into account the prevailing conditions, the Republic of Buryatia may become a pilot territory for the formation of ecological clusters in the Baikal region.

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Keywords: Baikal region, innovative development, cluster, environmental orientation.



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1. Introduction

The development of the Russian economy is characterized by conflicting trends: on the one hand, after the recession in 2015-2016, growth resumed in 2017, characterized by an increase in the pace of economic recovery, stabilization of inflation, increased investment activity and demand for products of domestic producers. On the other hand, some researchers point to a gradual slowdown in the Russian economy (Selishcheva, Selishchev, Djatlov, & By Zhou, 2017) due to low investment efficiency and the increasing role of global factors due to exacerbation of international tension. Despite the declarations on the need to intensify innovative processes in priority areas of science, engineering and technology, the country still maintains an export-raw model of development, in which natural resources (natural rent) are mainly exported, and most of the import is related to high-tech products (intellectual rent). As a result, for the period from 2008 to 2017 the growth rate of the world economy exceeded that of Russia by 29%.

The transition to the sixth technological mode requires significant investment in innovative development, since control over the world economy in the 21st century will be carried out by those states that will gain control over innovative technologies. In the Bloomberg Innovation Index 2019 annual ranking of innovative economies, Russia lost ground by falling two points (27th position) thus giving way to the Czech Republic and Malaysia (Jamrisko, Miller, & Lu, 2019). International experience shows that access to the trajectory of sustainable development is possible only within the framework of an effectively functioning innovation system (in Russian conditions, which urgently needs to establish coordination of federal and regional innovation policies).

When determining the vectors of innovative development of a country and its regions, one should take into account the existing contradictions associated with the nature and essence of innovation. The influence of the latter on the development of socio-ecological-economic systems is often underestimated: they are considered, first of all, as a tool to improve living conditions, while the appearance of new environmental threats and environmental risks is overlooked. Environmental orientation involves only the introduction of environmental innovations related to the rational use of natural resources and the prevention of environmental pollution, as well as toughening the requirements for environmental safety of all types and types of applied innovations. However, the sustainable development of modern socio-ecological-economic systems should be based on the environmental orientation of any innovation processes and innovation activity in general (Vishnyakov & Kiseleva, 2016).

2. Problem Statement

The issues of ecological orientation of innovative development are especially relevant for the Baikal region, in particular, for the Republic of Buryatia, on the territory of which there is $\frac{3}{4}$ the catchment area of Lake Baikal. 240 500 sq. km of the basin of surface and underground runoff to Baikal are located in Russia within the following subjects of the Russian Federation: the Republic of Buryatia - 171 000 sq. km, Irkutsk region – 12 500 sq. km, Trans-Baikal Territory – 55 800 sq. km. These figures give an idea as to which regional economy is most subject to the effects of the so-called “Baikal” factor. Since Lake Baikal is a UNESCO World Heritage Site, the Baikal socio-ecological-economic system has an increased environmental responsibility for the consequences of economic activity on its territory, and

therefore, when constructing scenarios for long-term regional development, it is necessary, first of all, to take into account the environmental and economic consequences for the environment.

3. Research Questions

The object of research is the prerequisites and development trends of environmentally-friendly innovative processes in the conditions of the Baikal region; regional policy in the field of environmental-oriented innovative development.

The subject of the study is the promising directions of the formation of regional ecoclusters as an effective tool for ecologically-oriented innovative development of the Baikal region.

4. Purpose of the Study

The aim of this study is to explore the possibilities of using the cluster approach in the development of the Baikal region, based on the regulation and consideration of environmental and economic consequences when implementing innovations. In the future this approach can serve as a theoretical and methodological basis for the development of mechanisms and tools for managing environmental-friendly innovative development of socio-economic systems.

Considerable attention is paid to the conditions and prerequisites for the formation and functioning of the Baikal region as a single socio-ecological-economic system.

5. Research Methods

The main methods of this study are the analysis and generalization of federal and regional legal acts regulating the development of the constituent entities of the Russian Federation included in the Baikal region, socio-ecological and economic analysis, general scientific methods of scientific knowledge and methods of empirical and theoretical scientific knowledge.

6. Findings

The Baikal region includes three entities on the territory of the Russian Federation - the Republic of Buryatia (hereinafter RB), the Irkutsk region (hereinafter IR) and the Trans-Baikal Territory (hereinafter - TBT). From the point of view of the regional economy, it is considered to be a single socio-ecological-economic system due to its location (in the territory of the drainage basin of Lake Baikal). The development of this territory should be aimed at preserving the unique ecosystem of the planet's deepest lake (the share of its territory in the undisturbed "wild" state reaches 81%). In 2003, Baikal and the Baikal Natural Territory (hereinafter referred to as BNT) received the status of a strategic territory for sustainable development of global importance (37th plenary assembly of the UN World Federation). In this connection Russian scientists propose to consider the Baikal region as a world model territory for testing mechanisms and tools sustainable development (Saktoev & Mantatova, 2012).

Let us consider some indicators characterizing the development of the constituent entities of the Russian Federation related to the Baikal region (see Table 01) (Russian regions: socio-economic indicators, 2018).

Table 01. Indicators characterizing the development of Russian regional systems that make up the Baikal region

Indicators	RB	IR	TBT
The share of the area of the BNT within the RF subject, %	61.4	12.6	16.8
The area of specially protected natural territories (SPNT) of the BNT within the RF subject, sq. km	20161	13127	6356
Population density, person/sq.km	2.8	3.09	2.47
Gross regional product (GRP) per capita, thousand rub.	204.8	495.3	279.4
Human Development Index - HDI (2016 data)	0.826	0.865	0.822
Investments in fixed assets per capita, rub.	42169	106747	84821
The share of investment in machinery, equipment, vehicles,%	28.2	34.8	34.0
The share of investment in intellectual property, %	3.4	3.2	2.7
The degree of depreciation of fixed assets, %	37.7	36.5	48.3
Innovative activity of organizations,%	4.7	5.3	2.9
The proportion of organizations implementing technological innovations,%	3.7	4.7	2.9
The share of internal research and development costs, in % of GRP	0.43	0.35	0.13
The share of technological innovation costs in the total volume of goods shipped, work performed, services, %	1.6	2.4	0.9
The share of innovative goods, works, services in the total volume of goods shipped, work performed, services,%	2.4	0.8	1.5
Percentage of organizations engaged in technological innovation, in the total number of organizations surveyed, %	3.7	4.7	2.9
The number of researchers performing research and development, per 10,000 employed in the economy, people	15.5	17.9	5.2
The number of patents for inventions issued by Rospatent to Russian applicants per 1 million people population, units	52.8	77.4	28.0
Emissions of pollutants into the air, thousand tons	231.5	249.8	834.9
The share of emissions from stationary sources in the total volume of emissions, %	49.0	79.0	53.7
Discharge of polluted wastewater into surface water bodies, mln cubic meters	35	524	45
The volume of production and consumption waste, mln tons	48.397	136.029	192.112
The share of recycled and neutralized production and consumption waste, %	64.2	95	77.2
Forest land covered by fires, hectares	275700	917380	304151
Current expenses for environmental protection, mln rub.	720	10446	1231
Investments in fixed assets aimed at protecting the environment and the rational use of natural resources, mln rub.	223.1	4578.7	1066.8

As can be seen from the table, more than half of the area of the RB is occupied by the Baikal Natural Territory (61.4%), within the boundaries of which there are legislatively established restrictions on economic activity, which significantly slow down the pace of economic development of Buryatia. The area of specially protected natural territories of the RB is 1.5 times larger than in the IR and in 3.2 – in the

TBT (in the total land area of Buryatia it is much inferior to the neighbors in the Baikal region), therefore the issues of environmental-oriented development are especially acute for the Republic of Belarus. Further analysis shows that of the three constituent entities of the Russian Federation that are part of the Baikal region, it is the RB that is in conditions that are forcing the republic to follow the path of intensification of environmentally-friendly innovative activity.

In terms of average population density, IR, RB and TBT are not very different, occupying, respectively, 69, 70 and 72 places among Russian regions. This indicator for the Baikal region as a whole (including the northern part of Mongolia) is 2.5 people / sq. km, which is 2 times lower than the maximum permissible population density of the Earth. Thus, BNT has a reserve of environmental sustainability (Saktoev, & Mantatova, 2012).

According to the annual rating of investment attractiveness of the Russian regions in 2018 (Rating Agency "Expert RA", 2018), the IR was in the group of regions "Medium Potential – Moderate Risk (2B)", the RB was in the group "Low Potential - Moderate Risk (3B1)", the TBT was in the group "Lowered potential – high risk (3C1)". Compared with the previous year 2017, the positions have changed slightly, not one of the entities has left their group, this suggests that the innovative and investment potential of the Baikal region can be regarded as average (at the same time, the IR is much faster than its neighbors in terms of economic development). So, according to the per capita GRP in 2017, the IR took the 20th place among the Russian regions, the TBT occupied the 58th place, the RB held the 75th position. According to the human development index, all the 3 subjects under study fell into a group with a very high level of development (0.800-0.899, which included Eastern Europe, the Persian Gulf, Malaysia, etc.), but the gap between them is still significant (IR is at 31 place, the RB holds the 73rd, the TBT occupies the 76th position). In terms of investment in fixed assets per capita, the IR is close to the average Russian indicator, the value of which amounted to 108734 rub/person, the TBT exceeded the average for the Siberian Federal District (making up 78783 rub/person), and only Buryatia showed a hopeless lag (occupied places among Russian regions: 25th, 37th and 73rd, respectively). Analyzing the structure of investments (for reference: the share of investments in machinery, equipment, vehicles in the Russian Federation – 31.8%, in the Siberian Federal District (hereinafter the SFD) - 36.6%; the share of investment in intellectual property in the Russian Federation – 3%, the SFD – 2, 1%), it can be noted that the IR and the TBT are focused on the development of industry since they inherited a higher industrial potential from the Soviet era than the RB. This, again, indicates that the problem of successful diversification of the economy of Buryatia is long overdue - its solution will determine the vector of development of the republic for the coming decades.

Despite the high (more than 1/3) degree of depreciation of fixed assets, the value of this indicator in the RB and the IR is lower than the national average (50.9%) and the average for the federal district (46.9%). In the TBT depreciation in fixed assets is close to 50% (in 2017, it amounted to 48.3%). In terms of indicators of innovative activity, the Baikal region is almost 1.5-2 times behind the average Russian level (in general, the values of the given indicators in the Siberian Federal District are lower than in the Russian Federation), with the exception of the share of technological innovation costs in the total volume of goods shipped, work performed, services (RF – 2.4%, SFD – 1.9%, IR – 2.4%. This is the only

innovation indicator listed in the table for which the Irkutsk region managed to exceed the average value in the district).

Given the level of socio-economic development of the three entities, their possible merger with a change in the administrative-territorial boundaries will negatively affect the positions of the Irkutsk region in the competitiveness rating of Russian regions. In our opinion, the Baikal region should not be considered as a potential administrative unit (all the more so, since November 4, 2018, the RB and the TBT joined the Far Eastern Federal District, while the IR remained in the Siberian Federal District), but as a promising macroregion that implements close interregional cooperation in the socio-economic and environmental spheres, coordinated by a specially created council.

Speaking about environmental monitoring, it can be noted that the following common problems are characteristic of the Baikal region: high level of surface water bodies pollution; high degree of treatment facilities deterioration; lack of monitoring of the state of atmospheric air in the settlements located in the central ecological zone of the BNT, as well as instrumental monitoring of pollutant emissions from vehicles; insufficient number of landfills for industrial and household waste.

However, as a result of the implementation of a number of measures taken to preserve BNT, the environmental situation looks better than in Russia as a whole: in 2017, in the Baikal region, atmospheric pollutant emissions amounted to 1316.2 thousand tons (0.041% of the volume of emissions in Russia, 17.4% – in the SFD), discharge of contaminated wastewater - 604 mln cubic meters (0.044% of the volume of discharges in RF, 36.8% – in the SFD), the volume of waste – 376.538 mln tons (0.06% of the volume of waste in RF, 0.085% – in the SFD). Unfortunately, in the same year, as a result of fires widely covered in the world media, significant forest areas were destroyed – 1,497,231 Ha, which is 45.6% of the total area of Russian forest land covered by fires (thus, the IR took the 1st place, the TBT occupied the 4th place, and the RB held the 5th position in the anti-rating of the most fire-hazardous regions of Russia, which is a logical result of the ineffective implementation of regional programs and the fulfillment of the functions of local self-government). Current environmental costs amounted to only 3.9% of the cost of RF, 21.1% – the SFD; investments in fixed assets for the same purposes reached 3.8% of the volume of investments in RF, 20.6% – in the SFD. The relatively favorable environmental situation in comparison with other Russian regions is ensured not so much by the efforts of regional authorities and society as by the action of international and Russian legal norms, providing for a number of strict rules and requirements in the field of protecting the Baikal ecosystem.

Judging by the data presented, the issues of environmentally-oriented development of the Baikal region still remain very relevant. Having analyzed the strategies for the socio-economic development of the RB, the IR and the TBT (Law of the Republic of Buryatia, 2019; Resolution of the Legislative Assembly of the Irkutsk Region, 2017; Decree of the Government of the Trans-Baikal Territory, 2013), the following points can be highlighted.

- Indirectly expressed regionalism – despite the existence of common environmental and economic interests and general words about the need to intensify horizontal cooperative ties with the subjects of the Baikal region, regional administrations do not seek to develop interregional cooperation and strengthen economic ties. Neighboring regions are

perceived, rather, as competitors or independent players, each entity plans to become an independent actor in international relations with Mongolia, China and is focused on projects with foreign investors. In the list of investment projects foreseen for financing until 2030, interregional events include the development of transport infrastructure aimed at the construction and modernization of regional communications. Already by the mission, goals, development priorities set in the texts of strategic documents, it is noticeable that the regional administrations did not determine the joint development vectors of the RB, IR, TBT and did not resort to the concept of sustainable development of the Baikal region as a single socio-ecological-economic system.

- Priority directions for the development of the IR – industry and tourism, the TBT - industry and transport and logistics infrastructure, the RB – tourism, service, agriculture (AIC). Significant attention in the strategies is given to the prospects of cluster formation. As potential interregional cluster formations, tourist-recreational and agro-industrial / agricultural clusters are mentioned. Currently, the cluster approach is used: the IR - in industry, the RB – in the tourism and recreation sector.
- Joint environmental and economic projects are not provided. Greening regional development means improving the environmental situation by reducing emissions and discharges of pollutants, waste, using modern resource-saving, environmentally friendly technologies; production of environmentally friendly products and the development of eco-tourism. One of the priorities for the development of the TBT is the creation and development of a regional network of protected areas (SPNT) that effectively contribute to the conservation of the gene pool of living organisms, natural ecosystems and landscapes, as well as optimizing the living environment of the population. As one of the strategic sub-objectives of the IR (Strategic Objective 1 “Ensuring Decent Living Conditions”), an increase in the environmental rating of the region (from 61st place in 2015 to 30th place in 2030) was singled out. In the conceptual basis of the strategy of the RB, the republic’s mission is presented as “saving the people, preserving the unique ecosystem of Lake Baikal for posterity”, based on the principle of the trinity of the natural environment, people and the economy. The Republic of Buryatia is considered as the territory of a “green” civilization, ensuring the preservation of the world heritage site on the basis of observing the principles of rational nature management, efficient use and reproduction of environmental resources, while its environmentally-friendly innovative economy provides a high level of income and the quality of life of the population.

Given the prevailing conditions, it is the RB, in our opinion, that can become a pilot territory for the formation of eco-clusters in the Baikal region and for assessing the consequences of their impact on the environment, as well as the degree of compliance with the principles of ecologically oriented innovative development.

It should be noted that even in the previous Strategy for the Long-Term Socio-Economic Development of the Republic of Buryatia until 2020, tourism and agri-food were selected as two pilot

clusters as the most favorable development conditions corresponding to the strategic goals and objectives of the region (Dorzhieva, & Dugina, 2015). Since the tourism and agricultural sectors, compared with other types of economic activity, cause less damage to the environment, the creation and functioning of clusters in these sectors should contribute to the formation of an effective environmentally-friendly model of innovative development of the region.

We single out the most promising directions for the development of eco-clusters.

1. The development of organic agricultural production, which is facilitated by the following local features:

- dominance of personal subsidiary farms in the livestock sector;
- traditions of nomadic animal husbandry;
- crop production due to lack of funding is characterized by a low level of mechanization of labor and the use of mineral fertilizers. The land resources of BNT as a result of strict environmental restrictions largely comply with the requirements for the production of environmentally friendly food products;
- parallel development of the tourist and recreational cluster expands the market for food products.

2. Niche occupation of highly specialized ethno-, eco- and agro-tourism. In addition to the general problems that hinder the development of tourism in the Russian regions (the lag in the pace of modernization of infrastructure compared to the level of socio-economic development of the country, the unsatisfactory condition of roads, energy networks, water supply networks, treatment facilities, shore protection, and sanitary stops), the tourism industry in Buryatia is affected by such specific factors, as:

- short warm season and huge competition from the ski resorts, which, coupled with a considerable distance from the center and high airfare, ensures low loyalty and “return” of Russian tourists;
- lack of historical and cultural monuments that can compete with famous European and Asian sights and attract foreign tourists;
- “Baikal factor” restricting mass tourism (the Baikal ecosystem cannot cope with the anthropogenic load with a tourist flow of 2 mln people, which was planned by the regional authorities in 2017-2018).

3. Promotion of the emerging East Medical Biopharmaceutical Cluster, specializing in dietary supplements, health and functional nutrition products, institutionalization of traditional medical systems, primarily eastern medicine. There is a serious scientific background in this area: potential participants are the Buryat Scientific Center of the SFD RAS and regional universities, a cluster development program has been developed, but it only describes social and economic effects. Issues of environmental safety and potential environmental and economic risks require a separate study.

It should be noted that the first direction can become the basis for the formation of an inter-regional agricultural cluster with the TBT, the second - a tourist-recreational cluster together with the IR, the creation projects of which were already considered when developing regional development strategies for these entities, but have not yet been implemented. The development of interregional cooperation in the third direction also has prospects, since the Baikal pharmaceutical cluster is currently being formed in the Irkutsk region, within the framework of which the creation of the “Baikal-Bio” industrial park is planned.

In the process of development is a balneological project of the International Baikal Health Resort, based on numerous and varied mineral healing sources of the RB, TBT, and IR with further involvement of Mongolian partners, aimed at the growth of inbound tourism and the intensification of integrative medicine.

Considering the above, the RB in the Baikal region can become a locomotive of environmental-oriented development, the role of which is to form and promote eco-clusters and assess the associated environmental risks, threats, consequences for the Baikal socio-ecological and economic system as a whole.

7. Conclusion

Despite the fact that the term “Baikal region” appeared in the “Strategy for the socio-economic development of the Far East and the Baikal region for the period up to 2025” ten years ago (Decree of the Government of the Russian Federation, 2009), currently the subjects of the Russian Federation included in the composition of this macroregion does not interact as elements of a single socio-ecological-economic system. There are no common mission, strategic goals and development vectors, coordination of actions within the framework of ecological and innovative development.

An analysis of regional policy showed that in the Republic of Buryatia optimal conditions existed in order to become a testing ground for testing cluster development mechanisms and tools taking into account environmental restrictions, risks and consequences for the Baikal ecosystem. If successful, proto-cluster entities will be transformed into inter-regional clusters, the organization of which will require the creation of a coordination council of the Baikal region and closer cooperation between the RB, the IR and the TBT.

The formation of eco-clusters contributes to the diffusion of innovations, the revival of small and medium-sized enterprises, the increase of self-employment of the population, the creation of jobs in related industries, the strengthening of intersectoral and interregional ties and the spread of the approach to the development of the Baikal region as a single socio-ecological and economic system with common economic interests and rational distribution environmental costs associated with the need to preserve the UNESCO World Heritage Site.

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