Innovation Clusters in the Arctic Zone of Russian Federation

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Abstract. The article discusses the problems, directions and opportunities for the development of federal level innovation clusters in the Arctic zone of Russian Federation (AZRF), taking into account the Russian state long-term plans for Arctic territories development and implementing major investment projects. The article analyzes the current territorial structure of supported clusters in the AZRF, explores their industry and production specifics, and identifies the main distinctive features and characteristics of them. Based on the analysis of Russian Arctic regions socio-economic development indicators, the regions, municipalities and cities for the prospective cluster formations development are identified; directions, key specializations and cluster development factors are distinguished. The article justifies the relevance of innovative clusters formation in the context of task innovative, territorial, technological, information and communication, socio-economic development by AZRF.

1. Introduction
The advanced development of the AZRF is one of the most important national priorities for the Russian Federation socio-economic and territorial development in the 21st century [1, 2]. The list of territories within the AZRF is approved by the Russian President Decree – “On the Land Territories of the Arctic Zone of the Russian Federation”. According to it, the AZRF includes the territory of the Murmansk Region, the Nenets, Yamalo-Nenets, Chukotka Autonomous Districts, as well as certain municipalities of the Karelia, Komi and Yakutia Republics, the Krasnoyarsk Krai and Arkhangelsk Region.

2. Federal level strategic planning documents in the field of Arctic zone of Russian Federation development
The special status of the AZRF is established by federal level strategic planning documents. Thus, according to the Spatial Development Strategy of the Russian Federation until 2025, the AZRF, as well as the Far East, Crimean Peninsula, North Caucasus and Kaliningrad Region are recognized as geostrategic territories of the Russian Federation. Geostrategic territories are defined as territories within the borders of one or few regions that have significant importance for ensuring sustainable socio-economic development, territorial integrity and security of the Russian Federation, characterized by specific living conditions and economic activities.

The special importance of the Russian Arctic in terms of solving the strategic tasks of economic development and completing the basic transport, energy, information, and military infrastructures formation is noted in the Russian Federation National Security Strategy. The Russian President Decree – “On the Fundamentals of Russian Federation State Policy in the Arctic until 2035” defines the long-term directions and priorities of the AZRF socio-economic development until 2035. The federal budget provides a separate state program for “Socio-economic development of the Arctic zone of Russian Federation until 2025”, which determines budget financing for the implementation of large investment projects in the AZRF: the total budget for this program is about 7 trillion rubles until 2025. The current
Development strategy for the AZRF and national security until 2020 will be completed in 2020. However, as of June 10, 2020, a new strategic planning document on the federal level has been presented—a draft Strategy for the development of the AZRF until 2035 was approved by the Russian Government and is being finalized at the Russian Security Council.

3. Directions of the AZRF socio-economic and spatial development

The main national interests in the AZRF is socio-economic and spatial development for the period until 2035: the Russian Arctic development as a strategic resource base and its sustainable use; transport infrastructure development, including an increase in Northern Sea Routes cargo turnover up to 80 million tons per the year by 2024, the use of the AZRF transit potential; state support of entrepreneurship [3]; environmental protection and conservation, environmental safety and sustainable use of natural resources; adaptation of the population and economy to global climate change and its consequences [4, 5].

The largest and most capital-intensive projects in the Russian Arctic are projects related to the main transport infrastructure development, included in the separate federal project “Development of the Northern Sea Route” as part of the Comprehensive Plan for the Modernization and Expansion of the Main Infrastructure until 2024:

- Northern Sea Route development – around 906 billion rubles;
- Northern latitudinal railway construction – 233 billion rubles;
- Sabetha seaport facilities construction (Yamal Peninsula) – 144 billion rubles;
- Murmansk transport hub development – 74 billion rubles;
- Marine transhipment complex for liquefied natural gas in the Murmansk region – 60 billion rubles;
- Chaika coal terminal in the Dikson seaport (Krasnoyarsk Krai) – 19 billion rubles, others.

Due to government measures, the AZRF contribution to the total socio-economic development in the Russian Federation is growing. An evidence therefore is the increasing share of gross regional product (GRP) produced in the AZRF, of the overall Russian GRP, as well as some other important socio-economic indicators [6].

However, according to the innovative and technological development target indicators for the AZRF, in recent years there was a negative trend, which is primarily determined by the strengthening of the raw material economy specialization (table 1):

| Table 1. Socio-economic development indicators of the AZRF in 2015 and 2019a. |
|-----------------|---------|---------|-----------------|
| Indicator / unit of measurement | 2015   | 2019   | Dynamics        |
| The share of Arctic GRP in the total Russian regions GRP /% | 5.0    | 5.8    | 16% increase    |
| Average life expectancy / years old | 71.02  | 72.39  | 2% increase     |
| The share of the population using the information and telecommunication network “Internet” in the total AZRF population /% | 83.4   | 91.2   | 9% increase     |
| The value added share of high-tech and knowledge-based economy sectors in the AZRF GRP /% | 7.5    | 6.1    | 19% reduction   |
| Percentage of science-based innovative goods and services of organizations in the total goods and services volume /% | 0.17   | 0.05   | 3.4 times reduction |

aSource: Rosstat, official statistical information on the AZRF socio-economic development, compiled by the authors

4. Results and Discussion: innovation clusters in the AZRF: current state and development prospects

Within the framework discussed in section 2, 3 the federal level strategic documents for AZRF development, covers the tasks of Russian Arctic industrial potential accelerating development, increasing the manufacturing industries share (including high-tech products with high added value).
Despite these tasks set, in current conditions the raw material sector of the Arctic economy is developing much more intensively than the manufacturing sector, but this remark does not remove the need to solve the problem of accelerating the development of the manufacturing sector in the AZRF territory.

Innovation clusters can be considered as one of the instruments ensuring industrial, innovative and technological development in the Arctic territory. The main problem of the cluster development in the Russian Arctic lies in the fact that the clusters formation and support, as a rule, carried out in large cities and developed territories specializing in manufacturing and innovative economic activities, while the creation of clusters in hard-to-reach territories with a raw material economy specialization is widespread to a lesser degree and represents a difficult management task [7, 8].

As of June 2020, according to the Russian Cluster Observatory, 118 federal level clusters are supported in the Russian Federation, and only four of them are located in the AZRF: 2 each in the Murmansk and Arkhangelsk regions (table 2):

| Cluster                                      | Key specialization                                      | Number of residents | Employed, people | Year of creation |
|----------------------------------------------|--------------------------------------------------------|---------------------|------------------|-----------------|
| Shipbuilding cluster of the Arkhangelsk region | Shipbuilding                                            | 23                  | 50427            | 2012            |
| Timber cluster of the Arkhangelsk region     | Forestry and woodworking; pulp and paper industry      | 31                  | 20110            | 2014            |
| "PomorInnovaLes" Tourist and recreational cluster of the Murmansk region | Tourism (entertainment and leisure industry, art, sports) | 12                  | 59               | 2015            |
| Northern Design Cluster of the Murmansk Region | Business services                                       | 12                  | 90               | 2018            |

Table 2. Federal level clusters supported in the territory of the AZRF, 2020.

The main centers of cluster development in the Russian Arctic are Murmansk and Arkhangelsk regions. At the same time, the potential for cluster development in other parts of the AZRF remains highly unrealized.

Taking into account the state’s plans for the Arctic territories development, innovative clusters can be formed and supported in the following industries and regions: transport sector – maritime safety, marine navigation systems and ship repair (Murmansk and Arkhangelsk regions, Karelia Republic); ecology and environmental protection, ecological nature management (Yamal-Nenets Autonomous Okrug); timber industry sector, deep wood processing, furniture production (Arkhangelsk region, Karelia Republic); biotechnology (Arkhangelsk region); integrated processing of coal and industrial wastes, coal chemistry (Nenets Autonomous Okrug, Komi Republic); information and communication technologies (Yamalo-Nenets Autonomous Okrug); military-industrial sector (Murmansk and Arkhangelsk regions); nuclear and radiation technologies (Murmansk region); electric power industry (Murmansk region); new materials (Murmansk and Arkhangelsk regions, Krasnoyarsk region); natural hazard management and protection (Murmansk and Arkhangelsk region, Republic of Karelia) [9, 10].

Perspective centers of cluster development in the AZRF, primarily, can be considered large settlements – cities and urban-type settlements with year-round transport accessibility. As an important cluster development factors should also consider the city population size, as well as the presence in it of large educational institutions and research organizations.

In total, 32 cities with a 1.84 million people population size, which is 78% of the total Russian Arctic population, located in the AZRF. Of the 32 Russian Arctic cities, only eight have a population size over 50 thousand inhabitants: Arkhangelsk, Murmansk, Severodvinsk, Norilsk, Novy Urengoy, Noyabrysk, Apatity, Salekhard. These cities are the most promising centers of cluster development in the AZRF (table 3):
Table 3. Perspective centers of cluster development in the AZRF<sup>a</sup>.

| City             | Region                                 | Population, 2020, thousand people | Number of Universities |
|------------------|----------------------------------------|-----------------------------------|------------------------|
| Arkhangelsk      | Arhangelsk region                      | 359                               | 3                      |
| Murmansk         | Murmansk region                        | 298                               | 4                      |
| Severodvinsk     | Arhangelsk region                      | 185                               | 1                      |
| Norilsk          | Krasnoyarsk region                     | 179                               | 1                      |
| New Urengoy      | Yamal-Nenets Autonomous Okrug          | 115                               | -                      |
| Noyabrsk         | Yamal-Nenets Autonomous Okrug          | 107                               | 1                      |
| Apatity          | Murmansk region                        | 55                                | 2                      |
| Salekhard        | Yamal-Nenets Autonomous Okrug          | 51                                | 1                      |

<sup>a</sup>Source: Rosstat, Ministry of Education and Science of Russia, compiled by the authors

5. Conclusions
Currently, a small amount of federal-level innovation clusters is supported in the AZRF. The specific features and characteristics of this instrument, its connectedness to the developed territories and large cities, explains the low demand for cluster formations in the AZRF. This study substantiates the relevance of innovation clusters creating in the most important in terms of socio-economic development sectors and major urban centers in the Russian Arctic. Cluster entities as objects of innovative infrastructure will contribute to solving the problem of developing the Russian Arctic industrial sector and increasing the high-tech industries share in the total AZRF economy.

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