

Intellectual potential for the Arctic ecosystem development

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Abstract. The level of the society human capital development in new technological order becomes the determining parameter of successful development. Globalization processes are growing against the background of globalization, ensuring the integration of regional economies into technological and financial chains. The development of the continental and marine Arctic is accelerating. The most effective and environmentally safe development will take place in technologically advanced ecosystems that have created a favorable institutional environment. Both these factors depend on the level of human capital development. Only the country (region), which makes efforts for the purposeful formation of human capital, has the opportunity to steadily develop the Arctic and benefit from it. In connection with climatic, conjuncture and technological challenges, the Arctic zone of the Russian Federation will face serious challenges in the coming years. Responding to challenges of the XXI century, rapid and effective mobilization of scientific and technological initiatives accompanied with the search for talent and active entrepreneurs are required. Regional personnel initiative will raise the level of human capital, which is especially important in the Arctic zone of the Russian Federation. It should be noted that not a single Arctic region of Russia currently possesses technological capabilities, scientific and research potential, entrepreneurial initiative and finances necessary for a scientific and technological breakthrough. In rare cases some are able to offer sustainable, advanced and demanded scientific-technological and technical solutions. The proposed regional personnel initiative is aimed at outstripping the increase in the general (regional and attracted) intellectual potential that will ensure the development of Arctic ecosystem.

1. Introduction

Exploration and extraction of minerals in the Arctic and related issues of ecology and environmental protection pose serious challenges for the Arctic states. A proportional response to them can be given by countries and regions that attach great importance to the education and training of highly qualified personnel. The level of development of human capital is essential for the exploration and development of the Arctic. The Arctic was developed by the efforts of many researchers and pioneers, who created opportunities for the founding of industry and new cities. Northern countries and regions are largely indebted to people who have studied the Arctic areas, since a significant part of their wealth is still being formed in these territories. «Human capital



was highly valued and constituted an object of national pride, but studies of this phenomenon did not receive serious development. In the planned economy, human capital was considered primarily as an input factor of production and, therefore, with the advent of market relations, became the subject of optimization for new owners, especially in the Arctic territories» [1].

2. Main part

The main goal of the Arctic development (or redevelopment) [2] is determined by the need to replenish Russia's strategic resource base in order to meet the challenges of the country's socio-economic development [1]. Within this framework, the goals and objectives aimed at the integrated security of the region, the preservation of the ecological balance, the observance of indigenous peoples' interests, and the development of the science of technology as a tool for achieving the main goal are set as secondary tasks.

Scientific and technological support of the purposes of the Arctic development is carried out through existing and formed innovative systems. Studies of the theoretical and methodological foundations and practical results of the innovative ecosystems formation in the Arctic make it possible to assert [3] “that in all strategies, in their movements and interlocks, reliance on a system that initiates and promotes innovation, on a regional innovation system will meet today's and tomorrow's challenges, the objective and global development of the sixth wave of innovation, the emergence of a ‘knowledge economy’”.

Innovative development is based on fundamental and applied scientific knowledge [4]. Traditional knowledge can also form an innovation process [5]. However, studies conducted in the circumpolar region, are often “about these places”, and “not for these places”, the North is regarded as a “laboratory for scientific research” [6]. However, if development in the Arctic should be more sustainable and human-centered, it is necessary to change approaches [7]. This same point of view is also expressed by Russian researchers, in particular: “The Arctic zone of Russia is a large site of development of fundamental and applied scientific research in various fields of knowledge ..., Russian Arctic cities can become intellectual platforms of a new economy based on knowledge and innovations” [8]. Therefore, the future opportunities of Russia's Arctic regions will largely depend on scientific and technological initiatives that will allow getting benefit from new technologies in the interests of business and society. This is also relevant for Western Arctic countries.

The Arctic zone of the Russian Federation (Russian Arctic) fully or partly includes nine subjects of the Russian Federation, or, more precisely, 271 municipalities. The area of the Arctic territories of Russia is 3.7 million km², the population is 2 million 420 thousand people, while the share of GRP is 5.3% of the whole Russian GDP. The population of the Arctic regions of the Russian Federation has decreased significantly since the 1990s, especially in the northern territories. At present, some decrease in population in several regions continues. In regions with a more developed economy there is a stabilization or a slight increase in the population. The share of high-tech and knowledge-intensive industries in the GRP of the macroregion is 7.1%, while the average for Russia is 20.7%. The share of high technology innovative goods in the total volume of shipped goods is 0.13%, which is 10 times lower than the Russian one.

The potential of the scientific and educational system of the Arctic regions is represented by 18 higher educational institutions, 12 of which are branches of higher educational institutions, 9200 specialists annually graduate from. There are 62 scientific organizations in the territory of the Russian Arctic, where 1900 researchers work. Almost the whole scientific and educational potential of the Russian Arctic is concentrated in the cities of Apatity, Murmansk, Arkhangelsk, in an insignificant part – in Naryan-Mar, Salekhard, Nadym, Norilsk and Anadyr. The point placement of the system elements, creating knowledge and competence, forms a high differentiation of human capital in the Russian Arctic and the need for its development.

“Human capital is a set of innate abilities and acquired knowledge, skills and motivations, the effective use of which contributes to the increase of income and other benefits. Analysis of the real processes of development and growth in modern conditions led to the affirmation of human

capital as the main productive and social factor in the development of modern economy and society” [9]. In many ways, it is formed in the systems of university and postgraduate education.

According to the results of the study of the higher education accessibility [10] in the regions, the Arctic regions showed the worst result, having settled in the last third of the list, with the exception of the Krasnoyarsk region (Table 1).

Table 1. List of regional higher education systems in the Russian Arctic

Arctic Region	Number of places	Population 17 - 25 years	Coverage, %	Place
Krasnoyarsk region	96 115	324 794	29,6	36
Murmansk region	14 114	80 508	25,3	57
Arkhangelsk region	22 777	108 872	23,6	68
The Republic of Sakha (Yakutia)	30 422	124 869	24,4	63–64
Yamal-Nenets Autonomous District	1957	53 121	10,5	80
Chukotka Autonomous District	181	4 690	10,2	81
Nenets Autonomous District	0	4 320	0,0	82

The above data reflects the situation at the end of 2016, yet a decade ago the situation was much better. For example, in 2007 in the Yamal-Nenets Autonomous District 13440 people were enrolled in higher education institutions [11]. According to monitoring results in 2017, there were 2 branches of a higher educational institution, the number of places was reduced to 1957. At the same time, the number of people aged from 17 to 25 years is more than 50 thousand. Young people who want to get a higher education, are forced to leave to study in Tyumen, Moscow, St. Petersburg, and as a rule they do not return after the study. The absence of universities and other research organizations in the circumpolar regions is seen as a factor hampering innovative development [14].

“In the 70s - 90s of the XX century, European Arctic countries created regional higher educational institutions with a wide range of applied specialties. Having created an effective system of training scientific and engineering personnel and providing enterprises with them, they were able to make a breakthrough in innovative development and ensure accelerated economic growth” [12].

At present, the development of intellectual capital through the creation of classical universities in the Arctic cities has no prospects, since it is expensive both in capital expenditures and in operating expenses associated with the formation and retention of a talented team of research and teaching staff. It seems more promising to consider evolutionary development of vocational education institutions in the Arctic regions, the qualitative improvement of their level on the basis of network, remote and online technologies, the development of a research base for the formation of colleges of new generation “College 3.0”, which presupposes the succession of improving competencies through education - research - implementation. Organization of regional innovation and technology centers on the basis of colleges in cooperation with small and medium-sized businesses will form a favorable innovative ecosystem and will allow benefiting from new technologies in the interests of business and society.

Undeveloped intellectual infrastructure of the Arctic regions provokes population flows. On the one hand, young people who have lost touch with the small homeland prefer to stay in big cities even having problems with employment, on the other hand, specialists from the central and southern regions come to the Arctic region on a temporary basis, they are not adapted to local climatic conditions and this entails negative social, environmental and economic consequences for the recipient region. At the same time, transaction costs associated with moving and living in a new place increase for both categories of the population (migrants and immigrants). To date, no

studies have been conducted on the costs incurred by organizations to attract specialists from other regions and the level of qualifications of these specialists. The question remains whether the attracted specialists will become patriots of the region, whether they will work with full efficiency for its development, or they will be guided only by economic interests. A significant negative consequence of the fact that young people leave their small homeland is the subsequent departure of their parents, which leads to the removal of both human and property capital accumulated during all years of life in the North, thus reducing the economic potential of the region.

Training the endemic population in major institutions of higher education in well-developed scientific, educational and industrial centers does not solve the problem of young specialists' return to their native cities either. It is necessary to solve not only the problem of where and how the schools graduates will continue their education, but also where and in what industry they will be able to find a job after the training. Education should be based on the principles of targeting orientation, which presupposes the preparation of formed groups of graduates in secondary and higher vocational schools, focused on the actual demand of specific enterprises and institutions in the region (city). Thus, the students know where they will work after the successful completion of their studies, the HR departments know who will join the organization in the future. At the same time, if it is expedient to return graduates of educational institutions to work to their native homeland, it is necessary to form not only an industry (organizational) procedure for the personnel training, but also a territorial one for specific settlements and professions. Taking into account the modern development of information technologies, the solution of such a task is quite manageable.

The fixed decline in the indicators of social development of the Arctic regions accompanied with industrial development shows that in the emerging knowledge economy even successful regions that did not create their own highly qualified personnel training system expect a decline in the level of human capital and subsequently the loss of leadership in the process of upcoming technological transformations.

This becomes possible, because in the conditions of a new technological order formation, the development of regional economy can be ensured only by embedding regional business in new technological and financial chains. Inclusion of the region in financial and technological flows is possible after solving two problems: the formation of a favorable institutional environment; improving the technological effectiveness of the economic system. The determining parameter for solving these problems is the level of development of human assets in the regional community. Thus, only the region that makes efforts for the purposeful formation of human capital has the opportunity to gain a foothold in the markets of the future.

Considering a person, his/her abilities and resources as the main capital of the Arctic regions, a regional personnel initiative that involves the training of highly qualified personnel in the interests of the region, the endemic population and business, should play a key role in the harmonious development of the Arctic territories and the use of the Arctic riches.

3. Conclusions

The proposed regional personnel initiative is aimed at building the human capital of the region through the formation of highly qualified personnel on the basis of endemic population and the reproduction of labor resources corresponding to the needs of the region in terms of professional composition. It is necessary to solve the following priority problems:

- development of integrative scientific and educational links with institutes of the Russian Academy of Sciences, universities, scientific centers;
- formation of favorable professional and social conditions for the educational and research activities of the population;
- assistance provided to graduates of schools from regional authorities and employers in further training and employment; development of human resources innovation infrastructure in the region;

- formation of colleges of new generation “College 3.0”, which presupposes the succession of improving competencies through education - research - implementation, organization of regional innovation and technology centers on their basis in cooperation with small and medium-sized businesses.

Particular attention should be paid to the advanced development of the personnel subsystem of the innovation infrastructure. The main personnel infrastructure subdivisions - personnel centers are formed in cities as part of the local innovation infrastructure and are consolidated in the regional personnel center, which provides the forecast of staffing requirements from the perspective of the long-term scientific and technological strategy; training of representatives of government and business in the areas of innovation theory and innovation management for the development and implementation of innovative projects.

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