

## The Need for Workforce in Constituent Entities of the Arctic Zone of the Russian Federation\*



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**Abstract.** In the first quarter of the 21st century, the Arctic and everything connected with it remains a popular topic in the humanitarian, socio-economic and political spheres. It is especially relevant for Russia, which has the largest polar sector in the world. An integrated approach to the study and analysis of development prospects of the Arctic territories can create conditions for sustainable socio-economic development not only in the Arctic zone of Russia, but also in Russia as a whole. One of the elements of this approach is the need for skilled workforce at the enterprises of the Arctic zone of the Russian Federation; this topic is considered in the paper. The relevance of the topic stems from the need to implement large-scale investment projects for development of mineral resources and transport infrastructure (megaprojects), the need to address long-term tasks of socio-economic development of the Russian Arctic and ensure national security in the region. All these points are contained in the strategy for development of the Arctic zone of the Russian Federation until 2020. Statistical evaluation of demographic processes indicates a continuous outflow of population from the majority of subjects of the Arctic zone of Russia. This happens both due to natural reasons and as a result of emigration, including the emigration of working age individuals. Scientific novelty of the paper consists in its comprehensive approach: using analytical and sociological methods, we analyze the need for labor force in the real sector of the economy in the Russian Arctic. We consider the possibilities of the higher education system to meet such needs. It is established that the emigration of able-bodied population from the subjects of the Russian Arctic and the launch of megaprojects can be considered as factors in the formation of the need for labor resources in the subjects of the Arctic zone of Russia. Further scientific search in the chosen topic consists in the following points: development of methods for long-term forecasting of the needs of economic entities in labor force against the background of its outflow from the Arctic zone, additional substantiation of the medium-term need and the possibility of its implementation through higher education, and search for an alternative to corporate data on the need for workforce.

**Key words:** Arctic zone of Russia, development strategy, workforce, need for personnel, education.

**Introduction.** Mankind has been actively exploring the Arctic for more than 80 years. During this time, several models of the Arctic economy have been developed: the US, Canadian, Russian and European (continental and insular) [1, p. 502].

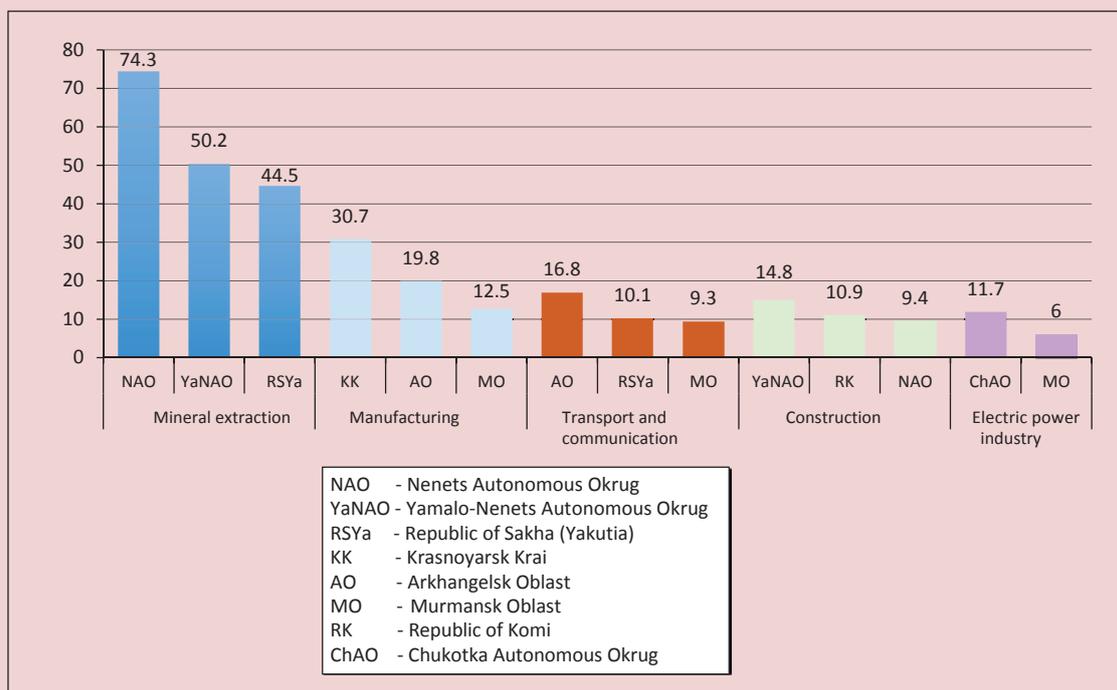
In 2015, GDP of the Arctic was about 300 million US dollars. Almost a third of its volume is created in the resources sector. The share of added value of extractive industries in the Russian Arctic reaches 60%, in The Far North of the U.S. and Canada – 30%, in Iceland and the Arctic circle in Norway, Finland and Sweden – 15%<sup>1</sup>. The manufacturing

industry and the services sector in the Arctic region have never been significant. Examples include metalworking and mechanical engineering (shipbuilding and ship repair) and the food industry. The latter was developed in settlements on the coast of the Arctic Ocean on the basis of fishing for aquatic biological resources and reindeer husbandry among indigenous peoples [2].

The Arctic zone of Russia contains the natural resource potential (worth several trillion US dollars), technological and production potential, which is involved in the production of 10–12% of GDP and creates about 25% of national exports [3, 4]. *Figure 1* shows the share of the leading sectors of the economy in the gross regional product (GRP) of the subjects of

<sup>1</sup> GDP per capita in the Arctic region. Available at: <http://www.arcticstat.org/> (accessed 07.02.2018).

Figure 1. Leading sectors and their share in the GRP of the subjects of the Arctic zone of Russia, 2015, %



Source: Federal State Statistics Service. Regions: socio-economic indicators 2015. Available at: <http://www.gks.ru/bgd/> (accessed July 22, 2018).

the Arctic zone of Russia for 2015, calculated according to official statistics.

The special status of the Arctic region is recognized in Russia and abroad. In 2014, the composition of the land territories of the Arctic zone of Russia was established<sup>2</sup>. The possibility of creating an executive body on “Arctic” issues in the structure of the Russian Government is being considered, in addition to the working State Commission on the development of the Arctic, which has existed since 2015. In 2008–2013, the President of Russia approved the Fundamentals of Russia’s state policy in the Arctic for the period up to 2020 and for the future and the Strategy for development of the Arctic zone of the Russian

<sup>2</sup> About land territories of the Arctic zone of the Russian Federation. Decree of the President of Russia of May 2, 2014 No. 296. Available at: <http://www.kremlin.ru/acts/bank/38377> (accessed 22.07.2014).

Federation and national security for the period up to 2020. In 2013–2015, the program for development of the Arctic zone of the Russian Federation – a financial instrument for the implementation of the national Arctic strategy – was adopted [5].

The purpose of the Russian Arctic strategy is to ensure innovative modernization of the local economy and social sphere based on the use of intellectual resources and advanced knowledge<sup>3</sup>. In order to develop the natural resources of the Russian Arctic effectively, it is recommended to focus on the elements, the progress in the use of which will provide a synergetic effect in the implementation of the entire range of priorities for the development

<sup>3</sup> Strategy for development of the Arctic zone of the Russian Federation and national security for the period up to 2020. Available at: <http://government.ru/info/> (accessed 22.02.2017).

of the Arctic zone of the Russian Federation. One of these elements is human resources that possess knowledge about the changing trends in environmental, socio-environmental and socio-economic systems and are able to effectively face the challenges in the Arctic. Human resources are a key link in the development of the Arctic. They ensure the implementation of projects envisaged by the development Strategy of the Arctic zone of the Russian Federation for the development of natural resources and transport infrastructure (primarily the Northern Sea Route, NSR). This is particularly noticeable in the Western sector of the Russian Arctic, in contrast to the areas located to the east of the Kara Sea, where in recent decades not a single project for the extraction of minerals and development of transport infrastructure has been launched. This can be explained by the lack of ready-made infrastructure and (which is more important) personnel trained to solve ambitious tasks in this region. In the Western sector of the Russian Arctic, on the land and continental shelf of the Arctic Ocean, it is planned to begin production of mineral resources and fuel (Pavlovskoye field on Novaya Zemlya, Prirazlomnoye oil field), which will entail the development of infrastructure, will contribute to the increase of cargo transportation along the NSR, promote the development of personnel support of navigation, staffing the services in the field of environmental management and climate change forecasting. In the framework of Russia's Arctic strategy, it is planned to construct the Belkomur railway and Severny deepwater district of Arkhangelsk port. The implementation of transport projects, considered in the context of mineral extraction, will have a comprehensive impact on the long-term socio-economic development of the Northern territories and will be accompanied by the creation of new jobs.

**Research methodology.** At the state level and in the academic community in Russia and abroad, much attention is paid to the training of labor resources and their provision to the sectors of the Arctic economy. The Fundamentals of the state policy of the Russian Federation in the Arctic provides for "...a sufficient level of fundamental and applied scientific research on the accumulation of knowledge and creation of modern scientific and geo-information bases for management of the Arctic territories, including the development of tools for solving problems of defense and security, as well as reliable functioning of life support systems and production activities in the natural and climatic conditions of the Arctic"<sup>4</sup>. This document prescribes the provision of training of specialists in the system of higher and secondary special education to work in the Arctic conditions, including the improvement of educational programs for the indigenous population, clarification of state social guarantees and compensation for persons working and living in the Arctic zone. Since 2007, an international group of scientists in the Arctic Council has been preparing a report on the state of human capital in the Arctic, its socio-economic and demographic development, distribution and reproduction of labor resources [6]. Factors influencing the dynamics of population and human resource development, foreign experience in migration policy to consolidate labor resources in the Far North, the need for modernization of the state policy in relation to the population residing in the North are considered in the works of M.M. Panikar and A.E. Shaparova [7], T. Hele- niak [8], A. Semenova, and I.M. Popelnitskaja [9, 10], D.B. Smakova [11], I.P. Povarich

4 Fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2020 and for the further perspective. Available at: <http://www.rg.ru/2009/03/30/> (accessed 10.08.2018).

and A.P. Harchenko [12], M.L. Belonozhko, A.N. Silin and O.M. Barbakov [13], M.A. Giltman [14]. The state of human resources in the subjects of the European part of the Arctic region, the dynamics of their changes, the impact on the demographic structure of natural and mechanical factors, the forecast and assessment of human resources are described in the monograph prepared by B.A. Revich, T.L. Khar'kova, E.A. Kvasha and others [15]. Comparing the list of shortage occupations in demand in the Arctic and the specifics of training on the example of Petrozavodsk University, S.V. Shabaeva, I.S. Stepus' and I.A. KHhteeva come to the conclusion that staff shortage in some professions will increase in the medium term in the Arctic region, and the universities, including those located in the sub-Arctic region, will be able to reduce the shortage [16]. Retrospective analysis with the use of "general methods of scientific knowledge", the analysis of formation of human resources in the Arctic zone of Russia on the example of the Murmansk Oblast is given in the work of D.P. Belyaev, T.V. Belevsky, A.G. Bakhtina [17]. M.V. Ivanova and E.S. Klyukina wrote a paper [18] based on studying the condition of labor resources in the Murmansk Oblast in 2010–2016, where the outflow of the economically active population in recent years was the largest among the constituent entities of the Russian Arctic. They conclude that the reason for the decline in the population up to 25 years of age lies in migration processes caused not only by the "group specifics of youth (its mobility)", but also by specifics of conditions for self-realization. Finland's experience in the management of labor resources, which is of practical interest to the Russian Federation (this conclusion can be made when comparing the directions of economic development of the Northern territories of the two countries) is described in

the article of E.A. Korchak. General issues of attracting labor resources to the development of natural-resource potential of the Russian Arctic, the problems and prospects of personnel training, the forecast for demand for labor force in the Arctic economy are highlighted in the articles by M.Sh. Karapetyan, A.R. Kutlubaeva, G.Yu. Obruch [20], A. Matveev [21], S.V. Sigova, I.S. Stepus' [22], E.A. Pitukhin, D.M. Moroz, A.M. Astafyev [23]. Complex issues of providing the subjects of the Russian Arctic with labor resources and concerning the problems of their reproduction are covered in the works of scientists of the Institute of Economic Problems of the Kola Scientific Center of RAS, who worked under the supervision of RAS Corresponding Member Professor G.P. Luzin, representatives of other institutions (Institute of Economic Forecasting, Institute of Demography of NRU HSE, RAS Institute of Geography), in the reports of the Ministry of Labor of Russia [24, 25].

The analysis of literature sources on the topic of our publication shows that in most cases they are devoted to the study of labor resources from the standpoint of assessing the demographic potential of a particular territory of the Arctic zone of the Russian Federation. The works of domestic scientists, with the exception of monographic works of specialists of the Kola Scientific Center, contain generalized data on human potential, labor resources of the subjects of the European North of Russia; they contain very little information about the demand for labor resources by enterprises and executive authorities of the Arctic zone. In 2016, Lomonosov Northern (Arctic) Federal University (NARFU, Arkhangelsk) conducted a study to expand the understanding of the labor resources of the Arctic zone of Russia, assess the current (currently observed) and medium-term (until 2022) needs of employers (that are engaged in economic activities in

the subjects that according to the Presidential Decree belong to the Arctic zone of the Russian Federation) for labor resources. The materials that have been collected and processed using the sociological method helped develop ways of providing information-analytical and methodological support to decision-making on the development of state policy of Russia in the field of personnel training. The assessment and forecast of the need for labor resources were carried out on the basis of data provided by the enterprises of the subjects of the Russian Arctic. Thus, we have identified the need for labor resources with higher education depending on the level of training (bachelor, specialist, master). One hundred and twenty seven employers were interviewed, 50 enterprises belonging to the category of major (over 5,000 people) and big (from 1,000 to 5,000 people) provided the necessary information.

Two hundred and three educational institutions of higher education, among which five universities are located directly in the Arctic zone of the Russian Federation, participated in the section of the study devoted to the possibilities of educational institutions of the Arctic zone of the Russian Federation to meet the staffing needs of enterprises, as well as in the analysis of factors affecting the formation of such needs. When making a sample in each university and its branch, the following techniques of the sociological method were used: cluster method and mechanical (step-by-step) method. The target group of the study was 3,000 respondents enrolled in programs of the Arctic orientation. Such universities include NARFU and Northern State Medical University (Arkhangelsk), Murmansk Arctic State University and Murmansk State Technical University.

The results of the study have a scientific and practical value, they develop an idea of the training of labor resources in the Arctic zone of

Russia and forecasting the needs for them. Comparison of the results of this study with foreign analogues can be carried out only in a meaningful context and on a structural basis with expert and analytical materials of the University of the Arctic, the Arctic Council, the working group on education and science of the Barents Euro-Arctic Council. The research materials were tested at the following all-Russian and international scientific conferences organized in NARFU in 2016–2018: “Monitoring and evaluation of development of the Arctic zone”, “Training for the Arctic: from problems to solutions”, “The Arctic – a national megaproject: staffing and scientific support”.

**Results and discussion.** In the course of the study, we can conclude that the staffing needs of enterprises engaged in economic activity in the Arctic region are heterogeneous both in the number and in the skills of labor resources.

The current need for employees with higher education is 6,198 people (including 3,680 bachelors, 1,364 specialists, 1,145 masters). Medium-term (up to 2022) demand is 8,261 people (including: 4,658 bachelors, 1,836 specialists, 1,753 masters). In the regional context, the greatest demand for labor resources is observed in the Murmansk Oblast, Yamalo-Nenets Autonomous Okrug, and the Komi Republic. Nenets and Chukotka autonomous okrugs and the Republic of Sakha (Yakutia) show the lowest indicators of demand for personnel (*Fig. 2*).

Taking into account the delayed nature of many megaprojects, it is important to consider the medium-term prospective staffing needs calculated until 2020–2021. It is revealed that the greatest need for personnel will be typical for manufacturing, metalworking, engineering, power, mining, telecommunications sectors and education (*Fig. 3*). The predominance of staffing needs not related to resource industries

Figure 2. Current personnel demand of constituent entities of the Arctic zone



can be explained by the diversification of the sectoral structure of the economy in the most populated regions of the Arctic zone – in the Murmansk and Arkhangelsk oblasts where more than 1 million people live and where conditions are created for the implementation of major megaprojects for the development of the Arctic zone.

Considering the need for labor resources, it should be noted that not all subjects of the Arctic zone of the Russian Federation and enterprises located on their territory are engaged in forecasting the long-term need for labor resources. Based on the available data, the following conclusions can be drawn.

The Murmansk Oblast is fully included in the Arctic zone and demonstrates the highest current (2,829 people) and prospective (4,342 people) demand for labor resources among the subjects of the Arctic zone of the Russian Federation. In the medium term, a high demand for employees with higher education (1,513 people) is predicted. Analysis of the survey data shows that the sectors of the economy experiencing the greatest need for labor resources are manufacturing, mining,

construction, communications, education and the social sphere (*Fig. 4*).

The Murmansk Oblast is turning into an outpost for the study and development of the Arctic. In the Oblast, it is planned to modernize the enterprises of the processing industry (shipbuilding, fish processing and electric power), to build a mining and processing plant (GOK) on the basis of apatite-nepheline ore deposits, to establish a center for construction of large-capacity marine facilities; and a powerful reserve of scientific substantiation of nature management in high latitudes has been created.

The executive authorities of the Arkhangelsk Oblast and the enterprises located in the territories classified as the Arctic zone indicate low current staffing needs (398 people) despite the fact that these territories have second largest population among the territories of the Arctic zone of the Russian Federation. In the medium term, it is forecasted that there will be the highest increase in the need for personnel with higher education by 77%, up to 704 people in relative terms among the Arctic regions. There is a demand for specialists in

Figure 3. Perspective demand of the Arctic zone of the Russian Federation for labor resources, broken down by economic sectors

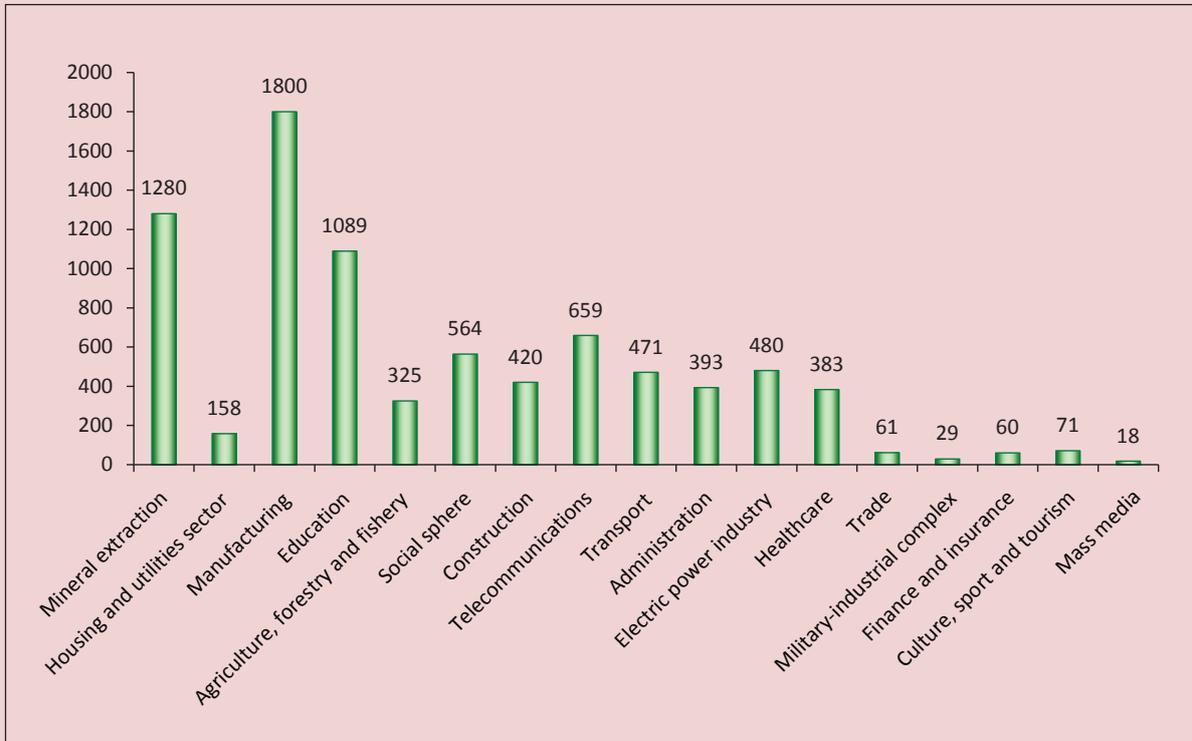
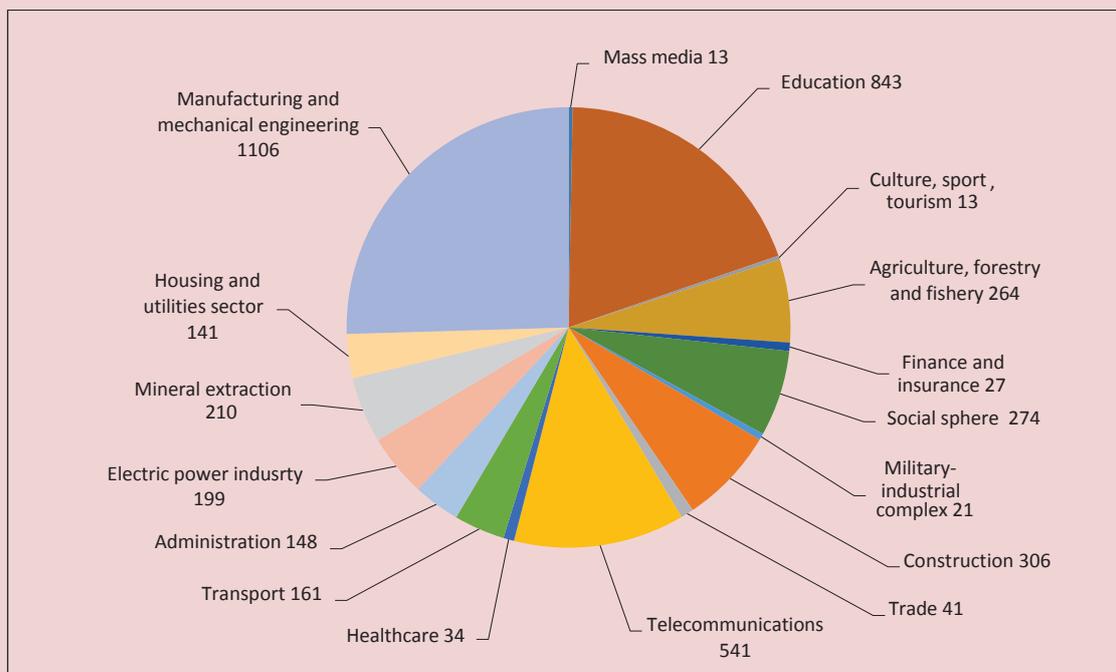


Figure 4. Perspective personnel demand of the Murmansk Oblast, broken down by economic sectors



the manufacturing industries, as well as for workers in the sphere of transport and mining (Fig. 5). The revealed trends are explained by the location of the enterprises of the United Shipbuilding Corporation in the territory of the Arctic municipalities of the Arkhangelsk Oblast, by the formation of an innovative territorial shipbuilding cluster, fisheries and tourism clusters.

Prospective staffing needs of the subjects of Krasnoyarsk Krai included in the Arctic zone of the Russian Federation are 340 people, which exceeds the current need (297 people; Fig. 6).

As in the above examples, the demand for personnel in the Arctic zone of Krasnoyarsk Krai is formed by mining, manufacturing, transport and education. The formation of the need for labor resources is facilitated by the

Figure 5. Prospective staffing needs in the Arkhangelsk Oblast, broken down by economic sectors

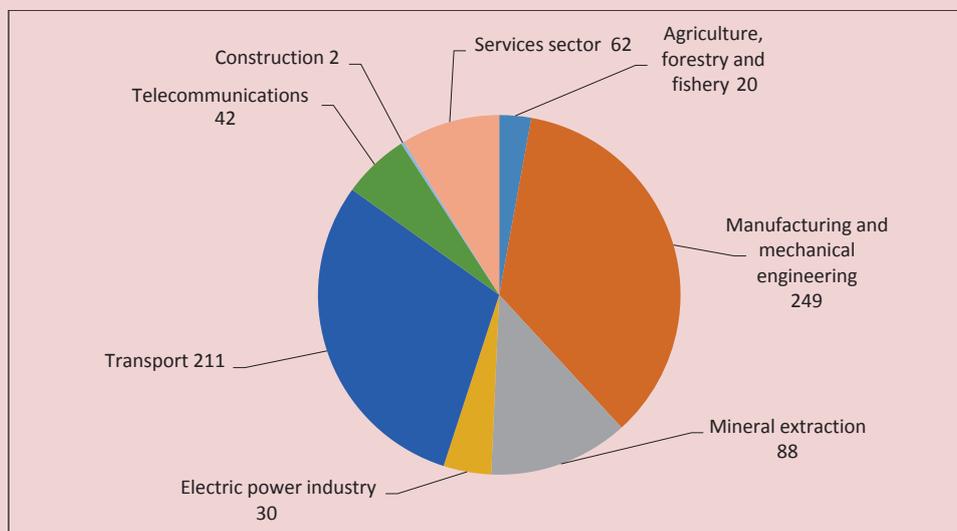
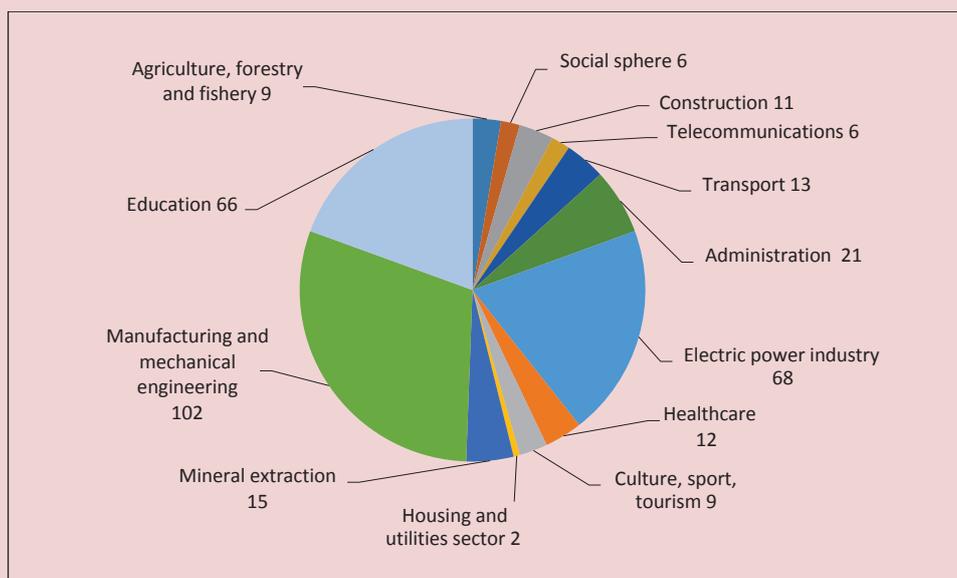


Figure 6. Perspective staffing needs of Krasnoyarsk Krai, broken down by economic sectors



fact that MMC Norilsk Nickel – the backbone enterprise of Norilsk – has developed a strategy for sustainable development of the enterprise, which involves upgrading the mining and metallurgical complex, and the development of urban and industrial infrastructure.

Among the Arctic regions, Nenets Autonomous Okrug has the lowest values of current and future staffing needs: 91 and 109 people, respectively (*Fig. 7*). The survey of enterprises did not reveal a significant need for labor resources even in the extractive industry, despite its leading role in the economy of the subject (by analogy with Yamalo-Nenets Autonomous Okrug). Industries with the greatest staffing need are the transport sphere and the telecommunications sphere. Specialists will be required for the implementation of the following projects under the Arctic Strategy of Russia: reconstruction of the Naryan-Mar airport; construction of the Sosnogorsk–Indiga railway, the Naryan-Mar–Usinsk highway (currently only a winter road is functioning), and the deep-sea port of Indiga.

The current staffing need of the urban district “Vorkuta” in the Republic of Komi is 557 people (*Fig. 8*).

A characteristic feature of the perspective personnel demand is the predominance of non-productive sectors: healthcare, management, education, social sphere. By 2020–2021, according to the results of the study, it is forecasted to grow by 31.4%, up to 732 people. Taking into account the implementation of long-term projects for the development of coal deposits in the Pechora basin, the demand for specialists in the mining industry is expected to increase.

Despite the fact that there are about 26 thousand people living in the territories of the Republic of Sakha (Yakutia) included in the Arctic zone, this region has great economic potential, which determines the current needs in the labor force (246 people) and medium-term needs (350 people) (*Fig. 9*).

Plans for the development of diamond deposits, establishment of Taimylyr fuel and energy complex – the first and only in the Russian Arctic (“Arktik-Uglesintez” company) on the basis of coal deposits of Bulunsky District; plans for the extraction and processing of non-ferrous metals and development of navigation form the demand for specialists in the fields of mining, manufacturing and electric power industry.

Figure 7. Perspective personnel demand of Nenets Autonomous Okrug, broken down by economic sectors

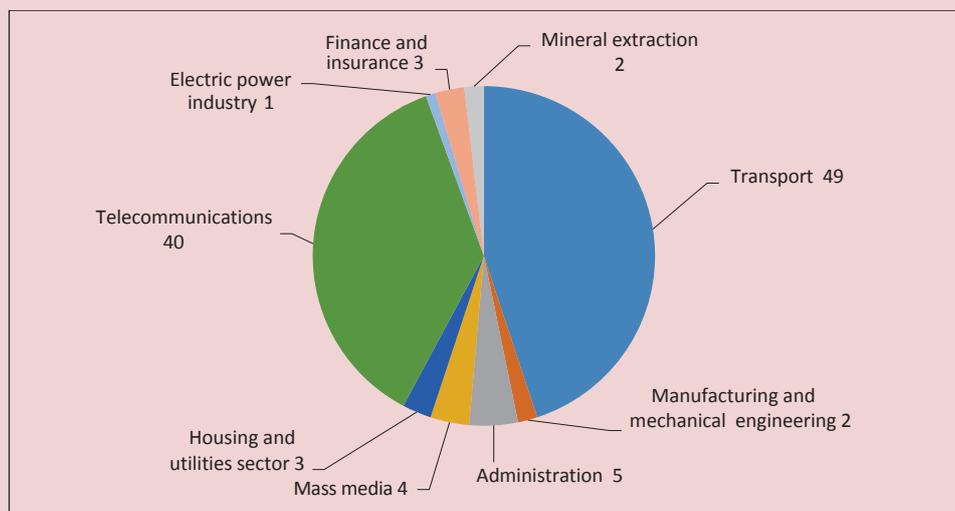


Figure 8. Perspective personnel demand of the urban district “Vorkuta”, broken down by economic sectors

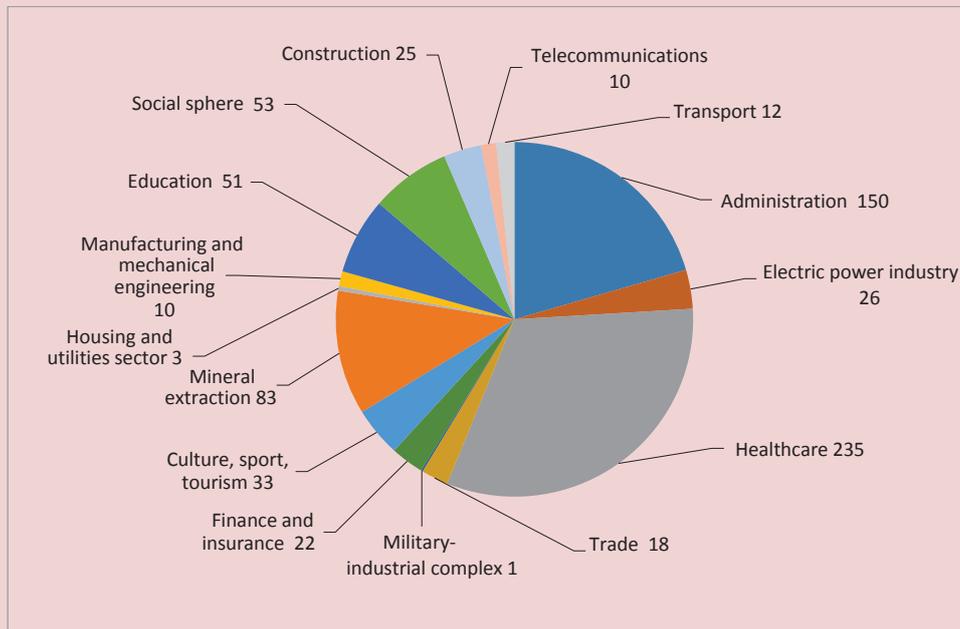
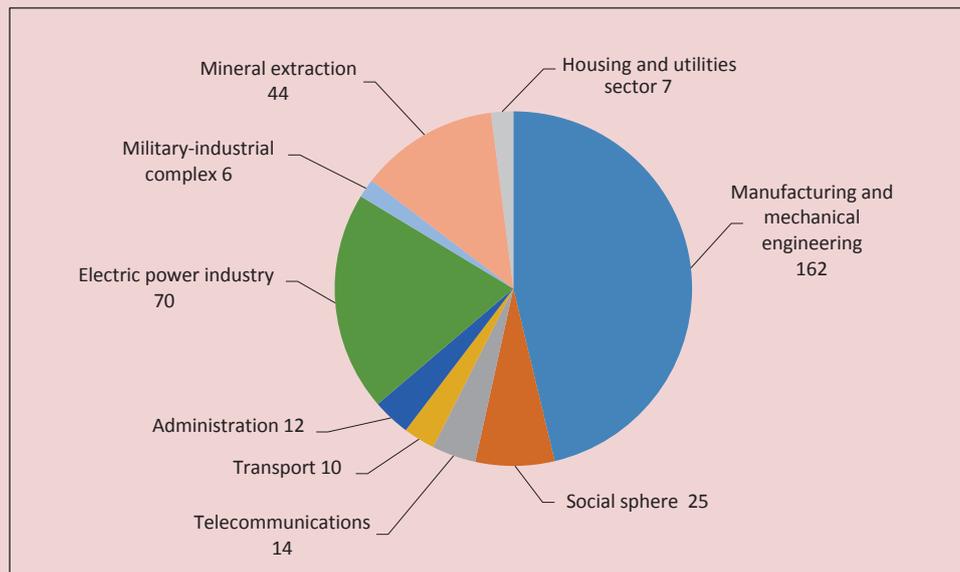


Figure 9. Perspective personnel demand of the territories of the Republic of Sakha (Yakutia), broken down by economic sectors



The current demand for personnel with higher education at enterprises in Chukotka Autonomous Okrug in the medium term will grow slightly, from 173 to 198 people (Fig. 10). The need for specialists in the electric power industry can be explained by the planned

commissioning of a floating nuclear power plant to replace the Bilibino NPP. The need for personnel in the agricultural sector is associated with modernization of agricultural enterprises and development of local greenhouse facilities. A significant part of the current and future

demand also falls on non-productive sectors: education and social sphere.

Yamalo-Nenets Autonomous Okrug ranks second after the Murmansk Oblast according to the number of required labor resources. The peculiarity of the staffing need in this subject is that in the medium term (1,486 people) it is less than the current need (1,607 people) (Fig. 11). By 2021, almost 70% of the total personnel needs will be in the mineral extraction sector, processing industries and infrastructure; this fact is associated with the implementation of the international project “Yamal LNG” for the development of the Bovanenkovo gas field, construction of the port of Sabetta and a plant for the liquefaction of natural gas, and development of land transport and energy infrastructure.

The demand of enterprises for labor resources and their training are interrelated. Meeting the request of companies for specialists is facilitated by educational and scientific organizations that ensure the implementation of the state order (within the framework of targeted

admission, as well) for training. Murmansk Arctic State and Technical universities are functioning in the Murmansk Oblast; there are NARFU and Ammosov North-Eastern Federal University in the Arkhangelsk Oblast and Republic of Sakha (Yakutia), respectively. The autonomous districts have branches of universities, some of which are located outside the Arctic zone. Therefore, training “on site” for the purpose of meeting the needs of enterprises is practically not organized [26].

The study shows that the universities of the Arctic zone of Russia provide training in programs of the Arctic orientation in accordance with the approved development programs (Fig. 12). Figure 13 shows the distribution of students in educational programs. Graduates are considered as labor resources of the Arctic zone.

Successful job search and consolidation of personnel at enterprises is facilitated by the fact that in the Murmansk and Arkhangelsk oblasts and in Krasnoyarsk Krai, universities and enterprises jointly participate in the training

Figure 10. Prospective personnel demand in Chukotka Autonomous Okrug, broken down by economic sectors

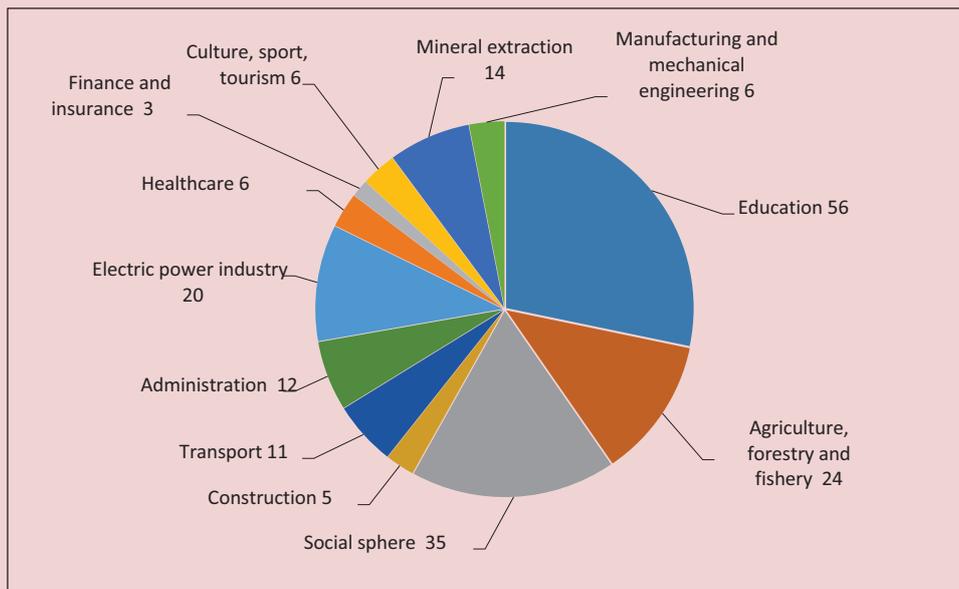
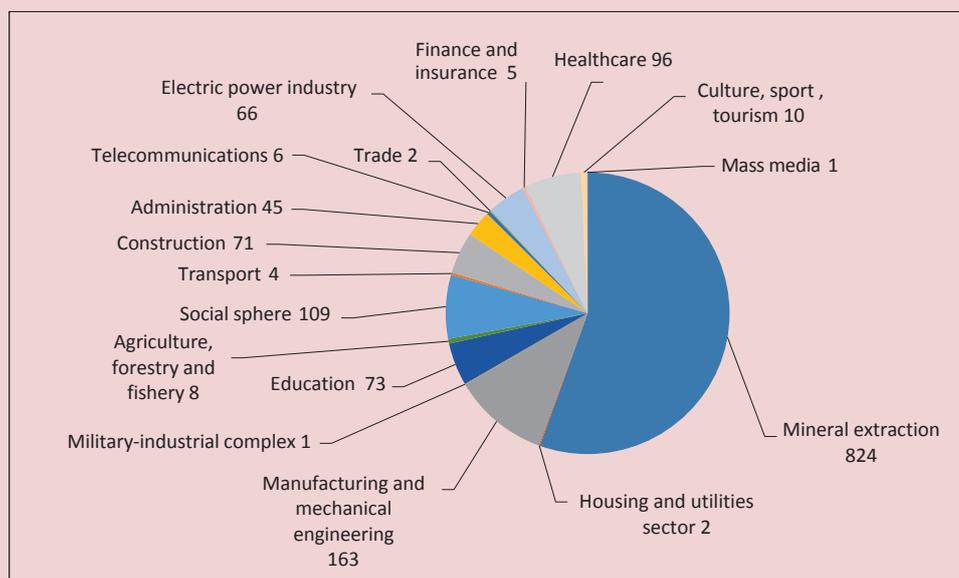


Figure 11. Prospective personnel demand in Yamalo-Nenets Autonomous Okrug, broken down by economic sectors



of students and undergraduates within the territorial clusters and basic departments. As a result, 71–75% of graduates of universities in the Arctic zone of Russia find jobs at local enterprises. Enterprises of the Russian Arctic employ about 17% of students who have graduated from universities located outside the Arctic zone (Fig. 14).

Summing up, we note that the staffing needs of the economy of the Russian Arctic by 2021 will be 8,261 people (Yamalo-Nenets Autonomous Okrug – 1,486, Arkhangelsk Oblast – 704, Murmansk Oblast – 4,342, Krasnoyarsk Krai – 340, Komi Republic – 732, Nenets Autonomous Okrug – 109, Chukotka Autonomous Okrug – 198 and the Republic of Sakha (Yakutia) – 732), among them: 4,658 bachelors, 1,753 masters, and 1,836 specialists.

In the medium-term planning (up to 2020–2012), the greatest personnel demand is observed in the following economic sectors of the Arctic zone of Russia: manufacturing and engineering (1,800 people), mining (1,280 people), education (1,089 people), communications (659 people), social sphere

(564 people). The forecasted growth in staffing needs in these sectors is due to the launch of investment projects for development of mineral resources and transport infrastructure and the need to address long-term challenges of socio-economic development of the Russian Arctic and national security in the region.

Based on the results of the study, the information concerning the training of labor resources in the Arctic zone was systematized and supplemented with the use of statistical and analytical methods. It should be noted that there still exist certain problems in the system of forecasting staffing needs and the process of personnel training. They are as follows:

1. Executive authorities of the subjects of the Arctic zone have no system for monitoring long-term need for specialists in the leading economic sectors of the Arctic zone.

2. The balance of migration of the able-bodied population is negative, despite the high share of employment of graduates from the universities located in the Arctic macro-region. Analyzing the data of official statistics, we can conclude that all subjects of the Russian Arctic

Figure 12. Educational programs that provide training in the interests of development of the Arctic zone

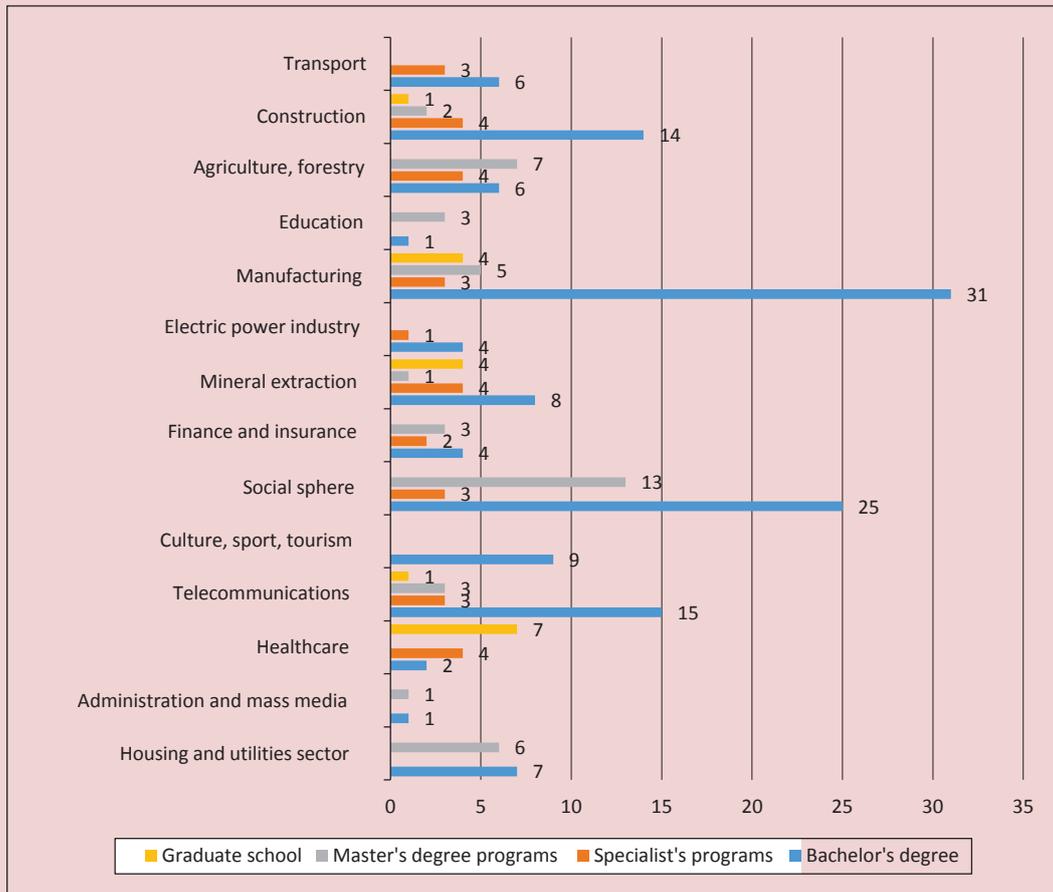


Figure 13. Number of students enrolled in the programs of the Arctic orientation at universities located in the Arctic zone

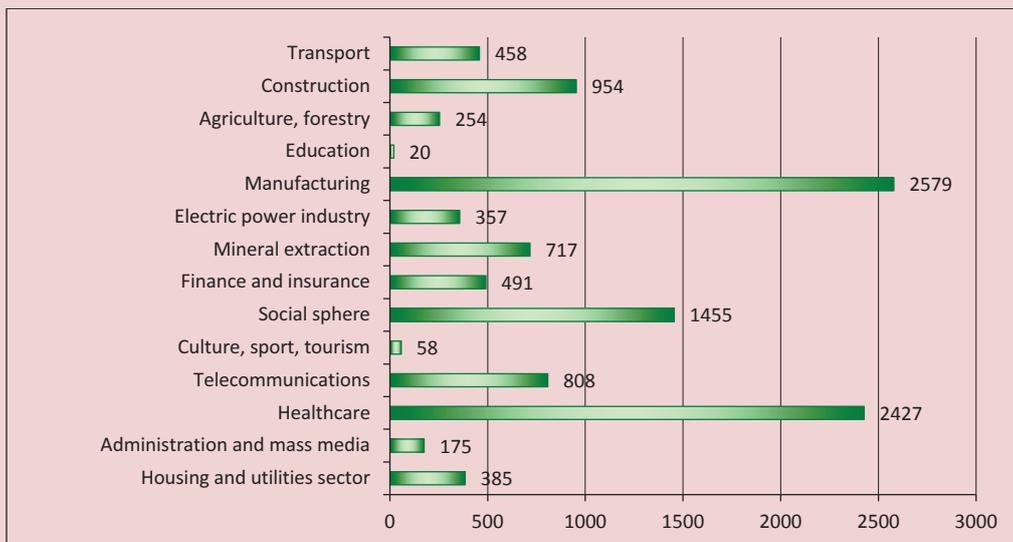
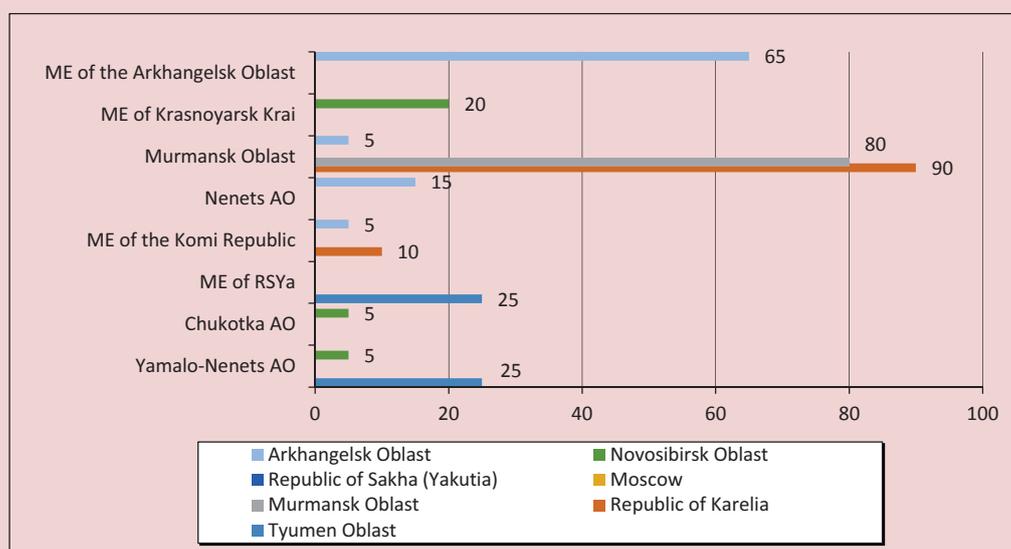


Figure 14. Proportion of graduates employed within their obtained specialty in the subjects of the Arctic zone of Russia, 2015, %



Migration of the population in the subjects of the Russian Federation with the territories included in the Arctic zone of the Russian Federation in 2012–2014

Subject of the Arctic zone of the Russian Federation	Migration gain (loss)		
	2012	2013	2014
Murmansk Oblast	-7925	-10017	-4998
Nenets Autonomous Okrug	50	- 12	6
Chukotka Autonomous Okrug	-336	-354	-154
Yamalo-Nenets Autonomous Okrug	-1127	-8124	-6068
Arkhangelsk Oblast	-2038	-3304	-1623
Republic of Komi	-3655	-3626	-2059
Republic of Sakha (Yakutia)	-1032	-907	-471
Krasnoyarsk Krai	-2210	-3837	-3198
<b>Arctic zone of the Russian Federation</b>	<b>-18273</b>	<b>-30181</b>	<b>-18565</b>

Compiled with the use of the data of the Federal State Statistics Service. General results of population migration, broken down by constituent entities of the Russian Federation for 2014. Available at: <http://www.gks.ru/bgd/> (accessed 22.07.2016).

are characterized by migration decline of the population, except for Nenets Autonomous Okrug (*Table*).

3. Forecast data of sectoral and corporate personnel services are not available. Currently, it is a difficult task to be solved. Its relevance may be due to the poorly formed internal need for forecasts of current and especially long-term demand for labor resources, which, in turn, may be due to a decrease in the intensity (and cessation in some areas) of

geological exploration on land and shelf of the Arctic Ocean, a significant time lag from exploration to the beginning of development of mineral deposits (over 20 years), and thus – a significant period of return on investment and, as a consequence, weak interest on the part of resource corporations.

4. The labor market in the subjects of the Arctic zone of the Russian Federation is characterized by an imbalance between the demand (10,536 specialists in the framework

of the medium-term need) and supply (61,424 students in universities in the region) of labor resources. In order to reduce the imbalance in the shortage of engineering personnel and an overabundance of specialists in the field of management and services, the Ministry of Education and Science of the Russian Federation (from May 2018 – the Ministry of Science and Higher Education) reduces the target numbers of admission to universities in the region in the training programs “Administration” and “Management”, and increases the admission to technical (engineering) and natural science fields of training.

5. The interaction between higher education institutions and enterprises and organizations in the implementation of practice-oriented educational programs is not streamlined in terms of organizing targeted training (only 3.4% of the total number of students enrolled in “Arctic” programs study under contracts of targeted admission).

The need to develop labor resources and improve human capital is a challenge for non-standard and large labor market of the Arctic zone. The challenge should be met with the state regional policy and personnel policy of enterprises focused on the implementation of a set of strategic objectives for the development of the Arctic region, contributing to the consolidation of the working population in

this region with extreme climatic conditions, provision of people with comfortable and safe life, and development of entrepreneurship. Therefore, we can recommend the conclusions of our study to be used by federal and regional executive authorities in the development of the policy in the field of management of scientific and educational space, personnel training for the real sector of the economy of the Arctic zone of the Russian Federation, including the implementation of megaprojects, the development of a system for monitoring and assessing staffing needs in the subjects of the Arctic zone and the introduction of such a system in the management system of its socio-economic development.

In order to increase the awareness of stakeholders and participants of the relations in the field of education, systematization and dissemination of the accumulated material relating to personnel training for the Russian Arctic, the Northern (Arctic) Federal University is forming an information and analytical database using the findings of our study – a portal of the national Arctic scientific and educational consortium, which displays universities and scientific and educational institutions engaged in training in the Arctic zone of the Russian Federation, the current register of educational programs implemented in them, data on the number of students, as well as a map<sup>5</sup> of employers in the region [27].

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<sup>5</sup> Territorial map of educational institutions, educational programs implemented in universities of the Arctic zone of the Russian Federation and enterprises engaged in economic activity in the Arctic zone. Available at: <http://arctic-union.ru/napravleniya/base> (accessed 07.02.2017).

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