








# Staffing the Sustainable Development of the Russian Arctic: A Professional Profile

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**Abstract.** The paper discusses the staffing component of the concept of sustainable development of the Russian Arctic macro-region. The results of a study of the staffing needs of the leading employers in the regions of the Arctic Zone of Russia and the correspondence of training of personnel by the system of vocational education in these regions are presented. About 100 leading employers in key sectors of the Arctic economy were covered by a survey on in-demand professions and competencies required to work in the Russian Arctic Zone. Based on the survey, a rating of the most popular professions was formed. A comparative analysis of 50 professions from this list and specialties/areas of training of graduates by the education system of the Arctic regions was carried out. The results of the survey showed that not all of these professions are trained in the territories of the subjects of the Russian Arctic Zone. The results obtained will make it possible to make managerial decisions in advance, which will improve the efficiency of training and use of labor resources and increase the balance of regional labor markets in the territories of the Russian Arctic Zone in terms of qualifications and personnel.

**Keywords:** Sustainable development · Arctic zone · Staffing needs · In-demand professions · Vocational education

## 1 Introduction

The Arctic Zone of the Russian Federation is a macro-region of geostrategic interests of Russia, which today plays an important role not only in terms of national security, but also the economy (On the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2035: Decree of the President of the Russian Federation 26.10.2020 № 645//Administration of the President of Russia. URL: <http://www.kremlin.ru/acts/bank/45972> (accessed 12.03.2022)). One of the determining factors for the successful development of the Russian Arctic, of course, is the availability of a highly qualified personnel base.

The Russian Arctic Zone is a territory that requires non-standard industrial and production solutions due to the economic and geographical features of the macro-region. The ongoing Arctic projects are a special phenomenon that radically differs from other infrastructure projects in the temperate zone in their complexity and the special role

of transport and energy infrastructure. The implementation of such projects requires non-standard approaches to personnel training and defines special requirements for the quality of educational programs and curricula.

The concept of sustainable development, which combines the principles of social justice, economic efficiency, and environmental safety, is the basic paradigm in managing the development of the Arctic states [1]. This concept also underlies the current stage of development of priority geostrategic territories in the Arctic Zone of the Russian Federation (hereinafter referred to as the Russian Arctic). According to V. Leksin and B. Porfiriev, the “re-development” of the Russian Arctic can be considered effective only under conditions of a balanced withdrawal of all natural resources and restoration of the environmental potential; diversification of the economy and mutually beneficial economic cooperation with foreign countries; balance of places of employment and the system of population resettlement [2, 3].

Researchers in the field of regional development note that one of the factors for the stability of the regional economic system is the state of labor resources [4]. Its quality and volume determine the limitations of social economic development, affect migration flows, population settlement and should be taken into account when developing and implementing the economic, social, and migration policies of the regions [5]. This means that sustainable regional development requires the timely provision of selected priorities with qualified personnel, which necessitates their advance professional training, and also imposes increased requirements on the quantitative and qualitative composition of personnel as one of the key factors in the functioning and effective development of the regional economy.

A systematic diagnosis of the staffing the economy problems of the Russian Arctic regions shown that one of these problems is information asymmetry in the market or uneven distribution of information.

Overcoming the information asymmetry in the regions of the Arctic zone of Russia through a balanced information policy and timely provision of high-quality information on the state and prospects of the strategic development of the Arctic plays an important role in achieving a sustainable balanced development of the economy of the Arctic Zone of the Russian Federation.

## 2 Related Work

Under the current conditions, the priority strategic goal of the system of vocational education in the regions of the Russian Arctic is such a quality of provided educational services that would meet the needs of the economy and social sphere of the Russian Arctic and ensure the effective development and infrastructural development of the Arctic territories.

To achieve this goal, it is necessary to have information about which professions are in demand on the labor market; what a graduate should know and be able to do; what professionally important qualities he must possess in order to work in the Arctic. Of no small importance at the present time is information about the conceptual interpersonal skills of graduates (“softskills”), which are relevant to a wide range of tasks and situations that go beyond the academic context. These questions are of interest for scientific study.

Researchers from the Estonian Entrepreneurship University of Applied Sciences compiled a list of 19 soft skills and surveyed students' opinions about the role of soft skills in the curriculum. According to the results of the study, it was revealed that students highly appreciate the importance of general skills and focus on the need to acquire and develop them in the process of obtaining higher education [6].

The article [7] presents the Russian experience in the formation of a list of the most demanded professions in the economy of the Russian Arctic, taking into account the priorities of the economic development of the regions and various criteria for the demand for professions, formed on the basis of monitoring data of vacancies of public employment services, a list of professions in demand at the federal level, a forecast of personnel needs of employers of the Russian Arctic, the competencies of the WorldSkills Russia championship.

The science-based econometric method for forecasting the needs of the economy in the context of professions is based on a combination of a macroeconomic regulatory approach based on forecasts of macroeconomic indicators, together with a microeconomic survey approach that serves to detail trends in demand in professional and qualification sections.

The articles [8, 9] analyzes the current conditions of the sector of employment and the labor market in the regions of the European and Asian part of the Russian Arctic. Major changes in the structure of the manpower resources formation and its distribution based on sectors of activity are studied. However, data on the occupational composition of the labor market is not presented.

An analysis of Russian and foreign experience has shown that one of the main sources of information about professions and competencies in demand, including for the purpose of subsequent adjustment of curricula [10], are the texts of announcements for required vacancies that are posted by employers in the public domain [11]. The article [12] considers the problem of soft skills, which are not directly professional competencies, but are required to a certain extent in every profession. The articles [13, 14] consider the features of the required competencies using the example of the profession of a librarian in the USA and the profession of an analyst in Peru. The doctoral dissertation (<https://epub.wu.ac.at/id/eprint/3174>) presented a study of the relationship between skills monitoring and curriculum planning.

Another way to identify in-demand professions and assess the required skills and competencies in the labor market is to consult with employers and trade unions and conduct surveys of employers. Practice shows that OECD member countries (OECD Innovation strategy: Key Findings. Paris: OECD, 2010. URL: <https://www.oecd.org/sti/45326349.pdf>; Towards an OECD Skills Strategy. The OECD Skills Strategy. Paris: OECD, 2011. URL: <https://www.oecd.org/education/47769000.pdf> (accessed 22.03.2022)) conduct surveys of employers and employees on new and in-demand competencies on a regular basis at least once a year.

All of the above information serves as the basis for a meaningful adjustment of educational programs, taking into account specific Arctic requirements, determining the directions for the development of the education system and the structure of admission to vocational education organizations in the Arctic regions.

### 3 Materials and Methods

To form the conditions for the sustainable development of the Arctic regions, it is necessary to fine-tune educational programs to the specifics of the Arctic. In this regard, special attention at the stage preceding the development/adjustment of educational programs should be paid to studying the opinions of employers about the professions and competencies that are in demand.

The methodology for compiling a list of professions in demand and competencies needed by employers in the Russian Arctic Zone is based on a sociological survey of leading employer companies in each region that is part of the Russian Arctic Zone. The purpose of the survey is to identify demanded professions and competencies, taking into account regional specifics for planning targeted training of qualified personnel for employers in the Arctic Zone.

The survey involved key employers conducting business activities in the Arctic Zone of the Russian Federation. The list of employers was formed and agreed with the executive authorities of the constituent entities of the Russian Federation as part of a similar study in 2015. As part of this study, this list has been updated and supplemented by employers from the Republic of Karelia, which became part of the Arctic Zone in June 2017. Thus, the general population of the study includes 132 employers in the Russian Arctic Zone. The sectoral focus of employers' economic activities reflects the industry specifics of the Russian Arctic Zone: most employers' companies belong to the extractive industry, industrial production and infrastructure industries serving them.

Within the framework of this study, the questions are aimed at obtaining such information as:

- information about the company, including its geographical location (for the possibility of filtering by region and belonging to the Russian Arctic Zone) and the average number of employees in 2017;
- description of the personnel selection system in the enterprise and features of the company's career guidance policy.

To identify demanded professions and competencies, two blocks of subject questions have been formed, which are aimed at:

- Identification and indication by employers of at least 10 professions and positions that are in demand in their company. Further, for each specified profession in demand, a block of additional information is formed about: the required level of professional education; the name of the enlarged specialty group and specific specialty; the average number of employees as of 2017; additional need for workers for 2018; average monthly salary; the period of demand for the profession (short-term, medium-term, long-term).
- Choice of 3 to 7 universal competencies that are the most important from the point of view of the employer as a direct consumer of labor resources.

The authors of this study proposed a classification system for universal competencies in the following blocks – “1 – Analytical activity”, “2 – Organization and administration”, “3 – Communicative activity (leadership and interaction)”.

The formation of the list of competencies was based on the best foreign and Russian experience and included an analysis of the sectoral dynamics of the Arctic economy, a survey of employers. The results of the study [15], which proposes a conceptual tool for analyzing “soft skills”, which includes 21 categories, such as critical thinking, decision making, problem solving, ethical and deontological principles, communication skills or lifelong learning, were considered.

Out of 132 leading employing companies of the Arctic Zone of Russia, 74 large employers took part in the survey, including: 17 employers from the Murmansk region, 14 from the Nenets Autonomous Okrug, 8 employers from the Arkhangelsk region, Krasnoyarsk Krai and Chukotka Autonomous Okrug, 7 employers from the Republic of Karelia, 5 Yamalo-Nenets Autonomous Okrug and 3 from the Komi Republic. The most represented were the basic sectors of the economy of the Arctic macro-region – mining and manufacturing. The same types of economic activity correspond to the largest number of the surveyed average annual number of employees.

## 4 Results and Discussion

Based on data on demanded professions provided by employers in the Arctic Zone of Russia, a list of the TOP-20 professions by education level was compiled: higher education (HE), training of mid-level specialists (MLS), training of skilled workers and employees (SWE), education not specified (NS) (Table 1). Demanded professions have a specific sectoral nature of the basic types of economic activity of the Arctic macro-region. For example, a surveyor, a mining engineer, an underground miner, as a rule, carry out labor activities in the field of mining (coal, metal ores, etc.). For these professions, indicators of the average annual number of employees (ANE) and additional need (AN), as well as their distribution by educational level (EL) are given.

Based on Table 2, a comparative analysis of the TOP-50 list of the Russian Arctic and the availability of training in the relevant educational professions/specialties in the regions of the Russian Arctic was carried out. As a result of the analysis, it was revealed that for 14 professions from the TOP-50 of the Russian Arctic (about 30%), personnel are not trained in the territories of the constituent entities of the Russian Federation that are part of the Russian Arctic. For a number of professions in demand, the lack of training in the regions of the Russian Arctic is caused by high requirements for the material and technical base. Training in “popular” specialties that require HE and are in demand in all regions – medical and pedagogical – is not conducted in the ChAO and YaNAO. It should be noted that the volume of personnel training is often not sufficient, especially for budget-funded places of study.

The “+” sign marks the profession in the “D” column if it was indicated in the region as demanded. The “+” sign indicates in the “T” column the availability of training in the region in the corresponding profession.

The next step after employers have identified the professions that are in demand is the choice of the most important universal competence for the profession, taking into account the specifics of the implementation of labor activity in the Arctic.

**Table 1.** The list of TOP-20 most demanded professions, formed on the basis of the results of a survey of leading large employers in the Russian Arctic Zone in 2018.

Name of profession/position at the enterprise	ANE, ppl	Structure of the ANE by EL, %				AN, ppl	Structure of the AN by EL, %			
		HE	MLS	SWE	NS		HE	MLS	SWE	NS
Aircraft operation engineer (aircraft systems)	1270	100	–	–	–	4	100	–	–	–
Mine excavation master	1186	85	–	–	15	11	45	–	–	55
Geologist	1085	100	–	–	–	28	100	–	–	–
Mining engineer	1024	100	–	–	–	2	100	–	–	–
Chemical engineer	1015	100	–	–	–	2	100	–	–	–
Mine surveyor	1028	100	–	–	–	6	100	–	–	–
Repairman	1680	62	–	–	38	70	43	–	–	57
Aviation mechanic (technician) for airframe and engines	635	–	100	–	–	5	–	100	–	–
Aviation mechanic (technician) for instruments and electrical equipment	635	–	100	–	–	4	–	100	–	–
Flight mechanic	635	–	100	–	–	4	–	100	–	–
Car driver	2676	–	–	98	2	120	–	–	86	14
Electrician for repair and maintenance of electrical equipment	2266	–	–	78	22	100	–	–	84	16
Oil and gas production operator	2117	–	–	50	50	92	–	–	50	50
Shaft worker	1451	–	–	100	–	111	–	–	100	–
Ship electrician	1268	–	–	100	–	223	–	–	100	–
Locksmith for instrumentation and automation	1075	–	–	51	49	44	–	–	55	45
Ship engine fitter	1027	–	–	100	–	20	–	–	100	–
Underground wireman	974	–	–	100	–	84	–	–	100	–
Electric and gas welder	765	–	–	69	31	74	–	–	77	23
Underground miner	726	–	–	100	–	196	–	–	100	–

The most important, according to employers, are the competencies of block 2 “Organization and administration”, namely, “persistence in achieving the goal”, “ability to make decisions under stress or under time pressure” and “ability to present and protect the results of one’s activities”. Certain competencies of this block are noted by employers

**Table 2.** Distribution of demanded professions across the territories of the subjects of the Russian Arctic and information on the availability of appropriate training for graduates in these regions.

Ranking	Code and name of profession/position		Educational level		Arhangelsk region		Krasnoyarsk region		Murmansk region		Nenets autonomous Okrug		Republic of Karelia		Komi Republic		Republic of Sakha (Yakutia)		Chukotka AO		Yamalo-Nenets AO		
	Code	Name	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	
1	11442	Car driver		+		+				+						+				+			+
2	19816	Ship electrician		+		+				+													
3	11717	Underground miner					+																
4	19861	Electrician for repair and maintenance of electrical equipment		+		+				+												+	
5	17491	Shaft worker					+																
6	19915	Underground wireman														+							
7	15824	Oil and gas production operator					+																
8	19756	Electric and gas welder		+		+				+													
9	18559	Repairman		+		+				+													
10	20589	Geologist		+		+				+													
11	18187	Metal ship hull assembler		+		+				+													
12	18470	Ship engine fitter		+		+																	
13	14000	Loader driver		+		+																	
14	18577	Ship repairman		+		+				+													
15	23785	Mine surveyor		+		+				+													
16	23911	Mine excavation master		+		+				+													
17	22551	Mining engineer		+		+				+													

(continued)

Table 2. (continued)

Ranking	Code and name of profession/position		Educational level		Arhangelsk region		Krasnoyarsk region		Murmansk region		Nenets autonomous Okrug		Republic of Karelia		Komi Republic		Republic of Sakha (Yakutia)		Chukotka AO		Yamalo-Nenets AO	
	Code	Name	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T	D	T
18	13193	Timberer																				
19	22860	Chemical engineer		+																		
20	16081	Process plant operator																				
21	18494	Locksmith for instrumentation and automation																				
22	18547	Technological plant repairman		+																		
23	19931	Duty electrician (mechane) and equipment repairman		+																		
24	13482	Sailor																				
25	10187	Hydrometallurgical operator																				
26	22491	Design engineer		+																		
27	22509	Mechanical engineer		+																		
28	14008	Underground machine operator																				
29	14257	Technological compressor operator																				
30	19149	Lathe operator		+																		
31	22854	Process engineer		+																		
32	22536	Drilling engineer		+																		
33	13583	Bulldozer operator		+																		
34	11196	Concrete worker		+																		
35	19867	Electrician for distribution networks operation		+																		

(continued)





for all professions in demand. The key competencies from block 1 “Analytical activity” are “Definition of causality” and “Self-development”. Competencies from block 3 “Communication skills” were indicated by employers less often than all the others, while the most popular ones were “decisiveness, self-confidence” and “Teamwork skills” (Table 3).

**Table 3.** Presents a fragment of the distribution matrix of universal competencies for demanded professions.

Name of universal competence	Geologist	Mining engineer	Chemical engineer	Mine surveyor	Mine excavation master	Shaft worker
High reaction speed (especially in situations of increased risk), ability to distribute attention	1	1		1	1	1
Initiative	1				1	
Communication skills (presentation, writing, negotiation)	1					
Motivating and stimulating the activities of other people					1	
Persistence in achieving the goal	1	1		1	1	1
Definition of causality	1			1		
Responsibility, performance	1	1	1	1	1	1
Reflection of activity (own and others) and its results	1					
Decisiveness, self-confidence	1					1
Self-control and self-organization	1	1		1	1	1
Self-development	1	1	1	1	1	
Ability to quickly adapt and work effectively in a variety of situations	1	1		1	1	1
Ability to have an effective discussion	1					
Ability to combine multidisciplinary tools in application to problem solving	1	1				
Ability to capture and classify data	1	1		1		

(continued)

**Table 3.** (continued)

Name of universal competence	Geologist	Mining engineer	Chemical engineer	Mine surveyor	Mine excavation master	Shaft worker
Ability to effectively delegate duties and authorities					1	
Ability to effectively search, process and analyze information for the task	1	1				
Ability to independently learn new ways of organizing activities	1	1		1		
Creative thinking/creativity, including the ability to see opportunities	1	1	1	1		1
Ability to mediate in conflict resolution						
Ability to define boundaries, norms and values						
Ability to plan your work and predict the results of your activities	1	1		1		1
Ability to present and defend the results of one's work	1	1				
Ability to make decisions under stress or under time pressure	1	1		1	1	1
Teamwork skills	1	1		1	1	1
Managerial and organizational skills	1	1		1		
Formulation of conclusions based on the results of their work	1	1	1	1	1	

In addition to universal competencies, it is necessary to pay attention to the professionally important qualities of employees that they must possess for successful professional implementation. Accounting for the professionally important qualities of an employee is a prerequisite for the implementation of his successful professional activities. In the context of this study, the employer's requirements for the presence of the necessary set of personal qualities of an employee to work by profession in the Arctic are identified. At the same time, these qualities are equally relevant for workers with higher and secondary vocational education.

The professionally important qualities identified by employers for demanded professions can be described as "Arctic" and divided into components:

- The professionally important qualities in terms of the motivational component include the desire to live and work in the Arctic Zone, the desire for career growth, the active desire to master certain activities, and the willingness to work on a rotating schedule in shifts, including at night time.
- The physiological component identified by employers includes such qualities as sufficient health, endurance in extreme conditions, readiness to work in the harsh climatic conditions of the North, with harmful and dangerous production factors, in difficult mining and geological, underground working conditions.
- The psychological component includes readiness for new and complex tasks, increased attention, etc.

In the list of professions in demand in the Arctic, 80% are professions that require secondary vocational education, and only 20% – higher education. The study of the demand for personnel with higher education in the Russian Arctic cannot be ignored. For 30% of professions that are in demand among leading employers and require higher education, training is not conducted in the regions of the Russian Arctic.

Below are suggestions to overcome the structural discrepancies between the training of graduates and the regional system of higher education and the needs of the regional labor markets of the Russian Arctic Zone:

- For a number of professions for which there is not sufficient training of personnel in the territory of the Russian Arctic, it is necessary to carry out targeted training of personnel in other regions, actively developing the practice of targeted training.
- The revival of the practice of creating branches of large universities, including with the use of online learning technologies, to provide funding for expanding the material and technical base of educational institutions, including through the use of employers' production sites in order to organize educational space and on-the-spot training.
- In order to attract qualified specialists in the Arctic regions to work in demanded professions in the medium and long term, it is necessary to carry out predictive career guidance activities.

These activities should be aimed at motivating schoolchildren to obtain in-demand professions in the Russian Arctic; motivation of students studying in demanded training programs to stay to work in the regions of the Russian Arctic, and for those who study in educational institutions of other constituent entities of the Russian Federation – to come to live and work in the Arctic. An example of such an event is the All-Russian career guidance lesson “Start your working biography from the Arctic and the Far East!” (Internet portal «Start your career in the Arctic and the Far East!» URL: <http://dv-arctic.labourmarket.ru/> (accessed 22.03.2022)), which is conducted for two target groups – for schoolchildren in the regions of the Russian Arctic (focus on staff retention) and for schoolchildren in the regions, whose graduates traditionally choose Arctic companies as they first job.

## 5 Conclusion

Seventy four leading companies of the Arctic Zone of Russia took part in a survey of employers on the subject of professions in demand and competencies of employees. At the same time, it turned out that every fourth employee of these companies works on a rotational basis.

As a result of the study, regional lists of professions in demand in companies conducting economic activities in the territory of the Russian Arctic were formed. A comparative analysis of the professions in demand and the availability of training for them in the relevant regions of the Russian Arctic has been carried out. Universal competencies and professionally important qualities have been identified, taking into account the peculiarities of labor in the Arctic, including harsh climatic conditions, the influence of long daylight hours and the shift nature of the work process.

One of the key universal competencies, according to employers, is “the ability to quickly adapt and work effectively in various situations”. Along with high professionalism, they attributed motivation and the state of physiological and psychological health to the professionally important qualities of employees.

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