

THE CONDUCTION OF COMPARATIVE ANALYSIS OF THE ARCTIC POPULATION'S MAJOR CATEGORIES' QUALITY OF LIFE*

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Abstract

The authors of the present study provide a comparative analysis of the quality of life within the Arctic zone of the Russian Federation. The analysis of the people's quality of life was based on the study of cultural, social and economic indicators and was held in accordance with the specifics of the Arctic zone of the RF. The Arctic zone was compared to the other subjects of the RF and a factorial analysis was carried out which gave an opportunity to define factors having the greatest impact on the generation of the people's quality of life.

Keywords: Arctic, the Arctic belt of the RF, quality of life, factorial analysis.

JEL code: J15, R11

Introduction

The improvement of the people's quality of life is always central within the issues of socio-economical development of any region. There are large investment megaprojects being planned and developed in accordance with the programmes of socio-economical development of Russia up to 2050 which would enable to exploit the Arctic belt of the RF and increase the level of welfare of this region as far as the focus and speed of the further reforms depends largely on it. This certainly proves the importance of building sustainable models of socio-economical development. In order to create them we must research the degree of dependency of factors influencing quality of life within the Arctic belt of the RF. The objective of the present study is to define factors which mainly influence managing people's quality of life within the Arctic belt of the RF. The following tasks were stated in order to achieve this objective: to systematize scientific approaches to the notion "quality of life", to structurize social, economic, cultural and infrastructural criteria influencing quality of life within the Arctic belt of the RF, to conduct factorial analysis.

* The study was carried out as part of a research project supported by St. Petersburg State University: "Urbanized Ecosystems of the Arctic Belt of the Russian Federation: Dynamics, Condition and Sustainable Development" (PURE Id: 11752931)

The essence of the notion “quality of life”

The category “quality of life” was first introduced into scientific use by J.Galbraith [1] in the 60s of the 20th century. Many researchers suggest that it appeared due to the transition to postindustrial society which was accompanied with special attention to the non-material aspects of life, when the problem of quality of life was realized in such social context where the problems of physical survival and satisfaction of elementary survival needs were not too critical. It is also vital to percept and absolutely accept the value of human being and human rights. The recognition of the notion “quality of life” is apparently connected with the spreading “doctrine of human relations” within management (E.Mayo) [2].

W.Nordhaus and J.Tobin [3] supplemented the abovementioned interpretation taking into account non-economical components: worktime fund and quality of the environment which was called “the measure of economic welfare”.

Nowadays scientific literature treats “quality of life” as a set connected components which can be described and characterized as a system or a process. L.A. Nesterenko in his research claims that the quality of life “viewed as a process, on the one hand, gives an opportunity to characterise quality of life as showing dynamic behaviour and a more flexible reaction on outer and inner changes and on the other hand, contributes to the continuity of managing quality of life in order to increase customer satisfaction (of population, society) by fulfilment their demands”.

It is worth saying that the economists pay quite a lot attention to the gnosiology of the term “quality of life (welfare)” while the problems of evaluation of people’s quality of life as applied to the certain regions of the RF are still under-investigated. This is due to the labor input into defining factors which influence the people’s quality of life.

As noted by the Russian and foreign researchers (A.T.Naberezhnaya, A.A. Popov, V.I.Kondratieva, A.V.Mikhailova, L.N.Popova, Khairuddin Idris, Hayrol Azril Mohamed Shaffre, Sulaiman Md. Yassin, Asnarulkhadi Abu Samah, Azimi Hamzah, Bahaman Abu Samah and others) [4], managing quality of life fist of all includes factors of social infrastructure which consists of residential space, its construction, social and cultural facilities, the sphere of housing and utilities infrastructure, businesses and organizations of healthcare system, education, nursery education, related to recreation and leisure, retail business, public catering, rendering services, sports and health institutions, public transport and intercommunication on servicing population, system of institutions rendering legal and financial and credit services, etc. Therefore, in our point of view, it is crucial to conduct a factorial analysis in order to create models of socio-economical development of the Arctic belt of the RF.

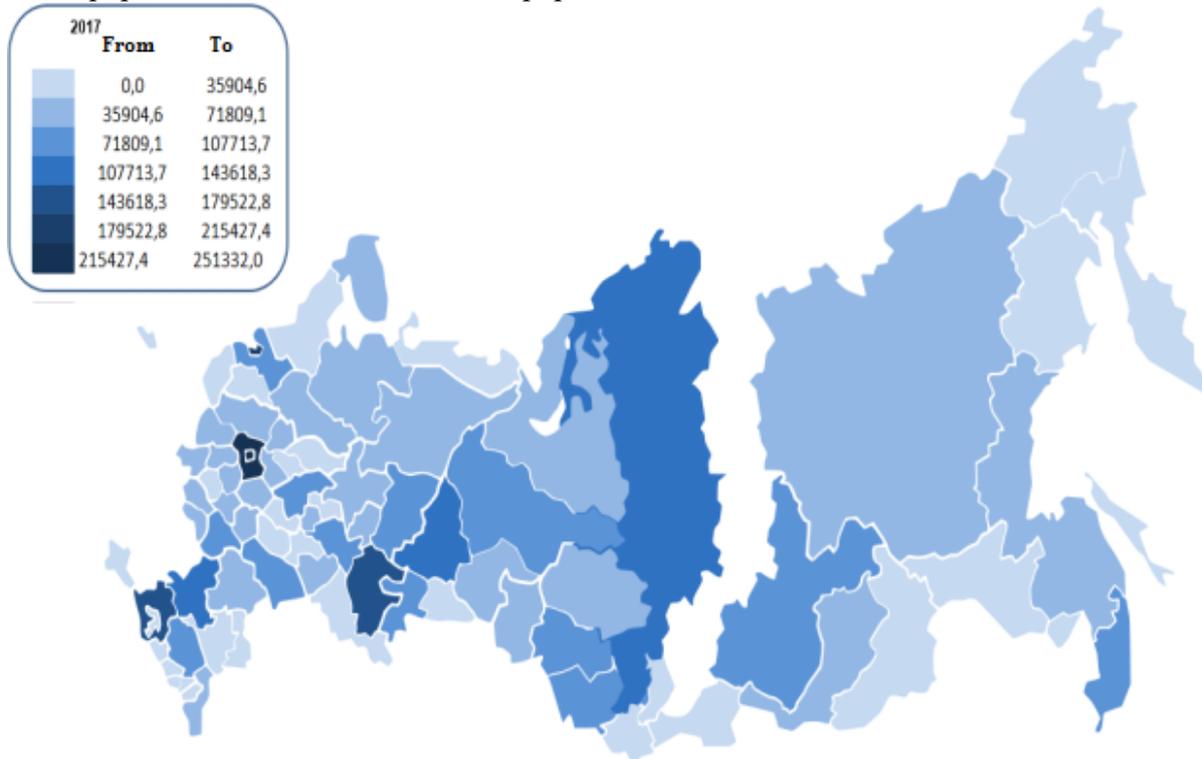
Features of development of the Arctic belt of the RF

The importance of creation a unique model of socio-economical development of the Arctic belt can be explained with the substantial migration loss¹ (pic.1). The largest number of migrants is observed in the Komi Republic (42595 persons, including 1291 persons moved outside the RF), Murmansk Region (43416 persons, including 3364 persons moved outside the RF), Krasnoyarsk Region (124082 persons, including 10109 persons moved outside the RF), the Republic of Sakha (45373 persons, including 623 persons moved outside the RF), Arkhangelsk Region (46924 persons, including 1678 persons moved outside the RF) .

It is worth noting that population migration from the Arctic belt of the RF is observed mainly within the boundaries of Russia.If we analyse emigrational gain, we can see that people from the Republic of Karelia mainly moved to Finland (96 persons in 2016, 148 persons in 2017),

¹ The analysis of migration gain indicates “migration loss” as the obtained result is below zero.

to Georgia (77 persons in 2017) and the CIS countries (50 persons in 2017); from the Komi Republic people moved to the CIS countries (445 persons in 2017); from Arkhangelsk Region people moved to India (79 persons in 2017), from the Nenets Autonomous District people moved to Belarus (31 persons in 2016) and to Finland (22 persons in 2016); from the Yamalo-Nenets Autonomous District people moved to Armenia (80 persons in 2016, 44 persons in 2017), Belarus (436 persons in 2016), Serbia (137 persons in 2016, 17 persons in 2017). It is important to say that people who move to other countries are mainly a part of high-skilled, able to work, economically active population. What is the reason for population decline?



Pic. 1. Migration in 2017
Source: governmental statistics

The socio-economical problems of the Arctic regions in the concentrated form are manifested in high cost of fuel and energy resources, indispensable food-stuff and commodities, in difficulties in realisation products of senile industries, absence of the modern processing industry. The population density here is by 14 times lower than outside the Arctic zone (0,05 persons per 1 sq.km.).

There are also problems in the housing and utilities sector of economy within the Arctic zone. The delivery of residential houses overall in the regions of the Arctic zone (further referred to as AZ RF) has grown by 9% in 2016 compared to the previous period and by 23% in 2017 compared to 2016 (more than in the RF where the increase in 2018 - 50,6% and in 2017 - 33%) and amounted to the total area of 1146 thousand sq.m. and 1055 thousand sq.m. correspondingly (the share in the RF is around 6% within the reviewed period). The largest delivery

of residential housing was in Krasnoyarsk Region (this region holds 12th place in Russia, 387 thousand sq.m. the share in AZ RF is 46,2%) and the Republic of Sakha (Yakutia) (this region holds 38th place in Russia, 254 thousand sq.m., share in AZ RF - 18,4%). We should specifically stress that the delivery of residential houses in the half of the regions of the Arctic belt of the RF within the latest three years shows the tendency of growth by more than two times. Though, such increase is conditioned with the fact that 4 regions of the Arctic belt are included into ten regions with the total floor area located in wrecking apartment buildings, terraced buildings, residential houses (specified buildings), in specific housing fund: in the Republic of Sakha in 2017 - 1221,2 thousand sq.m., in Arkhangelsk Region - 504,93 thousand sq.m., in Yamalo-Nenets Autonomous District - 476,43 thousand sq.m., in Krasnoyarsk Region - 405,6 thousand sq.m.

At year-end the area of housing fund per one citizen in the AZ RF varies from 21,6 sq.m. (in Yamalo-Nenets AD) to 27,3 sq.m. (in the Chukotka AD). In the Republic of Sakha (Yakutia) the area of housing fund per one citizen amounted to 21,2 sq.m. Overall in the regions of AZ RF from 2000 to 2017 the area of housing fund per one citizen increased by 3,4 times. Over 2017 overall within the regions of AZ RF housing fund with water conduits amounted to 74%, with water disposal system - 73%, central heating - 81% and hot water supply - 71%. The next factor of managing quality of life of people living in the Arctic part of the RF is power supply. Investment projects for the construction of WDPPs, EDEPSs (emergency diesel power supply stations), SPPs, mini combined heat and power plants are actively implemented in the region under investigation.

The share of the whole population of the Arctic zone having continuous access to drinking water corresponding to sanitary and epidemiological norms region-wise is the following: the Republic of Karelia - 84%, the Komi Republic - 99%, Arkhangelsk region - 86%, Nenets AD - 71%, Murmansk Region - 99%, Yamalo-Nenets AD - 88%, Krasnoyarsk Region - 63%, the Republic of Sakha (Yakutia) - 63%, the Chukotka AD - 82%.

There are different community social programmes, especially for the vulnerable groups of society being implemented in order to provide governmental support to population in improving housing conditions. The list of key programmes is shown in table 1.

Table 1

Social programmes in the RF

Funding source	Programme name	The subject where the programme is implemented
Ministry of Energy of the RF	Subprogramme "Economic and Social Development of the Russian Far East and Transbaikalia for the period up to 2013"	The Republic of Sakha (Yakutia), the Chukotka AD
Ministry of Natural Resources of the RF	The development of water resources utilization system of the Russian Federation during 2012-2020 within the frames of governmental programme "Regeneration and utilization of natural resources"	The Republic of Karelia
Federal Water Resources Agency		Arkhangelsk Region, Krasnoyarsk Region
Federal Agency of Construction, Housing and Utilities	Federal special purpose programme "Clear water" for the period 2011-2017	The Republic of Karelia
Ministry of Construction, Housing and Utilities	Governmental programme "Providing affordable housing and utility services to the citizens of the RF"	Nenets AD

Source: compiled by the authors

More than 25000 families used governmental support in improving their housing conditions within the period 2012-2017. The number of people having improved their housing has grown by almost 2 times compared to the indexes of 2012. Within the period from 2010 to 2017 6717 families

were re-accomodated from the area of 328,5 thousand sq.m. The number of families resettled from the wrecking and dilapidated housing has grown more than by 11 times compared to the indexes of 2012.

One of the critical factors in development of quality of life in the AZ FR should be improvement of agricultural sphere. Around 31% of the population in the Arctic Zone lives in the rural areas (as on January, 1st, 2018), while the level and quality of life in the households are low. The sahref of gross value added of agriculture, hunting and forestry in the gross regional product of the regions under investigation varies in the range from 0,23 in Yamalo-Nenets AD to 4,6% in Krasnoyarsk Region. The analysis of agriculture products per capita shows the leading position of Krasnoyarsk Region and the Republic of Sakha (Yakutia) - 29,6 and 31,8 thousand rubles correspondingly. The lowest indexes are in Murmansk Region and Yamalo-Nenets AD - 4,6 and 3,9 thousand rubles per capita.

Crop yield is a burning issue in Arctic. For instance, in the Republic of Karelia the best crop yield of cultivated crops (per harvested acreage) is observed in such positions as field vegetables (284,3 metric centners per hectar in 2013; 265,1 metric centners per hectar in 2014; 257 metric centners per hectar in 2016, 242,4 metric centners per hectar in 2016), feeding root crops (including sugar beet for cattle feeding) (240 metric centners per hectar in 2013; 135 metric centners per hectar in 2014; 210 metric centners per hectar in 2015; 228,9 metric centners per hectar in 2016; 213,6 metric centners per hectar in 2017) as well as pomaceous fruit (apple, pear, quince, etc.) (40,3 metric centners per hectar in 2013; 41 metric centners per hectar in 2014; 38,9 metric centners per hectar in 2015; 45,3 metric centners per hectar in 2016; 53,4 metric centners per hectar in 2017). Rye (around 8 metric centners per hectar) and stone fruits (plum, cherry, etc.) (a bit more than metric 10 centners per hectar) give the lowest crop yield. The leaders in crop yield in the following regions are the same as in the Republic of Karelia: Komi Republic, Arkhangelsk Region (plus cultivated berry plants , around 60 metric centners per hectar within the period under study), Krasnoyarsk Region (plus around 200 metric centners per hectar gives yield of corn grown for silage, soilage and haylage; plus around 200 metric centners per hectar gives yield of cultivated berry plants). The lowest yield indexes of cultivated crops are observed in the Nenets AD, Murmansk Region, Yamalo-Nenets AD and the Chukotka AD. Statistical data relating to crop yield in the abovementioned regions of AZ are listed in the table 2.

Table 2

Cultivated crops yield (per harvested acreage), metric centners per hectar

Region	Cultivated crops	2013	2014	2015	2016	2017
Nenets AD	Potatoes - totally	121	119	99	139	90,5
	Field vegetables	125	132	129	179	
Murmansk Region	Potatoes - totally	98	99,1	97,6	104,4	99,4
	Perennial grasses - grown for hay - totally	7,8	7,8	7,8	7,8	7,9
	Field vegetables	95,6	76,1	77,4	68,7	
	Annual grasses grown for hay		35			
	Fruit and berry plants	17	18	16,2	17	20,7
	Berry plants (wild strawberry, strawberry, raspberry, currant, gooseberry and other berry plants)				17	20,7
Yamalo-Nenets AD	Potatoes - totally	111	109,2	121,3	130,9	108,1
	Field vegetables	82,6	83	80,2	119,9	100,8
Chukotka AD	Potatoes - totally	99,3	100,5	119,1	142,5	111,1
	Field vegetables	27	13,5	17,9	117,6	111,8

Source: governmental statistics

Over the latest year there appeared a range of positive trends in the Arctic zone of the Russian Federation. First of all, unemployment decreased in average by 7,6%. Secondly, the decrease of poverty level. Thirdly, we can depict the tendency of increase of the average monthly nominal wage in average by 3–8%. The amount of the average monthly nominal wage is presented in the table 3.

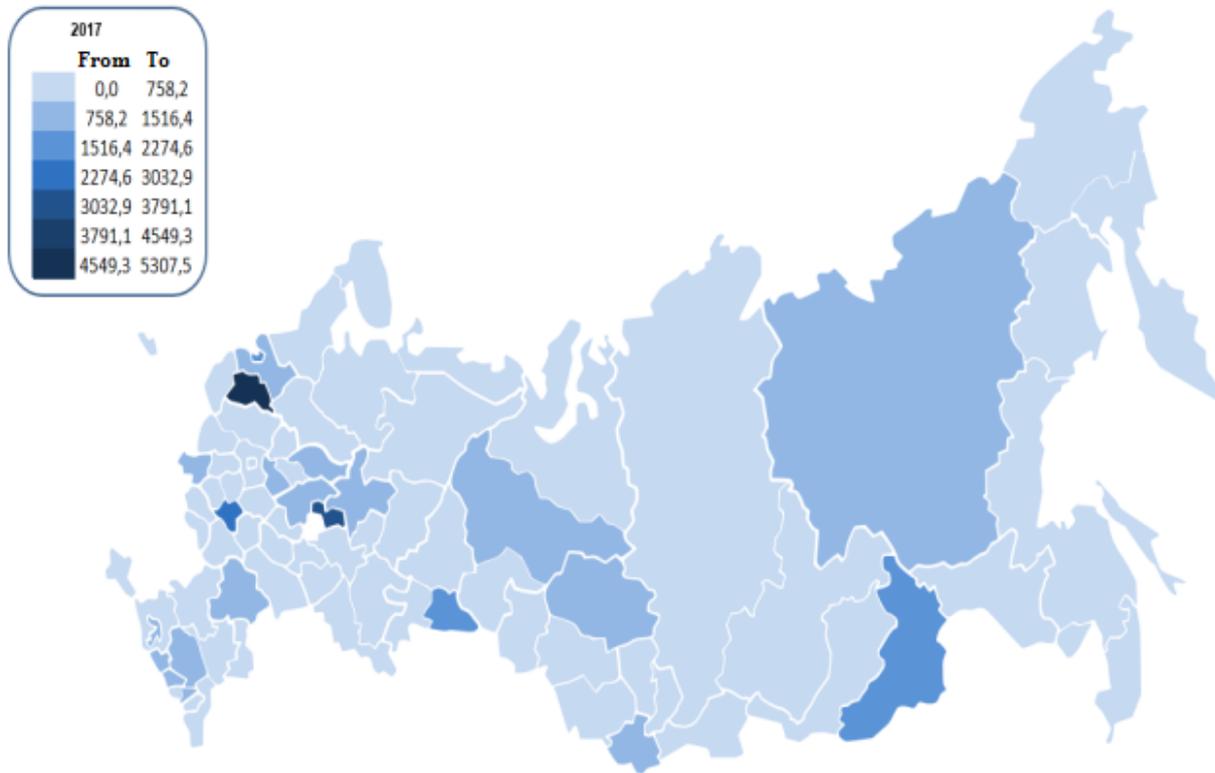
Table 3

Average monthly nominal wage of the employees of companies operating within the Arctic zone of the Russian Federation (less small business entities), rub

Region	January-December
Territory of Murmansk Region	55 982
Territory of Nenets Autonomous District	75 748
Land territory of the Arctic zone of the Russian Federation	72 493
Land territory of Arkhangelsk Region included into the Arctic zone of the Russian Federation	48 394
Land territory of the Republic of Sakha (Yakutia) included into the Arctic zone of the Russian Federation	69 869
Land territory of the Republic of Krasnoyarsk Region included into the Arctic zone of the Russian Federation	83 637
Territory of municipality “Vorkuta”	62 271
Territory of the Chukotka Autonomous Region	94 302
Territory of Yamalo-Nenets Autonomous Region	94 220

Source: governmental statistics

One of the most important aspects of regulating the problems of improvement quality of life of the Arctic population is the development of transport infrastructure and information and telecommunications environment. Picture 2 presents data showing the length of federal-aid, regional-aid, intermunicipal-aid public roads. According to the represented statistical data, it is obvious that the Arctic belt of Russia belongs to cluster 1 with the shortest length of roads, the only exception is Yakutia. Airplane mobility of the AZ RF population in 2015 is in average 38%. Traffic volume offshore the Northern Sea Route indicates unsubstantial transit cargoes (274,3 thousand tons in 2014; 39,6 thousand tons in 2015; 214,5 thousand tons in 2016; 194,4 thousand tons in 2017) and a considerable annual growth of traffic via the harbours and stations offshore the NSR (3707,7 thousand tons in 2014; 5392,1 thousand tons in 2015;7051,2 thousand tons in 2016; 9737,6 thousand tons in 2017) .

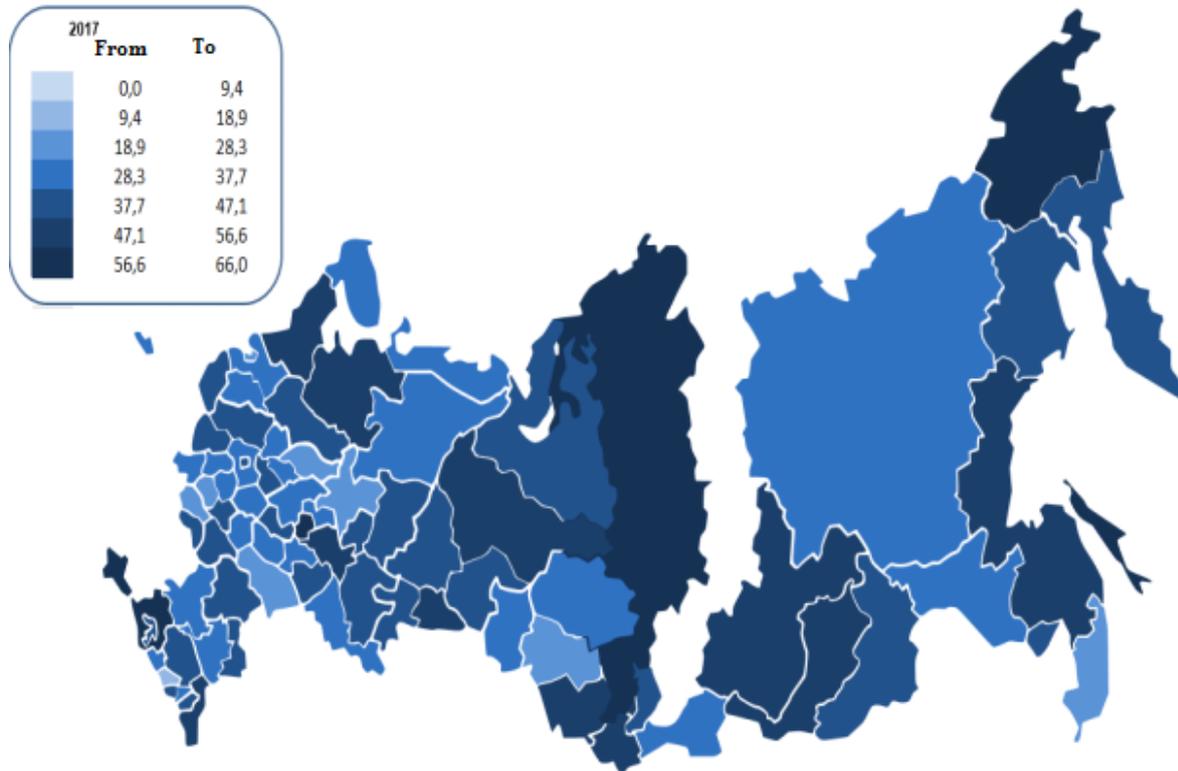


Picture 2. Length of federal-aid, regional-aid, intermunicipal-aid public roads
Source: governmental statistics

It is not only that communication systems cannot insure the possibility of navigation within the Arctic belt of the RF but also the population has not got opportunity to use the modern information and communication services to the full extent. The share of population using information and telecommunication system “Internet” in the total population size of the AZ RF amounted to 86% in 2017.

It is also worth considering the scientific and educational aspect of the AZ FR development. For example, in Yakutia in 2016 there were created additional 200 school places and in Komi Republic this number amounted to 100 in 2017. The number of governmental and municipal educational institutions providing programmes of higher professional education in the AS RF is quite limited: 3 institutions in the Republic of Karelia, 4 institutions in Komi Republic, 2 institutions in Arkhangelsk Region, 2 institutions in Murmansk Region, 11 institutions in Krasnoyarsk Region, 7 institutions in Yakutia. The number of non-governmental educational institutions providing programmes of higher professional education is 0 inst., 1 inst, 2 inst., 2 inst., 1 inst., 2 inst. correspondingly.

Library services population coverage in Russia in average amounts to 36%, while in the Arctic belt of the RF this index is considerably higher, for instance, in Yamalo-Nenents AD (40%), Krasnoyarsk Region (63%), the Chukotka AD (69%), the Republic of Karelia (51%), Arkhangelsk Region (49%) (pic.3). It is also interesting that the dynamics of library services population coverage within the regions under study was changing insignificantly.



Picture 3. Library services population coverage

Source: governmental statistics

We would further conduct evaluation of quality of life in the Arctic belt of the RF in the context of cultural aspect. The lowest indexes relate to the number of leisure and recreation parks (a little bit more than 3% of the total number in Russia), presence of zoos (0% of the total number in Russia), quantity of monuments (a bit more than 5% of the total number in Russia), the quantity of sport facilities (a bit more than 6% of the total number in Russia). In the Arctic zone there are in average 7% of the total number of leisure and cultural type institutions in Russia (2848 inst. In 2015, 2722 inst. in 2016, 2900 inst. In 2017), the biggest number of such institutions is located in the Republic of Karelia, Arkhangelsk Region, Krasnoyarsk Region, the Republic of Sakha. There are 8% of the total number of theatres in Russia within the zone under investigation (53 theatres from 2015 to 2017). Though, there are regions with no theatres (The Chukotka AD, Nenets AD). In the process of analysing cultural aspect of the Arctic belt of the RF development it becomes clear that approximately 15% museums are located in this zone (402 museums in 2015; 394 ones in 2016; 389 ones in 2017) but these are Altai Region, Krasnoyarsk Region and Yakutia that account for the most part of them.

Nowadays many Arctic territories are characterized with various level of natural geochemical background transformation, air pollution, vegetable cover as well as soil and subsoil degradation and also penetration of harmful substances into nutrition chains, the excessive sickness rate of the population. While there were registered only 6 cases of severe air pollution in

Arkhangelsk Region within the several past years, there were much more cases of water bodies pollution.

Thus, in the several past years there were registered 23 cases in Krasnoyarsk Region, 38 cases in Murmansk Region, 2 cases in Komi Republic, 8 cases in Tyumen Region. Environmental aspect is very important not only in terms of quality of people's life but it also needs understanding that careless attitude may intensify such processes as global warming, permafrost retreat. Table 4 provides statistics reflecting the quantity of accumulated construction and consumption wastes in the Arctic belt of the RF. Construction, wood processing, housing and utilities system, excavating metallic ores, land transport operation are the most significant problems in these spheres as far as they influence the safety of global ecology, river and sea ecosystem, health of the indigenous population.

Table 4

Quantity of accumulated construction and consumption wastes by hazard class in the Arctic belt of the RF, tons

Waste type	Sector	I class	II class	III class	IV class	V class
Abrasive powder, used abrasive wheels, scrap of used abrasive wheels, lead accumulator batteries	Construction		7,261		6,01	
Lead accumulator batteries	Wood processing			0		
	Housing and utilities			6,51		
	Construction			6,4		
Galvanic sludge	Wood processing				6,516	
	Housing and utilities				6,083	
Wooden packing (non-returnable container) made of natural wood	Housing and utilities					7,313
Wood waste of natural clear wood, unsorted	Wood processing					13612,5
	Construction					6,938
Pneumatic cells, used	Construction				18,772	
Electrolyte, used	Housing and utilities		6,135			
	Construction		6,106			
Non-ferrous scrap and waste	Construction				6,951	
Ferrous scrap and waste	Housing and utilities				6,258	
Brass scrap, unsorted	Wood processing					0
Ferrous scrap, unsorted	Housing and utilities					12,109
	Construction					7,252
	Excavation of metallic ores					6,5
	Housing and utilities			6,039		
Diesel oils, used	Land transport			7,3		
	Construction			7,327		
Compressor oils, used motor oils, used	Land transport			6,2007		
	Housing and utilities			16,95		
Transmission oils, used	Wood processing			24,515		

Waste type	Sector	I class	II class	III class	IV class	V class
	Housing and utilities			6,085		
	Construction			24,017		
Wastes from amenity spaces of establishments, unsorted (excluding large-size wastes)	Land transport				7,372	
	Wood processing				9,58	
	Housing and utilities				18,841	
	Construction				13212,938	
Natural clear wood cuts	Wood processing					768,026
Wood chips, contaminated with mineral oils (oil content not less than 15%)	Housing and utilities			6,394		
Natural clear wood chips	Wood processing					5930,5
	Construction					6,264
Household wastes, unsorted (excluding large-size wastes)	Construction				33	
Leather wastes	Housing and utilities					6,004
Coating materials wastes	Housing and utilities			6,014		
	Construction				6,007	
Wastes of polymer materials from grinding devices (light fractions)	Construction				6,027	
Saline wastes	Construction				1225352	
Wastes of packing paper, uncontaminated	Land transport					6,004
	Housing and utilities					6,038
Oil-treated hemp (oil content not less than 15%)	Construction				6,143	
Plastic containers, uncontaminated	Construction					6,313
Waste tires, tires with metal and textile cord	Land transport				6,005	
	Wood processing				24,32	
	Housing and utilities				6,364	
	Construction				16,044	
Rubber-asbestos wastes, uncontaminated rubber articles having lost use properties	Construction				6,01	6,104
	Wood processing					6,286
Mercury lamps, luminescent mercuric tubes, used and defective	Land transport	6,004				
	Wood processing	6,135				
	Housing and utilities	6,002				
	Construction	6,582				
Compression packing made of salamander wool and graphite, oil-treated (oil content not less than 15%)	Wood processing			6,277		
	Construction			6,188		

Waste type	Sector	I class	II class	III class	IV class	V class
Natural clear wood chips, steel uncontaminated facing, uncontaminated facing of ferrous metals	Construction					21,174
Contaminated filtering and absorbing substances	Construction			6,011		

Data in the table 5 cover growth of yield of fisheries and other aquatic bioresources in the Arctic belt of the RF. Though, one should not forget that frequent use of near-bottom drift fishery eliminates the habitat of sea animals (this said, for instance, in Barents sea there is a zillion of creatures which are studied by 20% only), by-catch contributes to the increase of unintended prey of fishermen, there is a growth of the amount of plastics in water, fishery is quite noisy activity (for example, narwhals and beluga whales orientate using their hearing, they are scared of loud sounds and many of them stop breeding because of stress).

Table 5

Yield of fish and other aquatic bioresources, tons

	2013	2014	2015	2016	2017
Arkhangelsk Region	147 994	157 272	159 479	156 753	165 609
Nenets Autonomous District	15 003	14 737	14 475	15 076	20 835
Krasnoyarsk Region	3 817	4 007	4 765	5 154	5 375
Murmansk Region	713 800	686 005	685 614	650 601	707 644
Republic of Karelia	98 570	89 789	87 423	94 411	111 707
Komi Republic	509	547	459	489	300
Republic of Sakha (Yakutia)	5 419	5 960	5 828	6 853	7 077
Yamalo-Nenets Autonomous Region	8 425	8 715	7 620	18 878	20 200
Chukotka Autonomous Region	25 068	8 215	8 633	8 689	10 319

Source: governmental statistics

Factorial analysis

For the purposes of the present study the obtained statistical data were structurized into social, economic, cultural, infrastructural, environmental blocks, academic element was also applied.

In order to conduct our analysis we systematised the factors under investigation by decreasing their number in order to create an independent, separate ranking environment of the factors under consideration in the most rational way. Each criterion used for working out ranking z_j was represented as a linear combination of the hypothetical factors: $Z_j = a_{j1} F_1 + a_{j2} F_2 + \dots + a_{jm} F_m$ ($j=1,2,\dots,n$), where

F_i – value of i criterion for the (j) region;

a_{ji} – weight of criterion i in the formation of quality of life in the region j ;

m – quantity of the AZ RF regions;

n – quantity of factors under study which contribute to people’s quality of life

It was chosen to use principle component analysis for analysis of such factors as it was necessary to estimate the quantity of the selected in this case criteria equivalent to eigen values greater than one.

Table 6

KMO and Bartlett's test		
Measure of sampling adequacy of Kaiser- Meyer- Olkin (KMO)		0,716
Bartlett's test of sphericity	approximate chi-square	109,116
	Number of degrees of freedom	52
	Value	0,000

Primary statistics was stated: Bartlett's sphericity test which shows statistically valid result ($p < 0,05$), on the basis of which it was found that statistical data are quite acceptable for factorial analysis (refer to table 6). It's also necessary to note the acceptable adequacy of Kaiser-Meyer-Olkin sampling according to which we have come to a conclusion that there is a rather high level of factorial analysis applicability within this research.

At the next step we set order numbers of criteria, the analysis of the sum of squared loadings, the percent of total variance driven by the factor and the relevant cumulative (accumulated) percent (before and after rotation) (refer to table 7). The higher is the percent of variance driven by the factor, the more weight this factor has.

Table 7

Cumulative explained variance						
Component	Initial eigen values			Sums of squared loadings		
	Overall	% variance	Total %	Overall	% variance	Total%
1	4,012	35,52	35,52	4,012	35,52	35,52
2	2,517	21,073	56,593	2,517	21,073	56,593
3	1,872	17,104	73,697	1,872	17,104	73,697
4	1,105	8,888	82,585	1,105	8,888	82,585
5	0,89	6,017	88,602			
6	0,503	5,003	93,605			
7	0,311	3,106	96,711			
8	0,211	2,215	98,926			
9	0,55	0,701	99,627			
10	0,011	0,294	100			
11	1,23E-04	-2,00E-04	100			
12	3,45E-07	-2,71E-04	100			
13	5,69E-09	-5,68E-10	100			
14	-2,26E-17	-1,89E-16	100			
15	-2,64E-16	-2,70E-15	100			

Factor discriminant analysis: principle component analysis.

The upper example which is also related to the analysis of criteria determining people's quality of life in the RF Arctic belt would require another 9 components (factors) in order to explain 100% of data variance. However, with the use of conventional criterion for stopping (the process of extracting factors) when the eigen value goes lower than 1.0, in this analysis only 4 out of 15 factors were extracted. These four factors explain 82.58% of data variance. These four factors are: agriculture, the sphere of housing and utilities, level of wages, social programmes.

Conclusion

People's quality of life includes the level of socio-economical development of the RF Arctic zone which was proved with factorial analysis. There is a great number of measures of socio-economic, biomedical and cultural nature being implemented in our country which allow saying that the quality of life in the extreme conditions of the North is improving.

References

- Galbraith JK Abundance Society // Olympus Business, 2018, 404 p.
- Burganova L.A., Savkina E.G. Management Theory E. Mayo. Kazan, 2007.
- Nordhaus W.D., Tobin J. Is growth obsolete? Economic growth, national bureau of economic research, no 96, New York.
- Popova L.N., Mikhailov A.V. Managing factors of improving the quality of life of the population on the example of the Arctic zone of the Russian Federation // Basic research, №4, 2016.
- Federal State Statistics Service URL: // <http://www.gks.ru>.