PAPER • OPEN ACCESS

Assessment of challenges, threats, and prospects in development of cities and towns in the Arctic zone

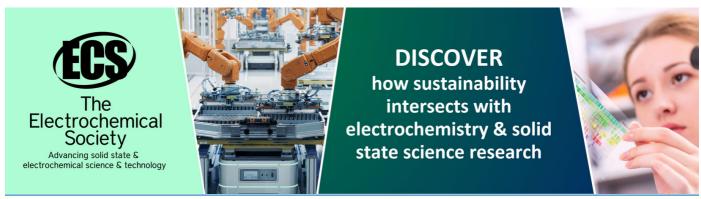To cite this article: M Kozin *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **302** 012103

View the article online for updates and enhancements.

Assessment of challenges, threats, and prospects in development of cities and towns in the Arctic zone

M Kozin[1], O Skotarenko[2] and V Plotnikov[3]

[1] Research Institute of the Federal Penitentiary Service of Russia, Moscow, Russia
[2] Murmansk Arctic State University, Murmansk, Russia
[3] Saint Petersburg State University of Economics, Saint Petersburg, Russia

Ksen-13@mail.ru

Abstract. The article suggests a way of tackling one of the crucial issues, namely using a novel research framework in management of territorial processes based on the qualimetric methodological approach.

The goal of the study is to identify major limitations, challenges, and threats occurring during economic development of Arctic territories on the basis of an analysis of socioeconomic development and to suggest, on this basis, prospective areas of economic practices and development in the Arctic. The study is based on a systemic *methodological approach* to assessment of factors in economic practices in Arctic territories, *a concept and methodology* of sustainable development, *methods* of comparative (interregional and international) analysis, institutional analysis and development. The article analyses the prerequisites for socioeconomic development of Arctic territories; identifies the factors, limitations, challenges, and threats for their sustainable development; contains a comparative analysis of national practices in economic exploration in the Arctic zone; describes the purposes of government regulation in those processes and their institutionalisation in economic policy; suggests prospective of economic development in the Arctic zone; provides recommendations for improvement in the aforesaid development.

Conclusions and recommendations. The study has shown that, depending on the combination of natural, climatic, social, resource, environmental, and other factors characterising a particular territory within the Arctic, a specific model of institutional regulation in its development should be created and institutionalised. The study has identified and listed the challenges and threats in economic practices in the Arctic zone. Prospective areas in economic exploration have been proposed.

1. Introduction

The level of economic development of territories worldwide and in individual countries varies significantly. It is connected both with culture and history and with natural factors. The latter are not given sufficient attention in economic studies. However, average annual temperatures and precipitation, type of relief, proximity to oceans and seas, etc. have a considerable influence on both results and the very possibility to carry out economic activities given the available level of technological development. A typical example of the aforesaid can be the low degree of economic development in the Arctic zone. At the same time, the changing trends in socioeconomic, environmental, and technological development require a more active development of Arctic territories.

However, it requires compliance with important restrictions set in environmental regulation as well as inclusion of interests of indigenous population carrying out traditional economic activities. Failure to comply with these requirements may lead to an inefficient and unsustainable development of Arctic territories. In this respect, it becomes relevant to provide a reasonable scientific assessment of challenges, threats, and prospects of economic development in the Arctic, identify possible scenarios for its organisation and institutionalisation. The Strategy for Development of the Arctic Zone of the Russian Federation and National Security Assurance until 2020 [1,3] should be based on an assessment of their socioeconomic development using a comprehensive indicator that would include simultaneous influence of all important and less important factors of socioeconomic development.

Among Russian authors who study the issues of developing methodological approaches to studying regional economies we can name A. G. Granberg, V. I. Suslov, S. A. Suspitsyn [6]; A. S. Novosyolov [7]; V. A. Plotnikov, Y. V. Vertakov [8], O. V. Skotarenko [9,10], in particular, the Arctic territories - are I.M. Zaychenko, O.V. Kalinina, S. S. Gutman [27]; Г.Ф. Ромашкина, Н.И. Диденко, Д.Ф. Скрипнук G.F. Romashkina, N.I. Didenko, D.F. Skripnuk [27] и et al. A considerable contribution to creating various theoretical models of regional economies was made by distinguished international scholars, such as D. Bell [12], H. Innis [16,17], C. Clarke [13], T. Mun [19], G. Myrdal [20], B. Ohlin [24], K. Ohmae [25], F. Perroux [26], C. Sable, R. Solow [23], A. Hirschman [14,15], E. Heckscher [18], J. Schumpeter [21,22] et al. The basics of the qualimetric approach to studying socioeconomic phenomena and processes were developed by Russian scholars, such as G. G. Azgaldov [11], M. M. Kaleichik, A. I. Subetto et al.

2. The study methodology
Is presented as the following succession of stage:
- the first stage means making a list of socioeconomic processes to be assessed, the processes being the most important for, first, building quality of life of the people, secondly, upgrade of regional socioeconomic development and determining tendencies of socioeconomic development of the territory;
- the second stage means making a list of compared regional territories and indentifying the respective degree of implementation of methodological approaches and theoretical principles;
- the third stage means developing a methodology for assessment of socioeconomic development level in the regions;
- the fourth stage establishes a retrospective period reflecting changes in each of the socioeconomic processes on the territorial level;
- the fifth and final stage means assessment of the socioeconomic development level of cities and towns in the Arctic zone. Depending on the comprehensive assessment value for the socioeconomic development level of cities and towns in the Arctic zone, our methodology makes it possible to get more objective results and divide the cities and towns into five groups:

1 – above-average level of development (comprehensive assessment rank: up to 1.4);
2 – above-average level of development (comprehensive assessment rank: 1.4–2.8);
3 – average level of development (comprehensive assessment rank: 2.8–4.3);
4 – below-average level of development (comprehensive assessment rank: 4.3–5.7);
5 – low level of development (comprehensive assessment rank: over 5.7)….

3. Findings
The minimum required selection for the comprehensive quantitative assessment of socioeconomic development level of cities and towns in the Arctic zone [2] should comprise 19 indicators (Table 1) presented as absolute data of annual state statistic reporting provided by Rosstat RF [4,5]; relative values showing the variance of these indicators; specific per-capita values. They account for all important constituents of the economic development level of the cities and towns and the state of social infrastructure and industrial sectors. For the comparative analysis, we use the ranking method

for a territorial process as compared to the same process in one or more compared territories, which will yield an additive assessment of the state of all processes in cities and towns in the Arctic zone as a cumulative rank [10].

The results of our comprehensive assessment of socioeconomic development level of cities and towns in the Arctic zone using the proposed methodology are shown in Table 1.

Indicator	Arkhangelsk						Severodvinsk						Murmansk					
				Rank						Rank						Rank		
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017
Population, thousand people	357.40	358.10	358.30	1	1	1	188.4	187.3	186.1	3	3	3	299.1	296.4	301.6	2	2	2
Rate of natural increase per 1,000 people	0.40	0.80	0.20	5	5	7	0.4	-0.5	1.2	5	6	5	0.1	-0.3	0.5	6	7	6
Number of organisations and enterprises (state registration data) per 1,000 people	38	38	36	2	2	2	18	18	19	6	5	5	50	52	53	1	1	1
Average annual employment rate in the total population, %	29.24	28.00	27.32	7	7	7	35.72	35.82	36.75	5	5	5	33.50	33.27	32.13	6	6	6
Registered unemployment rate in the total population, %	0.3	0.35	0.5	2	3	4	0.28	0.27	0.33	1	2	2	0.57	0.53	0.69	5	6	6
Average monthly nominal salary paid, RUB	35,754	38,289	40,303	7	7	7	36,983	42,844	47,334	6	6	6	46,351	50,097	53,240	5	5	5
Proportion of pensioners in the total population, %	32.43	32.22	32.18	5	5	4	37.79	37.96	38.42	7	7	7	34.40	34.55	35.01	6	6	6
Average monthly pensions paid, RUB	12,801	13,886	15,446	7	7	7	13,902	15,142	16,867	5	5	5	13,755	14,924	16,593	6	6	6
Newly-built residential houses, total area per capita, sq. m	0.27	0.17	0.22	3	3	3	0.10	0.10	0.16	4	4	4	0.03	0.02	0.03	5	5	5
Total average area of housing accommodation per urban inhabitant, sq. m	22.40	22.60	22.70	3	3	3	22.1	22.4	22.6	3	3	3	23.3	23.5	23.8	2	2	2
Availability of preschool educational institutions	0.97	0.98	0.97	3	3	3	1.05	1.04	1.05	1	1	1	0.58	0.65	0.65	6	6	6
Number of physicians per 10,000 people	93	92	82	3	2	3	58	60	60	6	5	7	74	73	69	4	3	4
Number of nursing staff per 10,000 people	164	161	161	3	2	2	151	152	152	4	4	3	149	143	146	5	6	4
Number of hospital beds per 10,000 people	134	129	127	4	4	4	94	91	90	6	6	6	122	120	118	5	5	5

Capacity of outpatient clinics per 10,000 people, visits per shift	456	447	441	1	1	1	418	419	421	3	2	3	303	294	261	6	6	7
Number of registered crimes per 1,000 people	22	20	20	5	6	3	12	10	17	2	2	2	19	19	30	4	5	4
Per capita volume of local goods produced and services provided by activity, million RUB:																		
а) minerals production	161.44	120.20	96.01	3	-	4	-«-	-«-	-«-	7	7	7	,,,	,,,	,,,	x	x	x
б) processing industries	34,700	35,420	42,938	3	4	4	76,645	115,643	121,977	2	3	3	112,448	151,692	190,533	1	2	2
в) production and distribution of electricity, gas, and water	39,636	38,004	38,377	3	3	4	47,931	40,166	40,102	2	2	2	38,106	38,738	39,010	4	3	3
Per capita retail turnover, RUB	48,680	56,371	66,354	4	5	4	23,521	32,337	38,659	6	6	6	130,162	146,261	134,547	5	5	5
Per capita capital investment, RUB	32,889	42,610	29,231	6	7	7	21,893	44,915	41,778	7	6	6	78,491	148,106	178,664	5	5	4
Comprehensive assessment, points	x	x	x	80	80	84	x	x	x	91	90	91	x	x	x	89	92	89
Average rank	x	x	x	4.2	4.2	4.4	x	x	x	4.8	4.7	4.8	x	x	x	4.7	4.8	4.7
Level of socioeconomic development	x	x	x	average	average	below average	x	x	x	below average	below average	below average	x	x	x	below average	below average	below average

Table 1. Level of socioeconomic development of cities and towns in the Arctic zone in 2015-2017 -«- - No such activity. ,,, - The data are not published to ensure confidentiality of primary statistical data from organisations, in accordance with Federal Law of 29.11.2007 No. 282-FZ *On official statistical recording and the state statistics system in the Russian Federation* (cl. 5 art. 4, section. 1, art. 9).

They show that the most populous Arctic city is Arkhangelsk, with the average population of 358 thousand people 2015–2017, followed by Murmansk, with the average population of 299 thousand people, which is 59 thousand below Arkhangelsk.

Cities such as Severodvinsk and Norilsk take the 3rd and 4th place among the analysed Arctic cities, with their average population during the observed period from 2015 to 2017 being 187 and 176 thousand people respectively. The average population of Salekhard is 48.5 thousand people. And, finally, the smallest towns are Naryan-Mar and Anadyr with their population of 24 and 14.4 thousand people respectively.

It should be noted that the biggest positive rate of natural increase is typical for small towns such as Salekhard (1st place), Naryan-Mar and Norilsk. For instance, the maximum natural increase rate per 1,000 people in Salekhard in 2015–2017 was 11.3, 13.1, and 14.1. In Naryan-Mar, the value of the indicator was 7 in 2015, 8.1 in 2016, and 10.5 in 2017. Finally, the natural increase rate in Norilsk was 9.3 on average during the observed period. In Anadyr, the natural increase rate per 1,000 people in 2017 was just above 4, which is lower than in 2015–2016 with 2.2 on average.

Arkhangelsk is characterised by a natural increase rate below 1 during all the three years analysed. A similar situation was observed in Severodvinsk and Murmansk in 2015 and 2017. In 2016, a decrease happened, equal to 0.5 and 0.3 points respectively.

Murmansk topped the list by the number of enterprises and organisations per 1,000 people (according to state registration data) during the three years of observation from 2015 to 2017, the number rising from 50 to 53 over the observation period. The value for Arkhangelsk was 36, which is 31% lower than Murmansk and corresponds to the 2nd place. In Salekhard, Anadyr, and Naryan-Mar, there were up to 30 enterprises and organisations per 1,000 people on average. Both in 2015–2016 and in 2017, Severodvinsk was in the penultimate place, 18 and 19 enterprises and organisations per 1,000 people respectively, which is almost 3 times less than the maximum value among all the Arctic cities and towns analysed. The lowest value of this indicator, equal to 13, was in Norilsk.

The highest annual average employment rate, equal to 65% of the total population, was observed in Anadyr, which determined the lowest unemployment rate during the whole period analysed, equal to 0.1% of the total population in 2017. A decrease in this factor was registered compared to the previous years, which is a positive fact of socioeconomic development of Anadyr.

In the Arctic cities and towns of Naryan-Mar, Salekhard, Norilsk, the employment rate was 50% of the total population on average, which is 15% below Anadyr. In Naryan-Mar, the annual average unemployment rate in the total population in 2015 was 0.56 %. Year 2016 showed a decrease to 0.44%, and an increase occurred in 2017 resulting in the value of 0.97%, which is almost 10 times more than in Anadyr. In Salekhard and Norilsk, the unemployment rates remained stable both in 2016 and 2017, equal to 0.4% and 0.56% respectively.

Approximately 1/3 of the population is employed by organisations of Severodvinsk, Murmansk, and Arkhangelsk, which is almost half of the Anadyr's figure and approximately half of that of Naryan-Mar, Salekhard, and Norilsk. Despite the low share of the employed, Severodvinsk officially recognises 0.29% of its population as unemployed on average, which is the lowest value among the other cities and towns and corresponds to the 1st place in 2015 and the 2nd place in 2016–2017. In Arkhangelsk, during the whole period analysed, the rate of unemployment had increased from 0.3% in 2015 to 0.5 in 2017. For instance, the highest percentage of the unemployed among all the Arctic cities and towns considered – 0.7% – was observed in Murmansk, which is 0.2 above the same value in Arkhangelsk that has a very similar population and share of the employed.

The inhabitants of Anadyr have the highest average monthly salary which was 81,533 RUB in 2015, 93,159 RUB in 2016, and 96,358 RUB in 2017. The second place by this indicator is held by Salekhard, where the employed people received, on average, 79,059 RUB in 2015, 82,616 RUB in 2016, and 83,032 RUB in 2017, which was lower than the Anadyr's average by 3% in 2015, by 11.3% in 2016, and by 13.8% in 2017. The third place is held by Norilsk where the average monthly income was equal to 66,584 RUB in 2015, 70,798 RUB in 2016, and 76,466 RUB in 2017. In comparison with Anadyr the respective average figure was lower by 18.3% in 2015, 24% in 2016, and 20.6% in 2017. In Naryan-Mar, the amount of salary paid in 2015–2017 was lower by 6.5%, 5.3%, and 8.6% respectively in comparison with Norilsk and lower by 23.6%, 28%, and 27.5 % than in Anadyr during the same time period. The lowest average salary – 35,754 RUB in 2015, 38,289 RUB in 2016, and

40,303 RUB in 2017, which is considerably lower than in Anadyr (approximately 2.4 times lower) – was observed in Arkhangelsk that takes the last, 7th place among the rest of the Arctic cities and towns considered. A similar situation was observed in Severodvinsk that takes the 6th place by the amount of average monthly salary paid. The 5th place is held by Murmansk where the average monthly salary was 46,351 RUB in 2015, 50,097 RUB in 2016, and 53,240 RUB in 2017, which is lower than in Anadyr by a factor of 1.8 on average.

Similarly to salary, the highest pensions were paid in Anadyr: 19,483 RUB in 2015, 21,189 RUB in 2016, and 23,364 RUB in 2017. The pensioners' income level is slightly lower in Naryan-Mar and Salekhard. For instance, in 2017 Naryan-Mar pensioners received 19,793 RUB on average, which is 1,290 RUB (or 7%) higher than in Salekhard.

Arkhangelsk pensioners have the lowest living standard, which is proven by their pension that was 12,801 RUB in 2015, 13,886 RUB in 2016, and 15,446 RUB in 2017, which is lower by 34% compared to the Anadyr pensioners in 2015–2017. The income of Murmansk and Severodvinsk pensioners is almost equal: the Severodvinsk pension was 16,867 RUB in 2017 compared to 16,593 RUB in Murmansk, making it 1.6% relative difference. If we compare the pension in Anadyr, the highest in the Arctic zone, with those in Murmansk and Severodvinsk, the difference is almost 29%.

The lowers share of pensioners in the total population in 2015–2017 – 22.69% and 22.92 % – was registered in Norilsk, Anadyr, and Salekhard. The high income levels in those places contribute to retirement age migration to other Russian regions for the purpose of moving to a milder climate. In Naryan-Mar and Arkhangelsk, the share of pensioners was slightly above 32% of the total population, which is 10% higher than in Norilsk, Anadyr, and Salekhard. The largest number of pensioners lives in Murmansk and Severodvinsk. Their share in the total population in 2015–2017 was 34.65% and 38.06%, which is 10% higher than in Norilsk, Anadyr, and Salekhard.

By the rate of new residential houses commissioning Salekhard and Naryan-Mar were ahead of all the other cities and towns in the Arctic territories, for instance, more than three times than in Arkhangelsk, almost 10 times than in Severodvinsk, and 30 times than in Murmansk! In 2015, Salekhard was in the lead, but the rate dropped in 2016–2017, and Salekhard made way for Naryan-Mar where the per capita rate of residential construction was 1.02 and 0.89 sq. m, which was more than in Salekhard by 0.55 and 0.39 sq. m (or by a factor of 2 and 1.8). For comparison: in Arkhangelsk in 2015–2017, there was from 0.27 to 0.22 sq. m of new construction per capita. Extremely low figures approaching zero were typical for Severodvinsk, Murmansk, Norilsk, and Anadyr, just 0.01 to 0.1 sq. m.

The maximum per capita accommodation area – 24.5 sq. m – was in Norilsk that held the first place among all the cities and towns in the Arctic zone. In the two following years it shared the first place with Salekhard with the maximum per capita accommodation area of 25 and over 28 sq. m respectively. Over the whole observed period from 2015 to 2017, the second place was shared by Murmansk and Naryan-Mar with per capita accommodation area of 23 sq. m on average. The third place was shared by Arkhangelsk and Severodvinsk with per capita accommodation area of 22.5 sq. m on average. Finally, the lowest number of sq. m per capita was in Anadyr that holds the last place.

It is important to analyse the social infrastructure development levels (indicators 11–15 in Table 1). For instance, the level of availability of preschool educational institutions is between 0.35 to 1.05 in all the seven towns and cities. Norilsk and Severodvinsk have high values showing full availability of preschool institutions. In Arkhangelsk, Anadyr, and Salekhard, the values of the indicator over the whole analysed period were 0.97, 0.94, and 0.91 corresponding to the third, fourth, and fifth places respectively. The lowest availability of preschool institutions – 65% and slightly over 50% – was observed in Murmansk and Naryan-Mar.

Anadyr leads in the number of physicians per 10,000 people, with the number of 130 in 2015 and 94 and 93 in 2016 and 2017 respectively. Similar results were observed in Salekhard that holds the second place. Severodvinsk and Norilsk were the most underperforming, with the value of this indicator being from 53 to 60 per 10,000 people.

The highest availability of nursing staff was recorded in Salekhard where there were 240 people of nursing staff on average per 10,000 people. Minimal availability, from 142 to 161 people, is typical for the other cities and towns.

The highest average number of hospital beds equal to approximately 200 per 10,000 people is typical for Salekhard that holds the first place. Similar results were also registered in Anadyr and, slightly below, with about 170 beds, in Naryan-Mar. The seventh and last place is held by Norilsk where the number of hospital beds per 10,000 people was about 80.

The highest capacity of outpatient clinics in 2015–2017 was recorded in Arkhangelsk with about 456 visits per shift per 10,000 people, the lowest capacity (nearly half of that of Arkhangelsk) being observed in Salekhard and Murmansk.

The lowest crime rate was registered in 2015 in Severodvinsk, namely 12 per 1,000 people, the highest, equal to 22, being in Arkhangelsk. In 2016, the number dropped in Severodvinsk (from 12 to 10), Naryan-Mar (from 17 to 12), and Anadyr (from 17 to 8), by 17%, 29%, and 53 % respectively, and rose by 13% in Salekhard. The number did not change in Arkhangelsk, Murmansk, and Norilsk: 20, 19, and 12 respectively. In 2017 there were 14 crimes per 1,000 people in Norilsk, making it the lowest figure among the other cities and towns, 17 crimes in Severodvinsk, Naryan-Mar, and Anadyr, and 20 crimes in Arkhangelsk and Salekhard. The highest crime rate of 30 per 1,000 people was registered in Murmansk which holds the worst rank for this indicator.

The largest volume of per capita minerals production in 2015–2017 – 3,275,041 RUB, 3,616,636 RUB, and 4,012,322 RUB respectively – was observed in Anadyr. The second place is held by Naryan-Mar where the values were 2,537,113 RUB and 2,581,551 RUB respectively which is lower than in the leading Anadyr by a factor of 1.5 in 2015, 1.4 in 2016, and 1.6 in 2017. Norilsk and Murmansk can compete with them, but the data are not published in order to protect confidentiality of primary statistical data. Salekhard holds the third place among the Arctic cities and towns, and the minerals extraction is thousands of times lower there than in Anadyr. In Arkhangelsk the specific value of this indicator dropped from 161.44 RUB to 96.01. There is no such activity in Severodvinsk, and it therefore holds the 7th place.

The largest amount of goods produced by processing industries in 2015 was in Murmansk: 112,448 RUB per capita, which is 46.7% more that in Severodvinsk that holds the second place in the Arctic, and 3.2 times more than in Arkhangelsk. In 2016, the highest value was observed in Naryan-Mar – 227,105 RUB – 1.5 times higher than in Murmansk. In 2017, Naryan-Mar kept its leading position. Moreover, the amount of goods produced by processing industries had increased by a factor of 2.2 and was 494,282 RUB per capita, which was 2.6 times more than in Murmansk that holds the second place in the Arctic zone. The last place is held by Salekhard where the processing industries produced the equivalent of approximately 8 thousand RUB per capita.

The highest figure in production and distribution of electricity, gas, and water in 2015–2017 was in Anadyr where the per capita values were 118,443 RUB, 111,329 RUB, and 113,436 RUB respectively. The second place is held by Severodvinsk where the figures are almost three times lower. Very similar results were recorded in Murmansk, Arkhangelsk, and Naryan-Mar holding their respective 3rd, 4th, and 5th places. The lowest production and distribution of electricity, gas, and water in 2015–2017 was in Salekhard: slightly above 35,000 RUB on average.

Among the Arctic cities and towns considered, the largest per capita retail turnover in 2015–2017 was registered in Murmansk: from 130.16 to 134.55 thousand RUB respectively. In 2016, this figure had risen by 12.37% compared with the previous period and was 146.26 thousand RUB per capita. In 2015–2016, Anadyr considerably lagged behind the leading Murmansk: by 27.24% and 39.46% respectively, and in 2017, Naryan-Mar was 30.62% behind, holding the second place. The lowest specific value, below 30 thousand RUB, was observed in Norilsk that holds the seventh and last place among the other Arctic cities and towns analysed.

In Naryan-Mar in 2015–2017, the per capita capital investment was 1132.62, 1478.18, and 1522.25 thousand RUB respectively, placing it on top of the Arctic ranking. Salekhard, in the second place in 2015, is considerably behind with 553.63 thousand RUB of per capita capital investment, which is

51.11% lower than in Naryan-Mar. In 2016–2017 the second place was taken by Anadyr where the figures for this indicator were 359.36 and 501 thousand RUB, 75.69% and 67.09% lower than in the leading town of Naryan-Mar. The lowest amount of capital investment in 2015 was 21.89 thousand RUB, which is 52 times lower than the maximum value in Naryan-Mar. In 2016–2017, the seventh and last place was held by Arkhangelsk with its per capita investment amount of 42.61 and 29.23 thousand RUB, which is 35 and 52 times lower than the respective values in Naryan-Mar in 2016–2017.

Summing up what has been said, the comprehensive assessment of the socioeconomic development level of cities and towns in the Arctic zone (Table 1) has made it possible to get more objective results and divide the cities and towns into five groups:

1 – above-average level of development (comprehensive assessment rank: up to 1.4);
2 – above-average level of development (comprehensive assessment rank: 1.4–2.8);
3 – average level of development (comprehensive assessment rank: 2.8–4.3);
4 – below-average level of development (comprehensive assessment rank: 4.3–5.7);
5 – low level of development (comprehensive assessment rank: over 5.7).

For instance, Anadyr leads in its socioeconomic development level compared to the other Arctic cities and towns in the comprehensive assessment value in 2016–2017 when the rank was 2.7 and 2.8 which is consistent with the above-average level of development (Annex 1) except the 2015 results when the average rank was 3.0 corresponding to the average level of socioeconomic development.

Over the whole period analysed, Norilsk, Naryan-Mar, and Salekhard had an average level of socioeconomic development with the comprehensive assessment rank being from 3.4 to 4.3.

Severodvinsk and Murmansk were the most underperforming cities from 2015 to 2017. The below-average level of socioeconomic development is proven by their comprehensive assessment rank ranging from 4.7 to 4.8.

The average rank of 4.2 in Arkhangelsk in both 2015 and 2016 corresponded to the average development level of the city, but in 2017 the situation slightly deteriorated, bringing Arkhangelsk to a below-average level of socioeconomic development.

Due to the absence of information on the per capita volume of locally-produced goods and services in all activities considered for 2015–2017 in Norilsk and on minerals production in Murmansk, those indicators were excluded from the ranking. Availability of such information would have added 1 ranking point at best and 7 ranking points at worst, which would not have significantly affected the overall score corresponding to the aforesaid level of socioeconomic development in those cities.

4. Conclusion

In the context of this study, we should add that in 2016 all economic indicators deteriorated in general because of the sanctions against Russia. The Arctic area undoubtedly has a huge potential. New development strategies are required there, especially in Arctic cities and towns.

The findings therefore show that, in order to build capacity of Arctic cities, it is necessary to develop their social infrastructure, expand and upgrade their housing resources. To eliminate the existing socioeconomic disproportion within and between cities and towns in the Arctic zone, scientific backing is needed for strategic goals of socioeconomic development to meet all needs of the public.

In our view, a reasonable tool to manage socioeconomic processes is management qualimetry. It will help carry out quantitative assessment of management levels in socioeconomic processes in the Arctic zone [9].

5. Areas of further studies

The study can be potentially expanded on the basis of scientific interpretation of methodological and conceptual issues in strategies for socioeconomic development of cities and towns in the Arctic zone. It will help develop comprehensive techniques and tools for management support which, when put into practice, will activate a system for socioeconomic development management of cities and towns

and improve the quality of decision-making in reaching and raising socioeconomic development levels and quality of life in the Arctic zone.

References

[1]   *The Strategy for Development of the Arctic Zone of the Russian Federation and National Security Assurance until 2020* Approved by the RF President on 20 February 2015 (Official Internet portal of the Russian Government (website) http://www.government.ru)

[2]   *On Land Territories in the Arctic Zone of the Russian Federation Decree of the President of the Russian Federation of 2 May 2016 No. 296*

[3]   *On Approval of the Government Programme of the Russian Federation for Socioeconomic Development of the Arctic Zone of the Russian Federation* Decree of the Government of the RF of 21.04.2014 No 366

[4]   *Regions of Russia 2018 Main Socioeconomic Indicators of Cities and Towns* (Moscow: Statistics of Russia) p 442

[5]   *Regions of Russia 2018 Socioeconomic Indicators* (Moscow: Statistics of Russia) p 900

[6]   Granber A G Sulov V I Suspitsyn S S 2008 Economic and mathematical studies of multiregional systems *Economics and Sociology* B **2** 120–150 (in Russian)

[7]   Novosyolov A S 2008 *Methodological issues in management of regional economies* (Novosibirsk: Institute of Economics and Industrial Engineering Siberian Branch of the Russian Academy of Chapter 18) pp 247-272

[8]   Plotnikov V A Vertakova Y V 2010 Consequences of the modern economic transformations and ways to overcome the financial turmoil in Russia *Bulletin of the Irkutsk State Academy of Economics* B **3** 71–78 150 (in Russian)

[9]   Skotarenko O V and Babkina L N 2010 Specifics of the qualimetric approach in regional studies *News of Science and Technology of St. Petersburg and Peter the Great St. Petersburg Polytechnic University Saint Petersburg Petersburg and Peter the Great Petersburg Polytechnic University* B **5** 161–165 (in Russian)

[10]   Skotarenko O V 2012 *New methods for assessment of socioeconomic development levels of Russian regions* (*Herald of Murmansk Technical University. Socioeconomic Sciences Series Murmansk State Technical University* B **1** (15) 220–229 (in Russian)

[11]   Azgaldov G 2011 Applied Qualimetry: Its origins, errors and misconceptions *Benchmarking: An International Journal* B **3** (18) 428-444

[12]   Bell D 1978 The cultural contradictions of capitalism (*New York Basic books Cop XXXIV*) p 301

[13]   Clark Colin Whitcomb 1985 Bioeconomic modelling and fisheries management (*New York etc.Wiley XII*) p 291

[14]   Hirschman Albert O 1997 *The passions and the interests Polit arguments for capitalism before its triumph 20 anniversary* (*Princeton univ pres XXVI*) p 153

[15]   Hirschman Albert O 1997 *The passions and the interests Polit arguments for capitalism before its triumph 20 anniversary* (*Princeton univ pres XXVI*) p 153

[16]   Innis Harold Adams 1977 The fur trade in Canada An introd. to Canad econ Rev ed (*Toronto Buffalo Univ of Toronto press XX*) p 463

[17]   Innis Harold Adams 1980 *The idea file of Harold William Christian* Toronto (*etc Univ of Toronto press Cop XXI*) p 287

[18]   Janusansiktet Eli Heckscher 2003 Nationalekonom och ekon historiker *Texter i urval av Rolf G H Henriksson och Mats Lundahl* (*Stockholm Timbro Cop*) p 348

[19]   Mun Thomas 1895 England's treasure by forraing trade (*New York London Macmillan* XVI) p 119

[20]   Myrdal Gunnar 1987 Historien om an American dilemma (*Stockholm SNS forl Cop*) p 169

[21]   Schumpeter Joseph Alois 1978 Can capitalism survive With an introd. by Robert Lekachman (*New York etc. Harper & Row* XVI) p 103

[22]   Schumpeter Joseph Alois 1979 Capitalism, socialism and democracy Introd by Tom Bottomore 2 impr (*London Allen & Unwin* XIV) p 437

[23]   Solow Robert M 1999 *Monopolistic competition and macroeconomic theory Cambridge* (*Cambridge univ press*) p 78

[24]   Ohlin Bertil Fri eller dirigerad ekonomi 1982 *Stockholm Folk & Samhälle* p 239

[25]   Ohmae K 1995 The Borderless World *Power and Strategy in the Interlinked Economy* p 246

[26]   Perroux F 1973 Multinational Investments and the Analysis of Development and Integration Poles *Economies et societes* B **5** 838

[27]   Zaychenko I M *et al* 2016 Labor resources of the Far North territories: Problems and prospects *Proceedings of the 28th International Business Information Management Association Conference - Vision 2020: Innovation Management Development Sustainability and Competitive Economic Growth* Available   from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85013952661&partnerID=40&md5=bda7edf13ac09f3fd66efa18a3542a77 [Accessed 05th Januaruary 2019] (in Russian)

[28]   Romashkina G F *et al* 2017 Socioeconomic modernization of Russia and its Arctic regions *Studies   on   Russian   Economic   Development*   B   **28**(1)   22-30   Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85013230972&doi=10.1134%2fS1075700717010105&partnerID=40&md5=dba57cc36ff14694f8e72dcd55805c1a [Accessed 05th Januaruary 2019] (in Russian)