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Comparative analysis of the trends in the development of the northern cities of the world and Russia

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Comparative analysis of trends in the development of the world northern cities and Russia

In northern cities cold winter lasts for 6 months. It creates the following question. If the world has many warm and comfortable places, why do people continue to live in the northern cities? Moreover, is there a global competition between the northern and southern cities?

Cities are complexes of nature, infrastructure and people. As known cities are the engines of growth of the modern economy and society. There is a special interest in the comparative analysis of development models between Russia and northern cities of the rest of the world. They all have growth restrictions, such as the environment, the demographic capacity of the area, the high level of technological hazards, etc. Thus, there are following similar conditions:

- Location next to the water (sea or river), respectively, these are ports;
- Highly developed transport infrastructure, including bridges;
- Small population;
- Most are the educational and research centers;
- Most are the administrative centers of the provinces (regions), metropolises.

To conduct the research work a database was formed which includes 125 cities and towns (small cities) of Russia (93), of USA (22), of Canada (5) and of Norway (5). The database includes the cities where the population ever reached or exceeded 1,000 people during the observation period for 115 years (from 1990 to 2015) and located above 55 degrees north latitude.

Data collected on the basis of an open Wikipedia. Since this is a free encyclopedia, information on the different countries varies in its entirety. It all depends on the attention of authors to the different aspects of urban life, as well as the characteristics of the national statistics. For example, there is no available data on the population in the cities of Russia in the 50s, after Second World War, no statistical surveys were made.

Data collected in the study include:

- geographical coordinates;
- the country and the state (region);
- presence of the polar day and night;
- presence of permafrost;
- average annual temperature;

- date of establishment and date of acquiring the status of the city or urban settlement;
- area of the settlement and its population density;
- population of the settlement, since 1900 or from the year of the city foundation;
- economic specialization;
- transport infrastructure (presence of a river or sea ports, railways, airports);
- availability of high education (university, institute or college), and the number of students in it.

The data, on which can be made an assessment of the quality and the level of life, including income levels relative to the national average, the level of the poverty, the crime rate, the volume of production (GDP), environmental situation, were not collected, because of the fragmentation of the submitted information in Wikipedia.

Part of the information is available for only US cities. Realizing the importance of this topic, the subject of subsequent studies can be based on international cooperation of scientists.

The main purpose of the study is to determine the characteristics of the urbanization process in the northern regions of the world in the 20th century - early 21st century.

Research Questions:

- *What can be called the city of the North;*
- *Is there a similar trend in the development of northern cities and settlements, given the fundamentally different economic models in national economies (US, USSR, Norway, Canada) in the 20th and early 21st centuries;*
- *How did affect the change in the economic model for economic specialization and the population in the northern cities of Russia, since 1990.*

1. What is the northern city?

There are national differences in the approaches to the **identification of the settlement as a city**.

One of the principles of giving to localities the status of the city - the population.

According to the recommendations of the United Nations, to enable comparison of urbanization and for other uses are encouraged to consider as the city all the settlements with 20 thousand residents and more. [<https://otvet.mail.ru/question/46585988>].

However, there are also national and historical features. For example, in the USA, the city – is the settlement with population of over 2500 people [<http://geographyofrussia.com/ssha-naselenie/>].

In Norway, according to the 1997 law, the settlement may apply for the status of the city, if the number of residents exceeds 5000. Prior to 1996, city status was assigned by the Ministry of Local Government and Regional Development.

In Russia, settlement may acquire the status of the city (urban-type settlement) if it is home to no less than one thousand residents. [<https://ru.wikipedia.org/wiki>] (Table 1.).

Table 1.**National differences of identification of the settlement as a city**

	Standard of population, people
United Nations	over 20,000
USA	over 2,500
Norway	over 5,000
Russia (urban-type settlement)	over 1,000
Soviet Union	
urban-type settlement	over 3,000
city	over 12,000

In Russia, urban-type settlements differ from rural settlements not by the number of people, but by the employment of the population. The bulk of the population (85%) should not be engaged in agriculture.

In the urban-type settlements of the Soviet period, the minimum number of people must be 3000 (in the city - 12 thousand inhabitants).

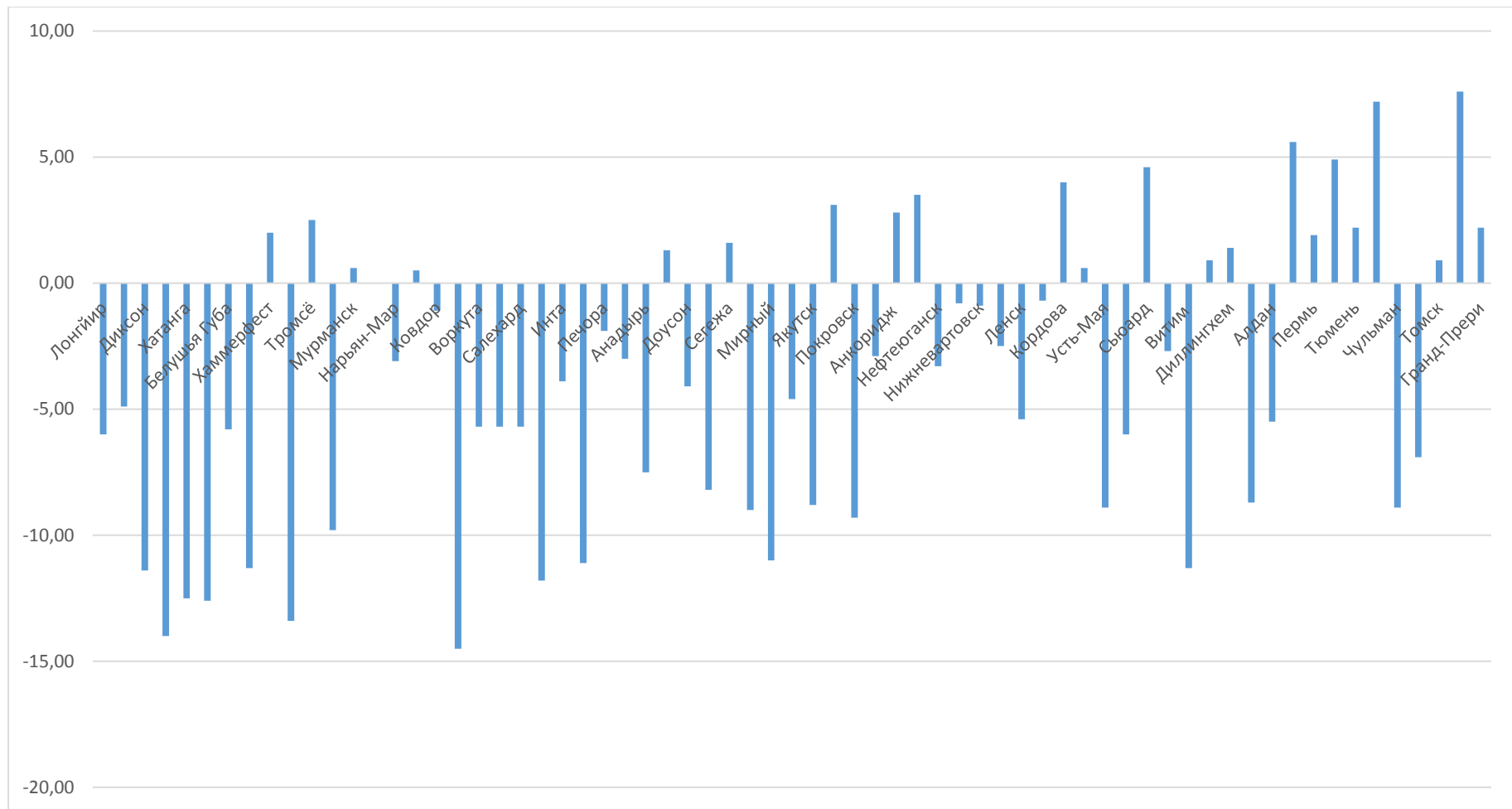
There are differences in the provision of urban and rural settlements with social infrastructure; they are fixed by urban planning regulations, which are approved by the ministries and construction committees at the level of federal regions of Russian Federation. For cities and urban-type settlements, the quality and composition of the social infrastructure from the Soviet period are higher than for rural ones.

Despite the fact that the rural settlements of Russia, including Yakutia, often have a large population (3000-10000 people), not all of them want to become cities. The reason lies in the traditions and history, as well as in the social policy of the authorities. People in rural areas have a number of benefits. For example, in Yakutia, they are partially offset by utilities, as they are provided for salary increments to 15% (the order of the Ministry of Labor and Social Development of Republic of Sakha (Yakutia) on October 14, 2008 №563-OD "On Approval of Recommendations on the establishment of the size of raising factors for the presence of the scientific degree, honors, for his work in the countryside and in the Arctic districts).

Settlement acquires the status of the city, according to the law, and particularly of Art. 11-13 Federal Law number 131 of October 6, 2003, at the initiative of the population by the laws of the Russian Federation. Dimensions of the settlement territory are set taking into account the size of its population; within the boundaries of the urban settlement may be one city or a village with the adjacent territory, as well as rural areas, which are not municipalities; within the boundaries of the rural settlement may be one rural town with a population of, as a rule, more than 1,000 people (for an area with a high density of population - more than 3,000 people), and (or) the combined total territory of several rural settlements with a population of less than 1,000 people each (for an area with a high density of population - less than 3,000 each); rural town with a population of less than 1,000 people, as a rule, part of the urban or rural settlements, etc.. [<http://baikalpress.ru/sm/2007/19/014001.html>].

In addition, there are different approaches to the definition of the North.

Fig. 1. The average annual temperature in the northern cities, degrees C



There is geographically precise definition of the Arctic Circle - above 66°33'44"degrees north latitude. The settlements are located behind Arctic Circle, regardless of national origin (Russia, USA, Canada and Norway) considered as northern and have extreme living conditions: the average annual low temperatures, long periods of polar night and day.

It is more difficult to identify the settlements below the Arctic Circle as a unique North. Not all of them are located on the permafrost, and the cities that are approximately in the same latitude, differ significantly in mean annual temperature (Fig. 1). Northern Europe - a region with a fairly mild climate, where relatively warm, due to the Gulf Stream. Therefore, in this study Scandinavian countries are hardly represented, but it also should be noted the features of National Statistics.

Russia inherited from the Soviet Union definition of the Far North. It didn't have so much the administrative-territorial importance, but economic one. The regions included in the approved list had special preferences: the population received additional social support measures and higher wages, but also higher prices (allocated 1, 2 and 3 price bands). This is partly reflected on construction and transport regulations and prices.

It should be noted also that the list of areas of the Far North is regularly changed; it included new regions and excluded old ones. This is the result of the lobby success of regions, or the line ministries of the USSR. For example, in 1970, 1971, 1975, 1977, 1982, 1985 as a part to these regions certain areas of Primorye and Khabarovsk, Chita and Tomsk regions were included. They were excluded by the decision of the Council of Ministers of the USSR from January 3, 1983 N 12. In the 90s (1990-1994) they were returned to the list, as at that time the list of Russia's northern regions has been expanded. The process continues, in 2008, it included a number of settlements in the Komi Republic, and in 2012 - Berezovsky and Beloyarsk region of Khanty-Mansyisk Autonomous District.

Thus, the base of the research is made up on northern cities, located below the Arctic Circle to 55 degrees north latitude: Russia (Republic of Sakha (Yakutia), Republic of Komi, Republic of Karelia, Republic of Buryatia, Krasnoyarsk region, Perm region, Murmansk region, Magadan region, Tyumen region, Tomsk region, Chukotka Autonomous District, Arkhangelsk region, including Nenets Autonomous District); United States (Alaska); Canada (Alberta, Yukon, Northwest Territories).

2. Trends in the development of northern cities in the 20th - early 21st centuries.

The data in Table 2. shows that from 125 cities only 46 or 37% were founded before the 20th century. On average, for the status of the city in Russia settlement requires 53.4 years, in the United States - 67 years, in Norway - 36.8 years and in Canada - 15.6 years since its foundation.

The oldest northern cities are in the North-West of Russia, founded in the 16th century, such as Solikamsk, 1430. In the 17th century, during the conquest of Siberia the majority of Yakutian cities and also Tomsk, Perm, Berezniki and Khatanga were founded.

The 18th century is the age of development of Alaska, at that time 6 of 22 considered US northern cities were based. In the 19th century this process continued, cities in Alaska were based as the basis for gold mining, in fact, the gold fever is the one of the most striking factors of expansion.

Table 2.**The temporal characteristics of the northern cities formation**

	Year of foundation			Total	The average duration of the period to acquire the status of the city since the founding of the settlements
	before 1990	1990-1940	1941-1980		
Cities	46	43	36	125	54,0
Russia	25	35	33	93	53,4
USA	16	4	2	22	67,0
Norway	2	2	1	5	36,8
Canada	3	2	0	5	15,6

Meanwhile Russia, Canada, Norway increased their northern lands by entering the Arctic Circle. Thereby, the first massive wave of expansion to the North lasted from the 40s of the 18th century until the beginning of the 20th century.

The 20th century was divided into two periods: before and after the Second World War. In the period from 1900 to 1940, a massive increase in Russian cities was due to industrialization, which required the involvement of new natural and human resources, political repression, the formation of new military bases. The main wave came in the 1924-1940. During this period, migration in Russia was from South to North, from West to East. In addition, these migration processes, as known, had a forced character. Man, who defined the Russian North development strategy, was Joseph Stalin and the modern northern cities of Russia remain as his legacy.

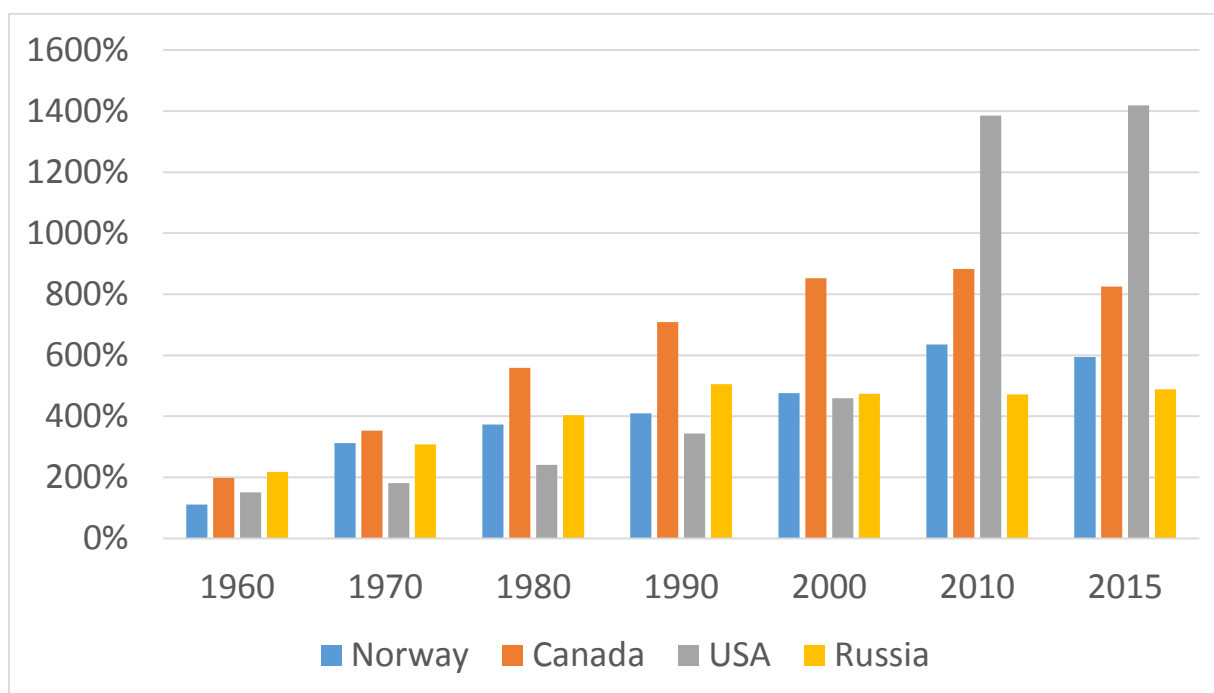
The third major wave of expansion was in the period from 1960 to 1980, when after the Second World War, Russia required economic recovery, and after Stalin's death, a period of development of new deposits in the Far East began, accompanied by the construction of new railways and highways, power plants. That is when acts were adopted to guarantee social benefits to northerners. This wave of development of the North took place in a more liberal political conditions, bonded labor dried up (closed Gulag), which required the formation of financial incentives.

By 1990, at the end of the Soviet model of economy population in these northern cities of Russia peaked - more than 6.4 million people, and then the restructuring decrement began. The reasons for this are various kinds of factors: the elimination of production and the subsequent loss of jobs, as well as the liberalization of migration conditions. The market economy, depriving secure working places, has given to people the personal capital. Many people have made a choice in favor of regions with more favorable climate.

As may be seen in Fig. 2, during the period from 1950 to 2015 there was most rapid population growth of the northern cities in the United States and in Canada.

"In Canada, 80% of the population live within 200 km of the US border, where the climate corresponds to the climate of the Altai. In Alaska, where permafrost zone covers 81% of the state territory, less than 50 thousand people live in these areas, while almost half of the population is concentrated in Anchorage (where the average annual temperature is + 3,4 ° C, in Tomsk, a city

Fig. 2. The dynamics of the population in the northern cities in 1950 - 2015, 1950 = 100%



far from the worst in Russia, it is only + 0,9 ° C). Calculations of the best American specialists show that from 1930 to 2010, the average January temperature in which lived the average citizens of Canada, increased by 1,2 °C, from -10.1 °C to -8,9 °C, but the same indicator for USSR (Russia) decreased during the same period by 1 °C, from -11.6 °C to -12,6 °C [C. Gaddy, W. Ickes. *Bear Traps on Russia's Road to Modernization*, London, New York: Routledge, 2013, p. 38]. This means only one thing: Canadians went against to the "north", while Russians were moving steadily to the north and northeast. We all know how it ended: an enormous overvoltage of effort and collapse of a great country" [V. Inozemtsev, *Who will go for hectare*, <http://www.gazeta.ru/column/>, the date of access 14.08.2015].

Depopulation of small cities is one of the common features of urbanization and social problem of all northern regions.

Qaanaaq - the city and the center of the eponymous municipality in northern Greenland. Qaanaaq population reaches 640 people, the entire municipality 850 (as of 1 January 2005). In addition to the town, people living in five villages. Population is shrinking as people move to the city. Previously, there were more villages, but many have been abandoned. The process of population concentration in cities is across Greenland [<https://ru.wikipedia.org/wiki/>].

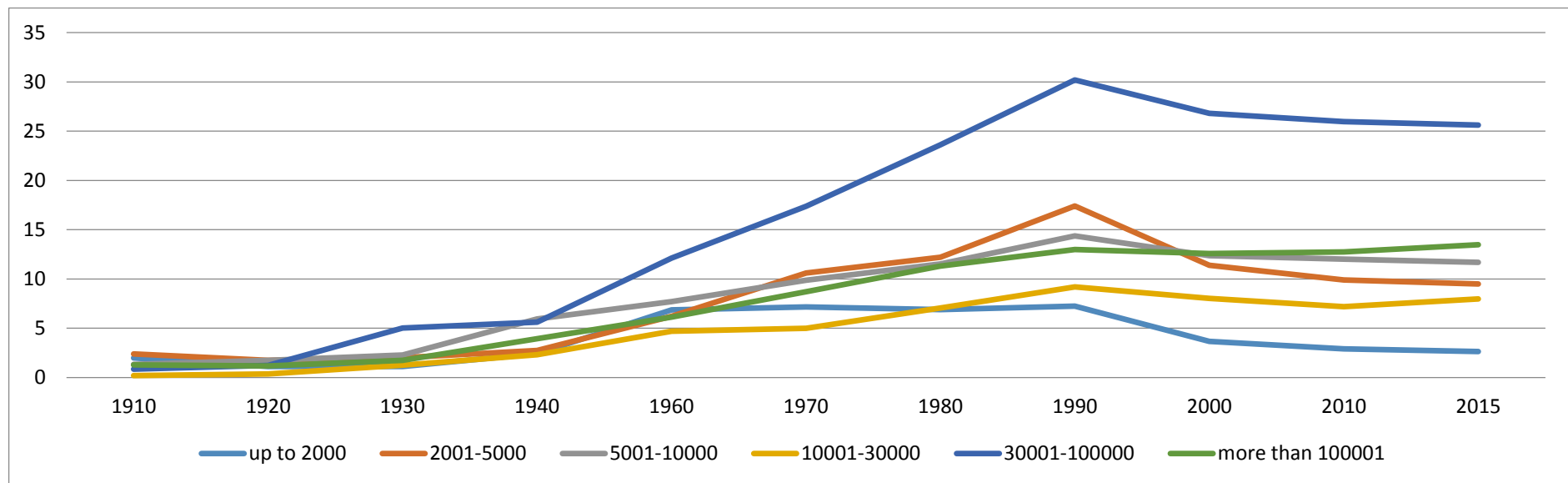
The data show that the average population in cities grew up to 1990, and then we can see a decline in all groups, which continues to this day, except for the cities with a population of 10 to 30 thousand people and over 100 thousand people (Table 3., Fig. 3.). Than larger a city than smaller a reduction in the average population in it. In the biggest cities, the decline was the smallest, and in 2015, the average number of population exceeded the 1990 figure. At the same time, the average population in the cities up to 2,000 people reached 933.3, and it is at the level of 40-50s of the 20th century. It is the process of exodus from depressed areas. In current conditions, when population mobility is not limited by administrative measures, small towns are uncompetitive compared with large cities by income and life standards. This is a long-term trend.

Table 3.

Ranking cities on their size in 2015, people

Population	1900	1910	1920	1930	1940	1960	1970	1980	1990	2000	2010	2015
Up to 2000	354	700	400	400	860	2435	2538	2438	2563	1302	1031	933
2001-5000	335	799	582	677	923	2079	3552	4090	5834	3816	3319	3185
5001-10000	622	835	1085	1416	3693	4784	6130	7161	8928	7679	7469	7258
10001-30000	2462	466	892	3090	5727	11571	12288	17395	22676	19795	17698	19633
30001-100000	2155	1841	2634	10846	12110	26137	37424	50864	65041	57781	55929	55216
more than 100001	25568	33177	30372	44908	100530	157143	222743	289435	331786	321829	326107	344296

Fig. 3. Dynamics of average population in the northern cities, 1900=100 %



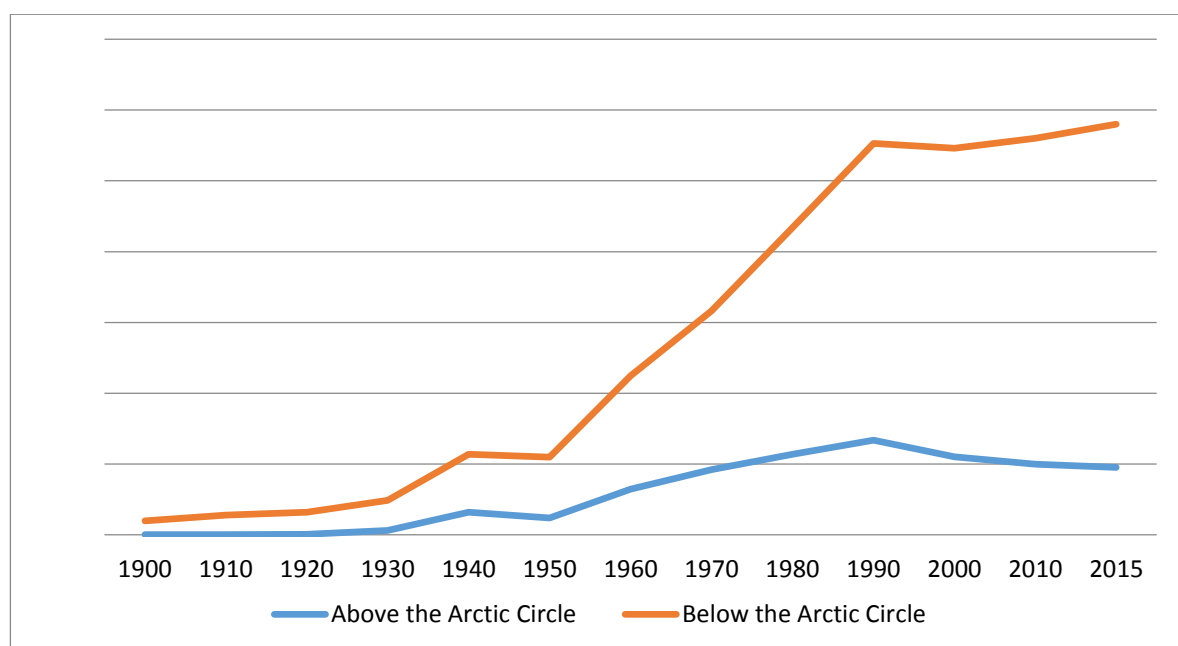
Big cities are more complex in organization of the economy. They are diversified. Closing unprofitable sectors does not always lead to a stop of the city development; some of them have successfully changed their specialization, such as Anchorage, which in addition to the seaport became a major educational and scientific center. However, the common feature of the northern cities is the presence of a relatively high proportion of people employed in the sector of management and in public services.

Dynamics of the population in cities above and below the Arctic Circle in 1900-2015 shows that the population in the cities above the Arctic Circle reduced since 1990 (Fig. 4.). Population in cities located below the Arctic Circle grows since 2000. This shows that the North and Arctic is not competitive relative to the South.

Maintenance of northern cities is very expensive. For example, in Yakutia duration of the heating season is 8-9 months in a year, and in the Arctic zone - 12 months. While maintaining isolation and inaccessibility, the main cost item of the budget system, population and business is the cost of electricity and heat. The level of their cost in the Arctic settlements of Yakutia is higher than in the central and southern cities of the country for 7,5- 8,5 times. The situation is similar in the separated towns and cities in Canada and Alaska. In addition, there is a resemblance, North - expensive.

However, there is a fundamental difference in the social model. Previously, the absolute discomfort conditions of life in the USSR was compensated by higher income, but now the situation has changed, because of the alignment of pay levels between regions, and because of the rise in prices. In Russia, usually citizens do not receive significant social benefits (benefits and pensions are low and paid by the state), but receive substantial transfers in the form of compensation for energy costs, free education and health care and other social services. In Alaska, as known, that there is a system of payments by corporations for the use of natural resources to indigenous people of Alaska, as well as payments of the state. Each model has its pros and cons, and have its own impact on the development of the northern regions; therefore, a comparative analysis is needed.

Fig. 4. Dynamics of the population in cities above and below the Arctic Circle in 1900-2015



The economic specialization of cities shows that it varies considerably across countries (Table 4.). Russian cities are mainly specialized in the industry, including mining. Energy and transport specialization of cities supports the development of the industry. By this Russia differs from the USA where the northern cities generally have a traditional specialization, fishing and tourism.

Table 4.

The economic specialization of northern cities

	Russia	USA	Norway	Canada	Total
Industry	55	4	2	3	64
Tourism	2	11	2	1	16
Power centers	9	0	0	0	9
Woodworking and logging	9	2	0	0	11
Transportation centers	25	6	2	1	34
Fishing and fishery	6	11	2	0	19
Scientific and educational centers	6	2	1	0	9
Administrative centers of the region	11	1	0	2	14
Agriculture and traditional economy	9	5	0	1	15
Prisons	5	1	0	0	6
Military bases	6	4	0	1	11
Total	93	22	5	5	125

Northern cities are smart cities. They are often educational and scientific centers. The data shows that the availability of higher education in the US is higher than in Russia (Table 5.). Here are the comparative figures for settlements with a similar number.

Table 5.

The availability of high education in 2015, the share of cities in the appropriate rank, %

People	Russia		USA	
	college	university (institute)	college	university (institute)
2001-5000	11%	5%	27%	9%
5001-10000	67%	20%	57%	43%
10001-30000	87%	47%	-	-
30001-100000	100%	73%	-	100%
More than 100001	100%	100%	-	100%

In addition, the northern cities of Russia are lag in the availability of airports in comparison with other countries (Table 6.). Moreover, this gap is only growing. In 2010 and 2012 in two Russian cities with a population up to 2,000 people local airports were closed.

Table 6.

The availability of airports in 2015, the share of cities in the appropriate rank, %

	Russia	USA	Norway	Canada
Up to 2000	25%	100%	100%	100%
2001-5000	72%	100%	100%	100%
5001-10000	64%	100%	100%	100%
10001-30000	69%	100%	100%	100%
30001-100000	73%	100%	100%	100%
More than 100001	71%	100%	100%	100%

What is the impact of change in the economic model for specialization and the population in the northern cities of Russia, since 1990?

Russia's transition to the market model on the one hand gave impetus to the development of large cities, but also has led to rapidly growing small towns depression, primarily single-industry towns with one large enterprise. A number of industries that have been put into operation in the Soviet age, in an open economy became unprofitable, such as settlements, specializing in tin mining in Yakutia.

Over the past 25 years, many of the northern cities of Russia have declined, which also entails the gradual elimination of airports, sea and river ports. It is clear that special measures are needed to eliminate a number of hopelessly depressed settlements, including through the resuscitation of the federal program on resettlement, which was closed in the late 90s.

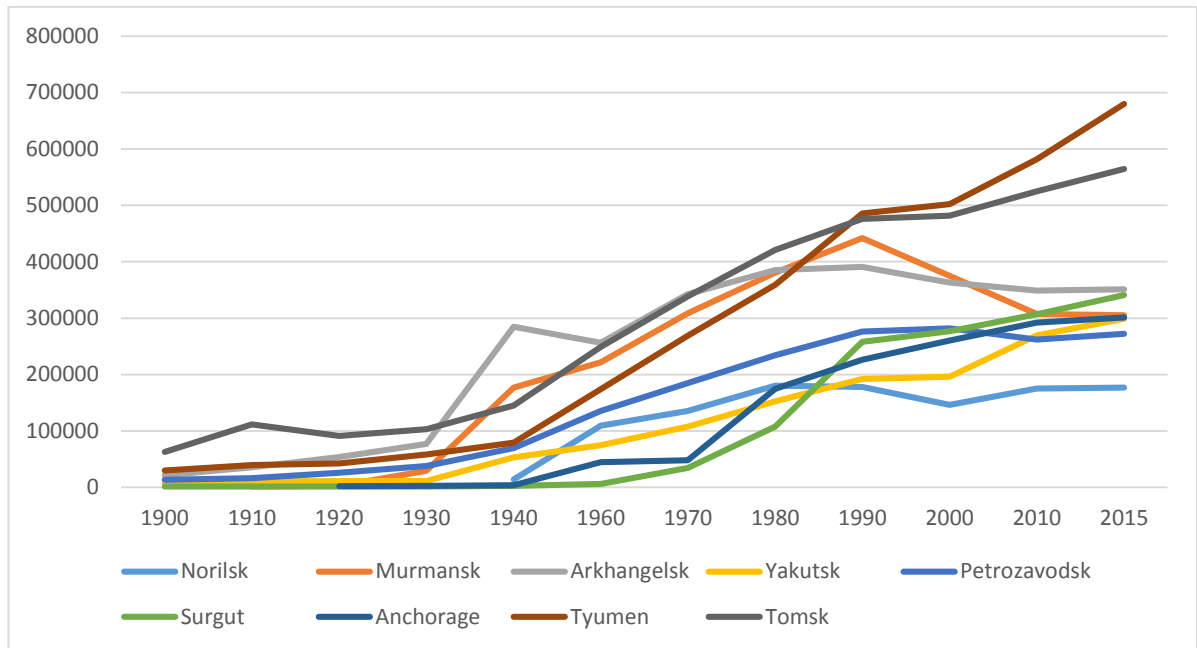
New Russian economy still based on the old territorial framework. It was formed over a long period of history, but especially in the 20th century under the Soviet model. In many ways, this framework is a legacy of Stalin and the Soviet plans of industrialization.

Fig. 5 shows the dynamics of the population in the major northern cities (with the exception of the city of Perm, where more than 1 million of people). The data show that they are actively developing, as administrative centers of the Russian Federation or as a state with an industrial specialization or with the nature of Research and Educational center. Most of the population stimulates the spreading of new products, and the level of consumption comes to the average world standards.

The data shows that cities with an industrial, educational, and scientific specialization grow faster than others. The population in the northern cities of Russia, specializing in oil and gas industry grows faster than others (Tyumen and Surgut). Administrative centers are stable. For example, the population of Yakutsk is growing rapidly.

The concentration of population in big cities will inevitably lead to an increase in the number of depressed communities with a small population that will continue to strengthen competition.

Fig. 5. Dynamics of the population in largest northern cities in 1900-2015



It confirms the conclusions of several reports on the Congress ERSА, including the conclusion of a new geographical reality. Agglomerations continue to attract people. Decentralization of population distribution is disappearing.

The solution to this problem lies in either optimizing the placement of settlements, or in the need of transport and engineering infrastructure development to compensate extreme living conditions. For example, small cities in the north of Russia are still not provided with quality internet, water, roads, and limited access to a range of social services.

Conclusions

1. The new geography is a reality. We will continue to observe the growth of agglomerations and depression of small settlements. This process is long-term.
2. Generally the North is not competitive relatively the South. The competitiveness of the northern city depends on how the quality of life, income and access to social services and transportation can offset difficult living conditions.
3. In the development of the northern cities we can see the similarities and national characteristics. The prevailing market model supplemented of social investments and payments for households in the United States, Norway and Canada allows supporting the development of northern cities. Now the Soviet model of development of the North main feature of which was the forced migration is not competitive. However, over the past 30 years, structural changes of the framework of northern regions did not happen in Russia. This is a key problem for the future.
4. Continue research on the comparative analysis of the northern cities can give some new results. To do this, we can implement new research projects in the field of sustainable development of the North. One of the promising research is to develop methods of compensation discomfort stay in the North, with higher level and quality of life that can clarify the prospects for the development of human capital. To do this, presented in this report, a database, through a single international project, can be completed not only with climatic information but also with national statistics on the quality and availability of engineering and social infrastructure, demographics and gender disparities, income and education, poverty and crime and other factors.