Comparative study of single-industry towns’ industrial dynamics: case of European Far North regions of Russia

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Abstract. The paper concerns the issues of development of single-industry towns located in the Northern part of Russia. The authors make focus on two territories of Russian Far North, namely Murmansk and Arkhangelsk regions where 14 single-industry towns are located at moment. The study distinguishes two types of single industry towns accordingly to industry of city-forming enterprises, mining and manufacturing correspondingly. The paper is based on analysis of federal and regional statistics and investigation of indicators characterizing the social, economic and industrial development of single-industry towns in the period of the last 10-15 years. The study disclosed the fact of faster growth of production in single-industry towns belonging to mining industry despite of the accelerated depopulation in comparison with single-industry towns of manufacturing industries. This contradiction can be explained by higher level of modernization of enterprises from mining industry. The recommendation for the policy makers in priority setting in support of city-forming enterprises is formulated. The direction of the future research are indicated.

1. Introduction

The sustainable development of countries with large scale territory like Russia depends on the level of rationality of spatial economy structure sustained allocation of industrial capacities. However the reality of existing structure of industrial allocation is not perfect due to historical ground. The industrial development of Russian economy during the state planning era in XX century was organized according to geopolitical approach dictating the allocation of settlements close to resources’ deposits. This approach defined the existence of so called single-industry towns. Naturally this phenomenon is the most typical for Russian Arctic and Far North since this area is especially abundant of natural resources. The regions of Far North are the producers of 95% of gas, about 60% of oil, 99% of diamonds, 90% of chromium and manganese of Russia’s total production. [1].

According to [2], a settlement is recognized as a single-industry town if the following criteria are met simultaneously:

- a municipality has the status of an urban district or settlement, with the exception of municipalities where the legislative (representative) authority of a subject of the Russian Federation is located;
- the permanent population exceeds 3 thousand people;
- number of employees one of the companies on the territory of the municipality or the same main economic activity (or the activity of which is carried out in the framework of unified production-technological process) reached in the period of 5 years preceding the date of
approval of the list of single-industry towns 25 percent of the average number of employees of all organizations operating on the territory of the municipality:

- the company’s activities are related to the extraction of minerals (other than oil and gas), and (or) production and (or) processing of industrial products;
- the number of employees who make up at least twenty five percent of the working population of the corresponding town.

There are 49 settlements of Arctic and Far North of Russia satisfying these criteria now and thus, belonging to category of single-industry towns [2]. The socio-economic situation in the majority of single-industry towns is deteriorating during last thirty years varying dependently on core industry, location and other factors. As a result the population of Arctic single-industry towns decreased on almost 20%, from 1105448 in 1998 to 891365 in 2016 [3]. However every single-industry town was equipped from the very beginning by the social infrastructure, i.e. educational institutions, medical services, libraries, cultural networks, etc. It helped to create and develop an economic industrial and labour potential which can be used not for core enterprise only but for regional socio-economic development as well. It is impossible (at least economically not viable) to remove settled population of the single-industry towns to other more comfortable regions and use long-distance commuting (fly in/fly out) technology for local operations [4, 5]. Nevertheless some of single-industry towns are successfully developing and growing. This dictates the following questions. What is the industrial structure of the single-industry towns in Far North regions located in European part of Russia since these regions are the most suitable for comparative analysis due to location? Which factors are crucial for the single-industry towns in these regions to be sustained? How the industrial dynamics is correlated with industry of core (city-forming) enterprise of the single-industry towns? What kind of inference could be concluded and recommendations could be formulated based on comparative analysis of industrial dynamics of the single-industry towns in frames of their core industries?

The most reasonable to analyze the single-industry towns of Murmansk and Arkhangelsk regions, since these regions are located in neighborhood at the North of European part of the Russian Federation. It allows using the same methodology and provides a comparability of the data and conclusions.

Thus, the goal of the study is comparative analysis of industrial dynamics of single-industry towns located in Murmansk and Arkhangelsk regions of Russian Far North in terms of their belonging to different industries, identification the most problematic areas and formulation of recommendations for focusing in the frame of single-industry towns state support programs.

The objectives of the study:

To identify the factors characterizing the industrial dynamics of Northern single-industry towns available in statistics.

To analyze the current list of single-industry towns located in Russian European Far North according to state regulation in Russia.

To analyze dynamics of indicators characterizing an industrial development of single-industry towns located in European part of Russian Far North in terms of their belonging to different industries.

To identify the distinctions in industrial dynamics between single-industry towns in terms of their belonging to different industries

To discover the factors defining the distinctions detected, to distinguish success and failure factors.

To formulate justified recommendations for industrial development in single-industry towns located in Murmansk and Arkhangelsk regions in terms of their belonging to different industries.

2. Existing literature
There are numerous studies focused on problems of single industry towns’ development. The majority of studies regard the investigation object as settlements which are located in places where the resources are found and where the chances for other types of economic activities are limited. [6] Actually the phenomenon of single-industry settlements exists for thousands of years. K. Warren pointed out that the first evidence can be discovered in ancient Greece in Laurien region not so far
from Athens where silver mines were located. 25,000 slaves extracted silver for Athenian state for purposes of coinage [7]. However the modern form of single-industry towns was shaped by multinational companies in developed and developing countries or governments in countries with planned economy (case of Soviet Union at the first rate). The main incentive was minimizing of costs for resources which were necessary for growing industrial production in the 20th century. The exact period of single-industry towns’ formation depends on the peculiarities of industrial development cycle in every country. In Russia (Soviet Union) it was period of industrialization (20th-30th and three decades after the II World War. However the transition to market economy in 90’s generated the new challenges for single-industry towns [8].

The analysis of the tools and ways to meet these challenges and solve problems is the subject of interests of various studies. The popular idea is to transform the town governing on the basis of “smart city” concept [9]. This idea looks a slightly optimistic due to infrastructural limitation in single-industry towns, low level of qualification of local workforce and management in rather sophisticated “smart city” concept implementation.

The trial to take into account the local realities and interests of local actors for sustainable development of single industry towns is done by authors of [10], [11]. A few studies regard some specific tools for restoration and development for instance creation of Territory of the Advancing Socio-Economic Development [12] and industrial parks [13], modern information and communication technologies [14], [15], [16].

The authors of Ivanova O. et al [17] propose an industrial cluster as a way of integration of single industry towns. The similar idea of cooperation and integration of single-industry towns of the mining industry was proposed in paper [18]. However the comparative analysis of single-industry towns of different industries is missed. The studies [19], [20], [21] analyze success and failure factor for single industry towns however not in Russia but in Belarus [19], Kazakhstan [20] and Australia [21].

Thus, the problem of single-industry towns’ development in Russian Far North in context of dominating industry factor is not explored well enough, which is important for priority setting in governmental support policy [22].

3. Methodology and materials

The list of single-industry towns is regularly reviewed. The purpose of forming a list of single-industry towns was to create a system of targeted support for industrial single-industry towns. The list did not include single-industry towns where city-forming companies were not related to industry (for example, cities of science). Industrial single-industry towns were excluded from the list if city-forming enterprises belonged to successful sectors, the oil and gas industry, and the generation of electricity. 313 single-industry towns were registered in 2014. It was assumed that the number of single-industry towns should be reduced. But by 2019, their number will increase to 321. At the same time, in 2019, some cities in the Far North were excluded from the list of single-industry towns, for example, Pevek (gold mining) and Beringovsky (coal mining).

Consider the single-industry towns of the Murmansk and Arkhangelsk regions belonging to the Far North of the Russian Federation.

| Single industry towns | Industry | Category 2014 | Category 2020 |
|-----------------------|----------|---------------|---------------|
| Kirovsk               | mining and chemical (apatite-nifelin ores) | 1 | 1 |
| Revda                 | mining and processing (non-ferrous metals) | 1 | 1 |
| Kovdor                | iron ore industry | 2 | 1 |
| Nickel                | mining and metallurgical (non-ferrous metals) | 2 | 2 |
When conducting the study, we were faced with a lack of data on business activity in individual single-industry towns, so we had to use data from regional or industry statistics. We proceeded from the assumption that the index of business activity in single-industry towns with a difficult socio-economic situation will not be higher than the average for the market or industry. When estimating the population, we used the data of municipal statistics. In the absence of data, we focused on the next available year. We assumed that the rate of population change is monotonous within the given period, which is confirmed by both observations and the absence of reasons for a sharp change in the population in the cities under consideration.

4. Results

Of the 14 single-industry towns of the Murmansk and Arkhangelsk Regions, 36% belong to the first category (with the most difficult economic situation), the second - 50%, the third, relatively stable - 14%. The most single-industry towns fall into category 2, which has risks of worsening socio-economic conditions. Since 2014, more than 100 types of state support have been available, including the creation of priority development areas. Despite the set of measures to support single-industry towns, there is no mass transition to category 3 (single-industry towns with a stable socio-economic situation) or a reduction in the list. But there is a tendency for single-industry towns to move from category 2 (risks of worsening socio-economic situation) to categories 1 and 3 (table 2).

| Region         | Categories, years |
|----------------|-------------------|
|                | 2014  | 2020  | 2014  | 2020  | 2014  | 2020 |
| Arkhangelsk    | 33%   | 29%   | 67%   | 42%   | -     | 29%  |
| Murmansk       | 29%   | 43%   | 71%   | 57%   | -     | -    |
| Total          | 31%   | 36%   | 69%   | 50%   | -     | 14%  |

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single-industry towns of the Murmansk region are mainly associated with the mining industry. In the Arkhangelsk region - from forestry and woodworking (production). The problems of ecology [23, 24] and the development of transport infrastructure [25] are extremely relevant for the regions. Notice that the index of entrepreneurial confidence for extractive industry organizations (for large enterprises) is consistently higher.

The Industrial Production Index of Intensity in Russia (period from January 2010 to January 2020) increased by 23.8%, the index of the intensity of mining and mineral extraction by 15.4%, manufacturing - by 35.9%. This is understandable, since taking into account the level of monopolization of production in the period 2010–2020 value added and producer prices in the mining industry grew faster than in the manufacturing industry.

Our analysis of population dynamics showed that the population of single-industry towns is steadily decreasing. However, over the past decade, population decline has been going down. The population of single-industry towns of the Arkhangelsk region is declining more slowly than in Murmansk region (tabl.4).

Statistics on the volume of industrial production for individual single-industry towns are not available. Therefore, the dynamics of Industrial Production Indices of the manufacturing and mining industries for the Murmansk and Arkhangelsk regions.

The growth rate of the mining industry (Fig. 2) in the Murmansk region is relatively low; they correspond to the all-Russian and regional dynamics. The manufacturing industry is growing in the Murmansk region at a faster pace in relation to the region (Fig. 3). We also note the volatility of output in production in the Arkhangelsk region.

The specifics of Russian single-industry towns is that changes in the structure of production are accompanied by interdependent transformations in the local community caused by, among other things, transition from a planned to a market economy. The production division and the success of the development of the industry largely determine the standard of living of the single-industry town, the nature of employment, and the demographic and socio-economic characteristics of local communities.
Features of the development of Far North single-industry towns:

- the narrowness of the labor market, focused primarily on the needs of the city-forming company;
- close relationship with the industry of the city-forming company, which determines the relatively low level of differentiation of types of labor activity of the population;
- orthodox traditions, the existence of "labor dynasties", the continuity of labor skills;
- the presence of sustainable models of social behavior;
- poor spatial mobility, when searching for a job, preference is given to a city-forming company;
- low innovation activity.

The prospects and the intensity of development of the industry (through the city-forming enterprise) will largely determine the socio-economic situation in the single-industry town. Consider the intensity indices of industrial production by type of economic activity (fig. 5, 6).

![Figure 4: Industrial Production Index by mining activities (cumulative).](image1)

![Figure 5: Industrial Production Index by manufacturing activities (cumulative).](image2)

Fig. 5 shows that the Industrial production index by iron ore industry is significantly lower than in the mining industry as a whole. And it is precisely this industry that belongs to the single-industry town, where the socio-economic situation worsened (tabl.4).

### Table 4. Distribution of single-industry towns by category

| Activities                          | Categories, years |
|-------------------------------------|-------------------|
|                                     | 1  | 2   | 3   |
| mining                             | 15%| 21% | 38% | 28% | -   | 7% |
| manufacturing                      | 15%| 15% | 31% | 21% | -   | 7% |
| forestry and woodworking           | 15%| 14% | 23% | 14% | -   | 7% |
| iron ore industry                  | -  | 7%  | 15% | 7%  | -   | -  |
| mining and metallurgical (non-ferrous metals) | 7% | 7%  | 23% | 23% | -   | 7% |

Production in the activities "wood processing and production of wood products" and "production of paper and paper products" is growing steadily. This explains the less intensive decline in the number of industrial single-industry towns of the Arkhangelsk region (table. 5), and the preservation of their categories (table.4).
Table 5. The rate of decline in the population of single-industry towns by activities

| Periods          | 2019-2015 | 2015-2010 | 2010-2005 |
|------------------|-----------|-----------|-----------|
| **Region**       |           |           |           |
| Arkhangelsk region | 2.4% | 3.9% | 3.7% |
| Murmansk region   | 3.5% | 5.9% | 10.0% |
| **Activities**   |           |           |           |
| mining           | 3.3% | 7.1% | 5.0% |
| iron ore industry| 3.3% | 8.4% | 5.2% |
| mining and metallurgical (non-ferrous metals) | 3.4% | 5.2% | 10.7% |
| manufacturing    | 2.4% | 3.8% | 4.0% |
| forestry and woodworking | 3.0% | 4.7% | 6.4% |
| shipbuilding     | 2.1% | 3.2% | 2.6% |

In the Murmansk region, we noted a consistent increase in industrial production. This sequence of actions, presumably, despite the more difficult economic situation in single-industry towns, slowed down the decline in population. In the Arkhangelsk region, the low rate of population decline is largely due to the relatively stable situation in the largest single-industry town Severodvinsk (shipbuilding industry). Thus, the production in single-industry towns is growing independently of industry of city-forming enterprise. The explanation is faster modernization of manufacturing in mining industries. That helps to produce more with less labor force. Consequently the state needs to make focus on support of innovative activities of city-forming companies belonging to manufacturing industries.

5. Conclusions and discussion

Among the factors affecting the socio-economic development of single-industry towns of the Far North, we identified the main factors - the intensity of development of the industry in this region. For the Murmansk and Arkhangelsk regions, these factors are:

- climatic conditions that increase production costs,
- the relative proximity of economic centers, relatively developed transport, engineering and social infrastructure,
- fluctuations in the global and Russian commodity markets,
- strategic goals of production campaigns, interest in the long-term development of an enterprise and a single-industry town, respectively;
- depletion of reserves of deposits around which monotowns and mono-settlements are based;
- growth of requirements for ensuring environmental safety of the Far North Territories;
- restriction of access to modern technologies, equipment that allows for the exploration of new deposits.

Another important factor is the policy of the region’s authorities aimed at ensuring stable consistent development of territories, the region’s priorities with regard to supporting industries, and fluctuations in regional industrial business activity. The recommendation for the state is support of modernization of city-forming enterprises from manufacturing industries.

The discussable issue in the present study is distinguishing of two groups of industries, namely processing and mineral (mining) ones. The future research will be focused on more specified typology of industries typical for single-industry towns. The other direction of the future study is increase of number of indicators of regional development taking into account investment policy of city-forming companies.

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