

## STATISTICAL EVALUATION OF SOCIAL AND ECONOMIC DIFFERENTIATION IN URBAN SETTLEMENTS AND AREAS OF RUSSIA'S EUROPEAN NORTH

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**Abstract:** The authors provide arguments for the fundamental and community importance of considering the phenomenon of social and economic differentiation. The particular relevance and practical demand of the statistical evaluation of social and economic differentiation of Russia's European North viewed through the lens of distinctions between urban settlements and areas have been substantiated. The authors provide grounds for the evaluation technique based on the use of the Lorenz curve and the Gini index. The specific features of differentiation between urban settlements and areas in the regions of Russia's European North have been identified: high differentiation in the economic indicators; lower differentiation in indicators characterizing the social life activity of the regions and the population level of life. Using the case of Murmansk region, the following trends have been found: the reduction of distinctions in the majority of social indicators and the growth of differentiation in the economic indicators.

**Keywords:** development disparity, social and economic differentiation, statistical estimates, Russia, European North.

### 1 Introduction

The fundamental nature of the space differentiation problem is determined by the permanent clash between the efforts of administration of any country, region, or municipality aimed at curtailing the social and economic disproportion of the territory under management and the objective laws of capitalist formation reproducing and intensifying differentiation in the social and economic space of any territorial object (Blaug, 1997; Piketty & Saez, 2003; Skufina, 2013).

The relevance of developing the scientific topic dedicated to diagnostics of social and economic development differentiation is determined by the necessity of summing up and elaborating the scientific ideas to solve the urgent scientific and practical problems of managing various level territories. The importance of this research is enhanced particularly by the choice of the research object – urban settlements and areas of the European North of Russia. Natural resources and industrial capacities located within Russia's European North matter much for the economy of the country (Leksin & Porfiryev, 2015). Meanwhile, it is these areas that are characterized by systemic problems: migration outflow against the background of escalating migration moods of the population, an insufficient level of the social sphere as compared to the remainder of the country, poor infrastructure development, etc. (Baranov et al., 2020; Samarina et al., 2019; Suopajarvi et al., 2017). This is why for solving the problems of ensuring the balanced development, the specific nature of differentiation of the social and economic space should be evaluated quantitatively as applied to the selected research object – the European North of Russia.

The scientific novelty of such research is determined by finding out new facts, trends, and proportions of the parameters of the particular research object (urban settlements and areas of the European North, for which no similar studies have been conducted so far). The practical importance is determined by diagnosing the situation, including independent monitoring studies of comparative dynamics for the regions, urban settlements, and areas of Russia's European North.

### 2 Literature Review

Traditionally, the studies of social and economic differentiation in various territorial objects make up one of the most urgent and

important focus areas of basic science. As numerous studies, including the authors' ones, show, there is a controversy between the significance of efforts aimed at solving the problem of differentiation of social and economic development of countries and regions and their low effectiveness (Baranov & Skufina, 2005; Skufina, 2013). With regard to this, as some studies point out quite fairly, social and economic differentiation (including the social inequality problem) becomes the subject of not only scientific but also a broad community debate in many countries (Piketty & Saez, 2003; Piketty & Zucman, 2014; Suopajarvi et al., 2017). Moreover, the public discussion of the problem of differentiation in all its manifestation ways has become quite heated in the recent years. This greater attention on the part of the public is a new and special phenomenon that allows supposing intensification of the political context in the problem of social and economic differentiation, its spatial aspect included.

The authors believe that such keenness of the public perception is generated by the problem of uneven social and economic development of territories, equally as the social inequality one, being insolvable within the capitalist model of the world development. Numerous attempts of the summing up analysis of main theoretical concepts indicate that there are currently no models that allow substantiating the conditions for reducing social and economic differentiation as an objective, self-regulating process from the standpoint of economic theory (Piketty & Saez, 2003). It has been found that the essence of economic models of various countries and global conditions of cross-country division of labor inevitably produce social and economic differentiation of the population, areas, states, and regions of the world (Atkinson et al., 2011; Skufina, 2013). Hence social and economic differentiation of the space is a natural phenomenon. Within these lines, the task of administration is to prevent such a level of distinctions that can provoke the development of undesirable, acute social processes.

This context expands the potential possibilities of applying the scientific results of evaluation of social and economic differentiation in the practice of managing territorial objects of the European North of Russia. This is determined by the following facts.

Firstly, the territorial objects are important for the current objectives of management. The selection of Russia's European North is completely in line with the actualization criteria owing to the high importance of this zone for fulfilling the national development interests of Russia. This importance is confirmed from the standpoint of management, too: on the one hand, by decreasing protectionism in relation to the Northern areas of Russia in general, but at the same time, by the rise of the economic activity in the part of exploiting the natural resources of this area (Baranov et al., 2020; Korchak et al., 2019; Skufina & Baranov, 2017). Moreover, currently, a new specialized state policy is being formed for the Russian Arctic. It was first outlined individually in the "Fundamentals of the state policy of the Russian Federation in the Arctic for the period of up to 2020 and further outlook" on 18/09/2008. Later it was made more precise in a large number of regulations and legal documents (Leksin & Porfiryev, 2015).

Further formation of new legislation for the Russian Arctic implies knowing the problems that are characteristic exactly for the Northern areas in detail. It is into differentiation of the social and economic space that these problems translate, which predetermines the necessity of specialized research. It should be noted that no full-scale studies of social and economic differentiation of the regions viewed through urban settlements and areas of Russia's European North have been conducted yet.

Secondly, this is determined by the importance of the research subject which includes evaluation of differentiation within the region – between urban settlements and areas.

It should be noted that in the recent years extremely much attention has been paid to the problem of interregional differentiation of Russia in the level of social and economic development. However, at the same time, distinctions within the regions are considered extremely rarely. Meanwhile, in most cases, these distinctions are even sharper than at the level of interregional juxtapositions (Skufina & Baranov, 2017). Obviously, for developing a sound model of balanced development of the country, region, municipal formation, these distinctions have to be known and taken into account.

Thirdly, crisis processes in Russia's economy are coupled with particular difficulty of ensuring the balanced development of the European North due to high costs of functioning of the economy and the social sphere, mono-dependence of its urban settlements and areas, weak actual and potential diversification of the economy, and so on (Korchak et al., 2019; Baranov & Skufina, 2005; Samarina et al., 2019). With regard to this, the worded strategic prospects of social and economic development of the Russian North and its Arctic constituent were formed in the conditions of a steady growth of the economy. Crisis conditions marking the aggravation of systemic problems these remote territories have and at the same time the enhanced geopolitical importance of the Russian North require adjusting the promising focus areas that can ensure the balanced development of not only the economy, but also the social sphere of its regions, urban settlements, and areas. Hence valid diagnostics of interregional differentiation is a paramount task.

The essence of diagnosing exactly the space differentiation is its direct association with management. This context implies the objective of diagnosing social and economic differentiation of spatial objects consists not in an attempt to describe the distinctions between the territorial objects in the fullest detail possible, but in the correct evaluation of the situation in the form of setting a particular diagnosis (Baranov & Skufina, 2005). Thus, the technology of evaluating differentiation of the social and economic space has to enable the reasonable use of the required simplifications within the limits corresponding to the set objectives and to the measure of danger of errors in regulating the problem of balanced development of the space in the Arctic Zone of the Russian Federation. However, the question of objective quantitative evaluation of social and economic development disparity remains debatable, which hinders achieving the consensus both in the economic theory, in the practice of management, and in the economic policy.

Below, the results of the authors' statistical estimates are given illustrating the evaluation of development disparity. The authors believe this will allow discussing the specific features of statistical evaluation of differentiation in a profound way and clarifying the nature of its manifestation for the regions, urban settlements, and areas of the European North of Russia.

### 3 Materials and Methods

The objective of the research is statistical evaluation of social and economic intraregional differentiation of Russia's European North viewed through the lens of distinctions between urban settlements and areas.

The research tasks are as follows: 1) substantiating the methodological particularities of statistical evaluation of the social and economic space; 2) presenting the results of evaluation of intraregional differentiation of development on urban settlements and areas of the European North of Russia; 3) finding out the particularities of manifestation of differentiation in the urban settlements and areas considered according to the regions of Russia's European North.

The research object is the urban settlements and areas of the regions of Russia traditionally making up the European North: the Republic of Karelia, the Republic of Komi, Arkhangelsk region, Vologda region, and Murmansk region. Let it be noted that the European North is also called the Northern economic area, one of Russia's 11 economic areas.

Diagnostics of social and economic differentiation of the space is an integrated analysis of comparative characteristics of territorial objects (in this case – regions, urban settlements, and areas of Russia's European North). Alongside the accumulation of scientific knowledge, the practical function of this diagnostics is support of the practice of managing the development of territories, including transformations of the social and economic space measured by proportions of a series of parameters characterizing differentiation (Rodrik, 2010; Baranov et al., 2018; Felipe et al., 2011).

The following principles of selecting the basic indicators used in the evaluation have been substantiated: 1) the principle of comprehensiveness, i.e. the indicators have to describe the main aspects of social and economic development of a territorial object; 2) accessibility, i.e. the initial indicators have to be accessible for other researchers to subsequently repeat the calculations for elaborating the study of social and economic differentiation further, finding out the situation dynamics and making it more precise in the future; 3) consistency, i.e. each of the indicators has to correspond to the principle "the more the better" in terms of social and economic development, or to the principle "the more the worse" (in case an indicator is not up to this principle, it is converted into the opposite form).

The authors have suggested the following list of indices or indicators that characterize the economic activity, social life activity, and level of life of the population of the European North: 1) investments into fixed assets of large and medium organizations per capita; 2) the average retail turnover per capita; 3) the volume of commercial services rendered to the population per capita; 4) the average monthly nominal gross payroll; 5) the number of registered crime per 1000 people of the population; 6) the officially registered unemployed as of the year end; 7) the average total area of residential premises per one citizen as of the year end; 8) the number of doctors per 1000 people of the population as of the year end. Let it be noted that in forming the list, the specific features of the North were taken into account; for example, the system of healthcare is particularly important for Northern areas.

This dictates the necessity of using relatively simple and reliable evaluation methods that allow obtaining unambiguously interpreted and repeatable results. In the series of studies of social and economic development differentiation in various level territories, the author used a set of various approaches and methods – some variants of complex estimates, index methods with the use of the Mahalanobis distance (the measure of distance between vectors of random values generalizing the notion of the Euclidian distance), and the method of principal components (Baranov & Skufina T, 2005; Skufina & Baranov, 2017). Each of these methods has certain limitations and positive sides of use. In this paper, the authors describe below the results of calculations relying on the methodological approach based on the use of fundamental developments in the domain of economic and social inequality. They use methods similar to those applied in studying e.g. the inequality of incomes (the Lorenz curve, the Gini index).

Let positive aspects of the techniques using this approach be noted: 1) the toolkit has been repeatedly tested out and it has proven itself as a universal means for characterizing the disparity of distribution of the values being analyzed; 2) it allows identifying the distinctions in the indicators not only between all regions of the country, but also between the groups of subjects of the Russian Federation (e.g., the group of depressive regions, the Northern regions group, and so on) as well as intra-group differences; 3) it provides a quantitative characteristic of the measure of distinctions of the regions according to an indicator (or index); 4) it is convenient for studying the process dynamics (the Gini index is dimensionless, therefore, no deflation is required for it).

The main disadvantage of using the analog of the Gini coefficient for characterizing the development disparity is some averaging of the evaluation. That is, in the obtained results, the indicator values are not singled out for abnormally lagging

behind or the most flourishing urban settlements and areas. However, this comprises the strong side of this approach, too: it allows evaluating the differentiation of an object on the whole, when the extreme values affect the result but do not determine it to the full extent (just like, for example, in estimates of differentiation by the range between two extreme values of the objects from the group under study).

For each of the basic indicators of social and economic development of urban settlements and areas (grouped according to regions), it is suggested to plot the Lorenz curve (DC) and the analog of the Gini index (let it be termed the RDI differentiation index). Formally, the above procedure takes the form of:

$$DC_k(0) = 0, \\ DC_k(i) = DC_k(r/N) = \sum_r f_k(r) / \Sigma_k, \quad (1)$$

where  $k$  is the indicator number;  $N$  is the quantity of regional objects (urban settlements and areas);  $r=1, \dots, N$  is the object number;  $f_k$  is the value of the  $k$ -th indicator for the  $r$ -th object; and  $\Sigma_k$  is the sum of values of the  $k$ -th indicator for the  $r$ -th object.

$$RDI_k = 2S, \quad (2)$$

where  $k$  is the indicator number;  $S$  is the area between the cumulative curve and the absolute equality line; let it be reminded that multiplier 2 appears when  $S$  is divided by the area of the triangle under the absolute equality line.

#### 4 Results and Discussion

Table 1 gives the results of calculation of differentiation index – RDI (the analog of the Gini index) calculated according to the 2018 data for urban settlements and areas for each of the regions of the European North. As of the point of writing this paper, the initial statistical data of most indicators for 2019 have not been accessible yet. Let it be noted that RDI (the analog of the Gini index) is a stable indicator allowing for no essential fluctuations, which was shown by the authors' earlier studies of social and economic differentiation of regions (Baranov & Skufina, 2005) and urban settlements (Skufina & Baranov, 2017).

Table 1 Differentiation index (RDI) values for urban settlements and areas, grouped according to regions of the European North of Russia

Evaluation indicators	Regions of the European North of Russia				
	The Republic of Karelia	The Republic of Komi	Arkhangelsk region	Vologda region	Murmansk region
investments into fixed assets of large and medium organizations per capita	0,63	0,42	0,60	0,38	0,51
the average retail turnover per capita	0,39	0,59	0,54	0,40	0,45
the volume of commercial services rendered to the population per capita	0,45	0,50	0,39	0,41	0,43
the average monthly nominal gross payroll	0,27	0,24	0,17	0,19	0,21
the number of registered crime per 1000 people of the population	0,31	0,33	0,24	0,30	0,21
the officially registered unemployed as of the year end	0,30	0,29	0,27	0,20	0,22
the average total area of residential premises per one citizen as of the year end	0,27	0,30	0,29	0,23	0,21
the number of doctors per 1000 people of the population as of the year end	0,27	0,31	0,26	0,29	0,27

Source: authors' calculations

Let it be reminded that if the Gini index is equal to 0 (0%), it speaks about the complete equality, while it shows the absolute inequality when it is 1 (100%). That is, the closer to 1 the calculated for each indicator values obtained by the authors are, the greater differentiation characteristic for a particular indicator is.

The analysis of the differentiation index values according to the indicators (Table 1) has allowed identifying:

1. the fact of high differentiation in the indicators characterizing the economic activity of urban districts and municipal areas (the indicators "investments into fixed assets of large and medium organizations per capita", "the average retail turnover per capita", and "the volume of commercial services rendered to the population per capita");
2. the fact of lower differentiation in the indicators characterizing the social life activity of regions and the population level of life (the indicators "the average monthly nominal gross payroll", "the number of registered crime per 1000 people of the population", "the officially registered unemployed as of the year end", "the average total area of residential premises per one citizen as of the year end", and "the number of doctors per 1000 people of the population as of the year end").

The paper views five regions of the European North, and the RDI is relatively stable for all the regions in question, so the said two facts can be considered as a regularity of the differentiation phenomenon observed in the social and economic space of the European North of Russia.

Discussing the dynamics of development of social and economic differentiation between urban settlements and areas of regions is of certain interest. Let the dynamics be considered using the case of Murmansk region – one having a favorable geographical situation, sharing borders with two developed states (Finland and Norway), rich in natural resources, having ice-free ports, a developed and diversified economy, with a large scientific center of the Russian Academy of Sciences located in its territory.

The analysis of the dynamics of Murmansk region differentiation index based on the above indicators (see Table 2) has allowed stating the following facts.

1. The indicators characterizing the region's social life activity and the population level of life in Murmansk region, mostly demonstrate minor differentiation and feature a steady decreasing trend. So, a lower differentiation trend is characteristic of indicators "the average monthly nominal gross payroll" and "the officially registered unemployed as of the year end". "The average total area of residential premises per one citizen as of the year end" and "the number of registered crime per 1000 people of the population" indicators maintain low differentiation steadily. Among social indicators, it is only the indicator "the number of doctors per 1000 people of the population as of the year end" that demonstrates uncertain trends but in general it does not feature high differentiation.
2. The indicators characterizing the economic activity of Murmansk region show maximum differentiation and an uncertain growth trend (indicators "investments into fixed assets of large and medium organizations per capita", "the average retail turnover per capita", and "the volume of commercial services rendered to the population per capita").

Table 2 Differentiation index (RDI) for urban settlements and areas of Murmansk region broken down according to the indicators for the period of 2001-2018

Indicators	2001	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Investments into fixed assets of large and medium organizations per capita	0,63	0,50	0,63	0,71	0,68	0,74	0,75	0,68	0,69	0,60	0,54	0,51

The average retail turnover per capita	0,30	0,29	0,60	0,56	0,56	0,54	0,47	0,63	0,58	0,50	0,60	0,45
The volume of commercial services rendered to the population per capita	0,37	0,35	0,35	0,38	0,38	0,36	0,47	0,42	0,40	0,44	0,39	0,43
The average monthly nominal gross payroll	0,32	0,28	0,28	0,29	0,28	0,28	0,26	0,26	0,27	0,26	0,26	0,21
The number of registered crime per 1000 people of the population	0,27	0,33	0,29	0,30	0,28	0,27	0,26	0,26	0,27	0,26	0,26	0,21
The officially registered unemployed as of the year end	0,47	0,46	0,47	0,49	0,46	0,47	0,45	0,31	0,44	0,29	0,30	0,22
The number of doctors per 1000 people of the population as of the year end	0,34	0,35	0,35	0,36	0,35	0,42	0,46	0,37	0,38	0,33	0,36	0,27
The average total area of residential premises per one citizen as of the year end	0,23	0,21	0,22	0,21	0,21	0,21	0,20	0,21	0,22	0,21	0,21	0,21

Source: authors' calculations

Therefore, there are grounds to believe two trends are observed in Murmansk region – a growth of differentiation in the economic indicators and decrease of differentiation in the majority of social indicators.

## 5 Conclusion

Summing up, let it be noted once again that the phenomenon of social and economic differentiation of regions, urban settlements, and areas is a quite natural one. In this reality, the task of administration is to prevent distinctions according to such constituents of community development which may lead to social tension and conflicts.

From this standpoint, the outlined particularities of social and economic differentiation of regions of the European North viewed through the lens of analyzing the indicators of urban settlements and areas should be considered as mostly positive ones. So, rather low differentiation is observed in the indicators characterizing the social life activity and the population level of life. This gives evidence about achieving the community-focused objectives of regional management aimed at leveling out social disproportions between urban settlements and areas.

High differentiation in indicators describing the economic activity is a feature characteristic of territorial objects in the conditions of capitalism. So, differentiation in this line cannot be influenced drastically. However, for managing regional development, there is an option of adjusting the situation by looking for new investment projects for their implementation in the towns and areas that are less developed economically.

Studying the behavior of the phenomenon of social and economic differentiation between urban settlements and areas of Murmansk region has allowed identifying two trends – a growth of differentiation in the economic indicators and decrease of differentiation in most social indicators. This confirms the effectiveness of regional development management, too.

Alongside this, the behavior of the "number of doctors per 1000 people of the population" indicator causes concern as it does not demonstrate any clear reduction trend. The areas of regions of the European North are quite vast; they are characterized by remoteness, not sufficiently good transport accessibility of a number of residential settlements, low development of the regional transport service, and shrinkage of the population's income during the present-day crisis (accordingly, cuts to spending on diseases prevention, quality nutrition, etc., which determines higher morbidity). All this gives evidence about risks of lower accessibility of medical aid for the population and a potential hazard of higher morbidity. Thus, further reduction of the number of medical organizations should not be allowed,

especially of those rendering primary medical and sanitary aid in the regions of Russia's European North.

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