

Geo-Demographic Typology of Municipalities of the Kaliningrad Region

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Abstract

The article discusses the features of the emergence and development of geo-demographic research in Russia, the US and Europe. It was concluded that despite the differences in purpose and nature of this kind of research, the primary method of analysis of geo-demographic situation is geo-demographic classification. The analysis of territorial differentiation of geo-demographic development of the Kaliningrad region is carried out through the cluster analysis. As a result, it 5 groups of municipalities have been defined: the core, the southern coastal municipalities, the small coastal municipalities, the semi-periphery, the border periphery. The majority of the municipalities are characterized by a significant inter-dependence between the level of socio-economic development and the character of demographic processes. The type of geo-demographic development of the Kaliningrad region corresponds to the model described in John Friedman's classical theory of "Center-periphery". The regional center is the engine of development in the region, including pulling resources from other municipalities.

Keywords: geo-demographic studies, geo-demographic typology, Russia, Kaliningrad region

1. Introduction

Geo-demographic studies, which are understood as 'analysis of the population in the community' (Sleight 2004), were developed at the beginning of the previous century in Europe and the US. The first remarkable works in this field are the ones of Charles Booth 'Indexed map of London' (Booth 2003), the Chicago school of urban sociology 1920-30 (Park et al., 1925) and the analysis of social areas by Shevky and Williams (1949). Booth developed a multi-variable classification of the population based on the 1891 UK census data and created generalized social codes of the census areas. The works of US researchers developed the idea of "natural areas" within cities, defined as "geographical units allocated on the basis of both physical characteristics and socio-economic and cultural characteristics of the population" (Gittus, 1964, p. 6). Shevky and Williams (1949) used three criteria to assess the society: urbanization, social status, segregation.

The impetus to develop geo-demographic research was the growing availability of the census results and improvements in statistical data analysis (clustering, factor analysis). By the mid-1970s the US and Western Europe grew commercial interest to the potential of the geo-demographic analysis. The classification developed by Webber in the UK at the level of census areas (1977), began to spread in the United States where it was named ACORN. In 1974, the US created a PRIZM classification (the system of potential indicators for the markets, limited by an area of a postal code), which brings together census data and surveys on consumer preferences, based on a system of ZIP-codes (Harris et al., 2007).

In the USSR, the geo-demographics began to develop in the 1960s as a research area rather than an applied economic (commercial) one (Fedorov, 2014). Development of the academic background to study the population as a functional and territorial system closely linked to socio-economic factors attracted such scholars as Valentey et al. (1991), Agafonov and Golubev (1973), Fedorov (1984, 1985, 1991). The definition of a geo-demographic situation was introduced by Fedorov (1984) as "... a sequence of successive geo-demographic situations inherent in a particular area and developing under the influence of both external and internal socio-economic factors, immanent to it as a system".

2. Geo-demographic typology as the main research method

Despite the substantial differences in the nature of development, objectives and areas of application in geo-demographic research in Russia and abroad, the main value in the research process in all countries is given to the classification. This method is the most grounded and effective, as it allows you to organize a large number of indicators that reflect the geo-demographic situation of the study area and describe its various connections and dependencies.

The most important factor determining the quality and accuracy of the geo-demographic classification is the validity

of the choice of analyzed indicators and reliability of the data variables sources. The main source of information for geo-demographic classifications is the results of the censuses and the current account of the population. Commercial classifications, which are mainly carried out abroad, are supplemented with data obtained in market research, public polls data, etc. The set of indicators to be used for various types of classifications is determined by a researcher and his understanding of the key characteristics that determine the nature of geo-demographic situation. Availability of statistical information for the study area is another important factor. While developing these classifications in the Russian research, selection of indicators for the analysis is carried out according to proposed by Fedorov (2014) geo-demographic categories (reflecting internal communications) and geo-demographic factors (which are components of the external systems that affect the state of the population).

Theoretical analysis of the functional structure of the geo-demographic situation allows to select its leading typological features:

- Demographic - population dynamics (reproduction rate, natural and mechanical growth), age and sex structure of the population (the ratio of men and women, the ratio of working age, pre- and post-working age groups, etc.).
- Economic and demographic – the rate of reproduction of labor resources, their distribution by industry and their availability.
- Urban- demographic – population density, the level of urban development
- Socio-demographic – social and demographic structure (age and sex distribution of the population on social, educational, professional composition, marital status), demographic behavior (women's opinions of the ideal, desired and expected number of children in relation to the actual number) migratory behavior (migration mobility of the population).
- Ethno-demographic – data on the ethnic composition of different age groups and their distribution by social groups and sectors of the economy.
- Ecological and demographic – the incidence of age and gender groups and various types of diseases, population account of environmental sensitivity (see Fedorov, 1985).

The majority of Russian authors limit themselves with demographic typological features while carrying out geo-demographic research (Kuznetsov, 2009; Obygraykin & Simagin, 2012; Chekmeneva, 2008). Fedorov (2014) presents the most complete set of indicators in the geo-demographic typology. Geo-demographic classification abroad are more highly specialized and are used to examine specific areas of public life, for example, the analysis of the level of education (Butler et al., 2007) and the availability of higher education (Chowdry et al., 2008), patterns of consumption (Webber, 2007), etc. These classifications are often compared with 'black boxes', because lists the variables used to describe the small areas, as well as their relevance are not published for commercial reasons (Singleton & Longley, 2009).

When processing final geo-demographic indicators the priority is given to the method of cluster analysis and comparison of profiles, which enable to highlight the similarities of social variables in the data set. The classification process is built in such a way as to maximize homogeneity within clusters, while maintaining the difference between them (Everitt, 1974; Gordon, 1999). The optimization procedure is based on normalization of base data and the specific value of certain variables. The result of this procedure is to ascribe some particular areas to clusters on the grounds of defined (or pre-established) social similarities under the procedure of clustering without taking into account the geographic proximity of districts with similar characteristics. Having complied this information, the researcher 'labels' and describes the selected clusters, highlighting the main characteristics of the areas combined in a specific cluster.

3. Geo-demographic situation in the Kaliningrad region

The Kaliningrad region is characterized by a relatively favorable demographic situation (as compared to other regions of Russia). Thus, according to Fedorov's typology the region belongs to the same group as the Leningrad, Moscow regions and the Krasnodar krai, which is characterized by a low level of natural population decrease with a positive migration balance (Fedorov, 2014). The age and sex structure of the population is close to the national average. However, intra-regional figures vary considerably. The assessment of territorial differentiation of geo-demographic situation in the region can be carried out applying the appropriate classification at the level of municipalities. The analysis is based on official statistics, reflecting the demographic, economic, urban, social, ethnic and ecological- demographic characteristics of the area. The selection of indicators is based on expert analysis. Further processing of statistical data involves the use of complex methods of statistical analysis using SPSS software. Geo-demographic typology was carried out in several stages. Initially the municipalities of the Kaliningrad region were differentiated and grouped according to the demographic

indicators.

The study resulted in more than 10 groups through different methods of statistical analysis: a preliminary reduction of dimension by factor analysis or directly with standardized variables using hierarchical clustering, or clustering with k-mean values using a comprehensive or reduced set of variables. All received the classification have a significant number of common features. Less than 20% of the territories changed their position by groups in different sections, which proves the validity of the results.

Further analysis included a classification built on 10 indicators that reflect the character of the natural and migratory movements of the population and its age structure (Table 1). It was compiled on factor analysis (correlated variables were grouped into 3 factors), then the variables were classified with the hierarchical clustering tool.

The analysis defined 5 groups of municipalities in the Kaliningrad region, which differ in demographic characteristics. The most favorable situation is seen in the areas of the first three types. All of them, except for Gusev urban district, are located in the western area in the vicinity of the administrative center. Guryevsk and Baltiysk urban districts have the best demographic indicators: their population increases both by natural and migration growth, demographic load indicators are the lowest in the region. The second group of municipalities is also characterized by the population growth (and sometimes even more intense), but only due to migration (birthrate exceeds the death rate only in Ladushkin). Demographic burden for the working population (especially the elderly) is more significant. Bagrationovsk urban district is the third group. Characteristics of natural movement and age structure of the population of this area resemble the values of the first group, but the nature of the mechanical motion is much different. This municipality shows an extremely high rate of migration. The coefficient of migration turnover is the highest among the municipalities of the region and more than 4 times higher than the same indicator for the Kaliningrad region as a whole. This is partly due to the fact that the settlement Severny locates the Center for temporary social adaptation of the participants of the federal program of resettlement for compatriots living abroad. Meanwhile the migration balance is negative in this municipality..

More than half of the municipalities of the Kaliningrad region fall into the last 2 groups characterized by negative dynamics of population. With the exception of Yantarny and Pionersky urban districts they are all located in the central and eastern part of the region.

Table 1. Demographic characteristics of municipalities of the Kaliningrad region

Type	Actively growing regions with a relatively favorable age population structure	Growing region with significant demographic load of elderly people	Regions with a relatively favorable age structure of the population and migration outflow	Regions with significant demographic load and actively decreasing population	Regions with a high load of the elderly population and actively decreasing population
Indicator					
Composition	Baltiysk, Guryevsk urban district	Kaliningrad, Zelenogradsk, Gusev, Svetlogorsk, Svetly, Ladushkin, Mamonovo urban districts	Bagrationovsk urban districts	Gvardeysk, Krasnoznamensk, Nesterov, Ozersk, Polessk, Slavsk urban districts	Pravdinsk district, Neman, Chernyakhovsk, Pionersk, Sovetsk, Yantarny urban districts
Children load coefficient	22.2 – 29.4	23.7 – 29.9	30.0	26.5 – 35.4	25.9 – 33.4
Elderly people load coefficient	29.7 – 30.7	34.1 – 42.1	30.1	31.6 – 35.4	37.1 – 47.7
Comprehensive demographic load coefficient	51.9 – 60.1	61.1 – 69.1	60.1	60.5 – 70.7	69.1 – 75.6
Coefficient of migration growth	3.9 - 25.9	3.6 – 29.5	-4.7	- 5.6 – - 20.0	1.6 – - 10.8
Coefficient of migration turnover	69.0 – 79.3	58.1 – 97.1	153.9	46.7 – 60.5	48.9 – 82.7
Coefficient of natural growth	0.9 – 4.2	1.8 – -1.8	3.9	1.9 – - 1.2	0.1 – -5.3

Source: Kaliningradstat, 2013. Available at: <http://kaliningrad.gks.ru>

Then the municipalities of the Kaliningrad region were classified according to economic, socio-demographic and

population distribution figures. The analysis did not include ethno-demographic characteristics due to high ethnic homogeneity of the region. Thus, the national composition of the population is dominated by Russians considerably (from 79.6 to 91.2%), while the remaining share is mostly the Slavs (Belorussians, Ukrainians).

Group division was based on data of population density, unemployment, average wage and the number of people with higher education per 1000 inhabitants. As a result of hierarchical clustering 5 groups of municipalities that differ in their levels of socio-economic development were defined (Table 2).

Table 2. Socio-economic characteristics of the municipalities of the Kaliningrad region

Type	Kaliningrad metropolitan area	Coastal areas	Small towns	Semi-periphery	Border periphery
Indicator					
Composition	Kaliningrad, Svetly, Baltiysk, Guryevsk urban district	Zelenogradsk, Svetlogorsk, Pionersk, Yantarny urban district	Ladushkin, Mamonovo, Sovetsk urban district	Gvardeysk district, Bagrationovsk, Polesk, Gusev, Cherniakhovsk urban district	Pravdinsk district, Nesterovs, Neman, Krasnoznamensk, Ozersk, Slavsk urban district
The number of people with higher education per 1000 population aged over 16	191 - 337	160 -227	163 - 188	132 - 156	82 - 113
Population density, persons per sq km	40.5 – 356.4	16.1 – 1411.9	77.5 – 955.5	23.0 – 58.4	9.8 – 28.7
Average monthly salary, rubles	25387 - 30547	23253 - 30707	19940 - 24517	17812 - 22031	15902 - 24904
Officially registered unemployment rate (in% of working age population)	0.5 – 0.8	0.7 – 1.3	0.8 – 1.6	0.6 – 2.0	2.5 – 5.7

Source: Kaliningradstat, 2013. Available at: <http://kaliningrad.gks.ru>

The most favorable socio-economic situation is in the western district, within the Kaliningrad metropolitan area, which is characterized by low unemployment, a high proportion of people with higher education and salary levels above regional average. The most negative indicators are in the group of "Peripherals Border" districts, which includes the municipalities with high unemployment, low educational level of the labor force and low wages.

Comparative analysis of demographic and socio-economic development of the population shows that districts with a high standard of living are characterized by a more favorable demographics (Kaliningrad, Baltiysk, Guryevsk, Svetly, Svetlogorsk urban districts and Zelenogradsk district). In contrast, areas with low living standards is also faced with negative demographic trends (Nesterov, Neman, Krasnoznamensk, Ozersk, Slavsk, Chernyakhovsk, Polesk urban districts, Pravdinsk and Gvardeysk districts). However, there are some exceptions. The "semi-periphery" Gusev and Bagrationovsk urban districts have rather favorable demographic situation. In contrast, in Pionersk and Yantarny urban districts the population is actively decreasing despite a rather high level of social and economic development.

Having analyzed the results of Kaliningrad regional municipality grouping on the demographic and socioeconomic characteristics it is possible to develop a geo-demographic typology of the territory, reflecting the qualitative differences between the analyzed areas according to complex typological features (Fig. 1).

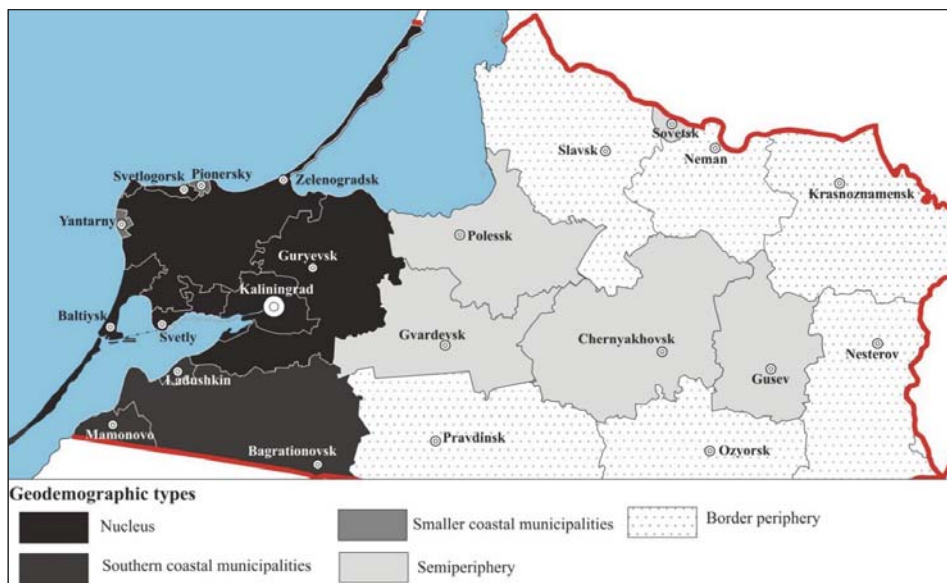


Figure 1. Geo-demographic typology of municipalities of the Kaliningrad region

3.1 Geo-demographic types of regions:

Core (Kaliningrad, Guryevsk, Baltiysk, Svetly, Svetlogorsk urban districts Zelenogradsk district). These are the most actively developing districts in the Kaliningrad region, both in the socio-economic and demographic terms.

Coastal southern municipalities (Bagrationovsk, Ladushkin, Mamonovo urban districts). Despite the high level of socio-economic development of territories, there are relatively favorable trends in their demographic development.

Coastal minor municipalities (Yantarny and Pionersky urban districts). These municipalities are characterized by negative trends in the demographic development of the region, though they have quite high socio-economic indicators.

Semi-periphery (Gvardeysk district, Gusev, Polessk, Chernyakhovsk, Sovetsk urban districts). Low levels of socio-economic development and the negative demographic situation.

Border periphery (Pravdinsk district, Nesterov, Neman, Krasnoznamensk, Ozersk, Slavsk urban districts). Low standards of living in the eastern municipalities contribute to the outflow of the population (especially the young), and, as a consequence, increase depopulation processes.

This compiled geo-demographic typology cannot fully display the existing heterogeneity in the nature of the socio-economic and demographic development of the municipalities of the region. The study results allow to draw conclusions that have practical importance to work out a strategy of municipal development in the future, since ignoring the territorial disparities in geo-demographic development of the region can exacerbate the situation and strengthen the heterogeneity of social and economic development of the Kaliningrad region.

There is a clearly visible influence of geography on the nature of both socio-economic and demographic development. The research findings illustrate well the existing disparities in the development of western and eastern territories of the region. Proximity to the regional center and the sea stimulates the development of economy, social sphere and becomes a competitive advantage in migration exchange. The central and eastern parts of the region (especially border periphery) are depressed. The social situation of the periphery (and semi-periphery) may get qualitatively worse as a result of negative selection – high numbers of socially most active people, primarily young people, go away to study and never return from the regional center (Mkrtychyan & Karachurina, 2014).

Most of the municipalities are characterized by a strong dependence between the level of socio-economic development and the characteristics of demographic processes. Opposite examples (Pionersk and Yantarny urban districts) are not likely to show the fallacy of this theory, but the availability of opportunities to overcome the negative impact of demographic factors on the socio-economic development of regions.

4. Conclusion

The main trends of geo-demographic development of the Kaliningrad Region fit the framework of the classical theory by John Friedman 'Center-periphery'. The regional center is the engine of development in the region, even due to pulling resources from other municipalities. Substantial inter-municipal differentiation of demographic and socio-economic development within the Kaliningrad region requires an appropriate regional policy to ensure the convergence of municipal development parameters to an acceptable level. The primary objective is to avoid increasing divergence process that can lead to comprehensive relocation of human resources from the periphery to the center. It is important to avoid unification of approaches to implementing regional policies within the Kaliningrad region. Issues of development of various economic sectors in the municipalities of various types must be well-considered and justified, taking into account geo-demographic potential of the territory.

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