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RESIDENTIAL DIFFERENTIATION IN POST-SOVIET LITHUANIA
(On the basis of small area Census data)

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Introduction

Problem statement

The collapse of the Soviet Union was followed by enormous changes in the social structure and economy (Norkus, 2008; Norkus, 2014). Their scale and pace pose significant challenges for research – it is easier to misinterpret, and to dismiss some of the most important features than to identify and understand them. Moreover, the post-Soviet “shock therapy” took place in a global context where during recent decades neoliberal policies tended to dominate. It is not so easy to perceive some of the changes as the effects of global markets, but even in everyday life the impact of rising income inequalities, state withdrawal from housing sector and private underinvestment in the Soviet housing stock, importance of mortgages and speculative investments becomes more and more obvious. These institutional changes have important implications for urban sprawl, city shrinkage and rural depopulation.

Under such conditions it is useful to develop a geographical model which helps to understand that reality which evolved after turbulent period of decollectivization, deindustrialization and privatization. The main pre-conditions for its development are the use of existent knowledge and methods which efficiently allow us to compare many cases, combined with a spatially detailed and rich dataset. This poses some substantial challenges under post-Soviet institutional conditions. Nevertheless difficulties could be overcome by attempting to answer the following question: *What is the nature of the post-Soviet residential differentiation in Lithuania and its main reflections in the present?*

Main objective and tasks

The main objective of this dissertation is to start small area data-based residential differentiation research in Lithuania, one of the ECE countries. The main objective is further refined into six tasks:

- 1) review existing scholarship on residential differentiation,
- 2) operationalize residential differentiation research under post-Soviet conditions,
- 3) extract general features of residential differentiation in Lithuania,
- 4) measure regularities of residential differentiation in the main cities,
- 5) identify main small area based area types in Lithuania,
- 6) produce a regional synthesis of residential differentiation analysis results.

In institutionalized social sciences complex structures at local and global levels have been ignored for a long time (Wallerstein, 2002). This dissertation seeks to fill scholarship gap of detailed social structure and ecological research in ECE. In addition it aims to create an anchor point for future benchmarks.

Opening statements

1. Multiple features of residential differentiation are best revealed by using different models of measurement – principal component analysis, segregation indices, neighbourhood classification by socio-economic mix, location quotients and clustering of similar areas.
2. Socio-economic patterns and processes of residential differentiation under changeable conditions of ECE are best revealed using social stratification schemata.
3. Post-Soviet residential differentiation with tight links between housing and demographic characteristics is heavily shaped by a large share of flat owners, their limited economic power and, on a higher level, by overall housing market failure (with the exception of more expensive housing segment).
4. In the main cities the share of neighbourhoods with a working class population saw the greatest decrease during 2001–2011, and bipolar occupational structure became well-pronounced. On the city level it translates into average level of residential segregation even in the most homogeneous large housing estate sector (in the case of Vilnius), while higher-status population concentrates in the inner and outer city parts.
5. At least 9 homogeneous small – census enumerator district level – area types with objective differences should be distinguished. They form some statistically significant spatial clusters. Area differences at a higher – local authority and city – spatial level are defined by various combinations of enumerator district types.
6. 18 formative and 2 main regions with different core-periphery features could be identified in Lithuania.

State of the art

1. Small area data concept has been used in multidimensional residential differentiation analysis. This thesis is the first geographical research with a large spatial resolution of societal and housing data in Lithuania which applies the multiple measurements of residential differentiation approach.

2. Main dimensions and weakly interrelated most important separate indicators of residential differentiation have been identified and were used in the regional synthesis of analysis results.
3. Findings have been evaluated in the most recent ECE context. The case of Lithuania provides information on residential differentiation in second-tier, small cities, their different parts and rural areas.
4. Research accomplished on the residential differentiation in the main cities demonstrates the usefulness of social stratification schemata in geographical research. Earlier works have focused on education and sources of income.
5. Homogeneous small area types, their groupings identified and regional synthesis of analysis results reveals complex relationships between different indicators. That promotes new view on post-Soviet cities, towns, rural areas and their frontiers.

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1. Background

The first influential account on industrialization and its resulting extreme forms of residential differentiation in Manchester was produced by German philosopher Friedrich Engels (1845). Later, residential differentiation was explored in London by conservative philanthropist and social researcher – Booth, 1888; Booth, 1903. It led to the development of “poverty line” concept and introduction of “limited socialism” in Britain with old-age pensions and free school meals for the poorest children in the beginning of the 20th century.

At that time Lithuania was an agricultural country in the economic periphery of the world, and one of the least urbanized countries in Europe. After a successful development period during its inter-war period of independence (Norkus, 2014) it experienced hyper-industrialisation under the Soviet Leninist political regime. In 40 years (1950–1990) urbanization level went up from 30 to 70 %. That was a growth rate that compares to today’s China (1990–2010). There is a need to stress that it was achieved without any influx of capital from the global markets.

During that period the three main variables based on which Wirth (1938) was thinking it possible to explain urban way of life and differences between cities of various sizes and types – viz., population number, density and heterogeneity – were under the Communist Party control. The growth of the largest cities was limited, while the density of settlements was defined by the construction of large housing estates and regulated by the Unified Settlement System Act. Finally, the cities were used as a means to create a homogeneous worker society.

After the fall of Berlin Wall, enormous changes took place. In order to understand them there is a need to use tools created by other scientists and make use of theoretical developments made in other ECE countries.

1.1. Research on residential differentiation

Geographers drew much of their initial inspiration from Chicago school of sociologists and social area research. Modern city models – concentric (Burgess, 1925), sector (Hoyt, 1939), multiple nuclei (Ullman and Harrison, 1945), measurement of segregation using dissimilarity index (Jahn et al., 1947; O. D. Duncan and B. Duncan, 1955) came from the University of Chicago. On the other hand, there was independently produced “social area research” by Shevky and Williams, 1949; Shevky and Bell, 1954 which was also partly based on Chicagoan ideas. They hypothesize that social rank, urbanization and segregation are the main factors of residential differentiation.

Modern city models were summarized by Berry (1971) and different dimensions of segregation were outlined by Massey and Denton (1988).

Quantitative revolution has brought scientific dictionary and statistical methods to geography (Barnes, 2009). Factorial ecology allowed researchers to make comparisons between greater number of different countries and cities. Monographs by Robson, 1969; Timms, 1975; Berry and Kasarda, 1977; White, 1988 represent this period of research best. Rees (1971) emphasizes that urbanization-family status dimension is distinct in the US cities, but in other countries it goes together with social status and forms a single life-style dimension. Janson, 1971; Janson, 1980 outlines different dimensions of: young, established and post-familism. They assume that different dimensions of familism in Scandinavian societies are a result of lesser population mobility and bigger role of planning. On the other hand, social status dimension is the most stable one (ibid.). In the former Soviet-block countries Weclawowicz (1979) produced research using 1931 and 1970 census data. While 1931 data has clear divisions by social status and ethnicity the situation in 1970 shows mosaic pattern and specific Soviet differentiation characteristics. The main divide is between old-timers who were submissive and important to Soviet regime (higher educated; journalists, writers, artists; aged 25–64; state-owned housing) vs. settlers (office workers; aged 0–14 (with kids); from countryside; in the city for 5–9 years; cooperative housing). After the initial period of research, in the 1990s factor analysis was mostly used as data dimension reduction tool (Demšar et al., 2013).

Another field impacted by the quantitative revolution was neighbourhood research. The field which took off in 1955–1975 and was the most successful in the commercial sector was geodemographics – based mainly on k-means algorithm. An overview of that field is provided by Singleton and Spielman (2014). It has limited theoretical grounding, but is valuable as spatialization of social class (ibid.).

In academia, research on *neighbourhood effects* mostly attracted the attention of leading sociologists and human geographers. The jewel of the crown is article in *Science* by Sampson, Raudenbush, et al. (1997) which shows the importance of collective efficacy for the successful functioning of the neighbourhoods. Definition of neighbourhood is provided by Galster (2001) and overview of studies before 2000 – by Sampson, Morenoff, et al. (2002). In Europe work on neighbourhood effects was introduced by Friedrichs et al., 2003; Van Ham and Manley, 2009.

Nevertheless, current scholarship is dominated by indices-based approach (Reibel, 2011) and asks for contextual explanations (Van Kempen and Murie, 2009). The state of segregation research

in Europe and the USA was summarized by Musterd (2005). It shows that the levels of residential differentiation are not that much different between continents if we consider the segregation of black population separately.

1.2. Post-socialist transformation in Eastern Europe

Levels of segregation in 1990 were low and income inequality was sharply rising (Marcińczak, Tammaru, et al., 2015). That indicates a big potential for segregation and makes ECE an important case to explore (Van Kempen and Murie, 2009). Some main topics of research became obvious at the end of the 20th century. They are outlined in four articles, all of which are based on the cases of largest ECE cities: Moscow, Budapest and Prague.

In the first their article Bertaud and Renaud (1997) conclude that the absence of land markets has profoundly impaired the ability to allocate and recycle urban land. The pattern of land use is startling: “population density gradient rises as one moves away from the center of the city, while factories are rusting in prime locations and distant residential areas in suburbs”. Authors foresee four possible problems with the Soviet large housing estates: 1. operating and maintenance costs; 2. space standards which vary little in central and suburban locations; 3. lower quality of services in peripheral locations; 4. rising transportation costs.

Articles by geographers Sailer-Fliege (1999) and Kovács (1999) emphasize the role of changing labour and housing markets. During the socialist period cheap housing and secure jobs were the cornerstones of the welfare system. After 1990 all the ECE countries experienced similar tendencies in labour market – take-off of the tertiary sector and comprehensive blight in the previously industrial areas. Although the directions of housing sector development were quite different in all countries, nevertheless, all cities are experiencing housing affordability problem, marginalization of communal and decay of the oldest housing stock. The housing affordability problem has above all intensified for young households. Sailer-Fliege (1999) concludes that solutions will not be found for these problems: the decay of old housing stock, large scale derelict industrial areas, as well as the extent and deficiencies of high-rise housing estates.

Sýkora (1999) identifies three main mechanisms of residential change: 1) social mobility *in situ*; 2) migration within the existing housing; 3) filtering out of affluent population to newly-constructed residential areas with suburban homes or urban condominiums. Ecological structure of ECE city changes this way: 1) pre-WWII high status, inner city areas are increasing their status; 2) Soviet housing estates were not subject to major social changes but their relative position

declines and there are signs of their differentiation – residential districts with higher concentrations of manual workers and with worse accessibility by public transport show signs of decline; 3) outer city and suburban city areas undergo important transformations caused by suburbanization of affluent population. Šykora concludes that socio-spatial differentiation can be slowed or reversed by public intervention into housing provision and allocation, but currently segregation is not perceived as a problem and is not a topic for public discussion.

In addition to these four articles, we may add an empirical account by Hegedüs et al. (1996) which was the “first systematic data collection in the region since the change of the political system”. It demonstrates unique features of Lithuanian housing sector in comparison to other Baltic and ECE states. Before the independence, Lithuania had the highest housing construction rate for 1 000 inhabitants – 5.6 flats p.a., while regional average was around 3.8. Independent Lithuania was leading again, but this time by the highest privatization and inflation rates. In 1994, 79 % of flats were already privatized in Lithuania, compared to 39 % in Latvia and 31 % in Estonia. Housing differences between Lithuania and Estonia in 1994–1995 were great – 20 vs. 32 m² of living space for person, 46 vs. 27 % of dwellings without bath or shower, 18 vs. 74 % of new flats constructed by the state. In contrast, the size of new housing during 1994–1995 in Lithuania was the largest in ECE, same as in Hungary and Slovenia. Data provided by Hegedus demonstrates the enthusiastic expropriation of state property and quickly rising inequalities in Lithuania. Well-developed state construction sector went down in the first years of independence together with other export-oriented industry sectors, while in Latvia and Estonia it survived providing jobs and housing for a longer time.

After the year 2000 most visible articles can be divided in two groups: 1) new research which focuses more on the whole city issues or Soviet housing estates, 2) wide generalizations and theoretical frameworks. To the first category belong works by Ruoppila and Kährrik (2003), Nuissl and Rink (2005), Brade et al. (2009), Kährrik and Tammaru (2010), Marcińczak, Musterd, et al. (2012), and Marcińczak, Tammaru, et al. (2015), to the second – generalizations by Pichler-Milanovich (2001), Heyns (2005), Borén and Gentile (2007), Van Kempen and Murie (2009), Šykora and Bouzarovski (2012), Martinez-Fernandez et al. (2012), and Golubchikov et al. (2013).

Research on socio-economic residential differentiation in Tallinn by Ruoppila and Kährrik (2003) has shown that population mobility in the 1990s was low, and the changes of residence places which took place had not increased residential differentiation – 10 year period was too short for significant changes.

Nuissl and Rink (2005) analyze how suburban sprawl took place in Leipzig even under unfavourable demographic conditions. They state that it is doubtful whether planning could withstand the pressure of investors. Controls became successful in 1997 only. On the other hand, population in mid-1990s was mostly content with their housing situation. They invite to support this situation and to concentrate on urban restructuring or even contraction, as well as being concerned that the means that urban policy has at hand are designed to organize growth, and not to manage decline.

Brade et al. (2009) present results of the first international housing preference study in ECE, which also includes Vilnius. Its main finding is the popularity of the suburban single family housing ideal and at the same time the wide acceptance of the Soviet housing estates by the inhabitants, contrary to their bad external perception. Authors also stress the issues of housing shortage, low income of population and the negative effect of mass privatization, fragmented ownership on maintenance of housing estates.

Kährlik and Tammaru (2010) provide evidence why Soviet housing estates maintained their status during the 1990s. More educated population was more likely to leave, but people who were not participating in the labour force were least likely to move into Soviet housing estates, too. “Both high-income and low-income groups are over-represented among out-migrants compared to people earning average incomes, high-income groups clearly dominate among in-migrants. People who settle in panel houses need to have enough income to pay either the market rent (as nearly all the dwellings were privatised) or pay a mortgage in the case of buying a flat, and should also be able to pay the high monthly utility bills.”

Finally, in the articles Marcińczak, Musterd, et al. (2012) and Marcińczak, Tammaru, et al. (2015) year 2000 census track data is for the first time utilized for segregation research in ECE. The results show fundamental residential intermixing differences between the large cities of ECE and the capitals of the Baltic states. In addition, they confirm earlier findings that inertia of residential differentiation was strong after 1990 despite of rising income inequalities.

A second group of articles – providing wide generalizations – starts by Pichler-Milanovich (2001) article which evaluates the development of ECE housing market in the 1990s. It concludes that housing reform resulted in “market failure” and “policy collapse”. It also suggests a solution: “there is a continuous need for public involvement and targeted financial subsidies and combination with private investments in order to avoid homelessness, urban decline, social and spatial polarization and crime”.

Heyns (2005) presents theories of inequality and analyzes data from multiple post-Soviet countries. She concludes that economic inequalities increased most in the least successful countries and least in those with strongest cultural connections to the West.

Borén and Gentile (2007) and Van Kempen and Murie (2009) summarize the first two decades of urban research in ECE. It is important to explore cities in greater number of post-Soviet countries, evaluate effects of emigration, pay more attention to the city parts where less obvious changes take place and analyze small and middle-sized cities. “Majority of population lives in small and middle-sized cities, but they remain virtually unstudied (Borén and Gentile, 2007)”. Van Kempen and Murie (2009) asks for a context sensitive approach in the European urban studies and stresses that “greatest risks of housing adding to other inequalities rather than mitigating them are in parts of Europe where there is neither a social rented sector, strong policy capacity nor the resources to address problems within the housing sector and where consequently there are greater risks that segregation and specialization of neighbourhoods will undermine attempts at integration and social cohesion.”

Sýkora and Bouzarovski (2012) and Golubchikov et al. (2013) present two different perspectives on post-Soviet city. The first one offers “multiple transformations”, evolutionary perspective, and the second one, a dialectical approach. According to the first one, multiple transformations are needed in order to transform the Soviet reality into capitalist one; the past must be remade. The second one claims that both realities function at the same time, whereas formerly socialist structures, created to accommodate egalitarian society, now function as infrastructure for neoliberalisation. Minor inequalities get magnified and unsuccessful places evolve. It may be remarked that the first perspective was dominant during the first decades in ECE urban research, while the second one may become more influential in the future.

Martinez-Fernandez et al. (2012) is the most cited article released after 2010. It is a theoretical review of research on shrinking cities and their planning issues. It shows that very little is known about the situation in Eastern Europe.

1.3. Research in Lithuania

Three groups of works can be outlined: 1) early research on rural and urban areas, 2) descriptive regional and planning based accounts by geographers, 3) works on socio-economic structure by sociologists.

The first research on urban social structure by architects was summarized by Vanagas, 1992; Morkūnas, 1995; Vanagas, 1996. These studies focused on housing preferences, home ownership, housing structure, quality of life and place identity. Rural areas were explored by Butkevičius, 1980; Rupas and Vaitekūnas, 1980. Stages of Soviet development were outlined and settlement sizes, types and principles of planning analyzed.

The most numerous group of articles is by Lithuanian geographers. Various regional accounts of different social aspects based on single or multiple variable mapping on municipality level were produced. Some works were summarized by Burneika et al. (2011). Works from geographers at Vilnius University are more oriented towards spatial science tradition and planning.

Survey-based sociological studies analyzed the class structure of the Lithuanian population Brazienė (2002) and Matulionis (2005). Morkevičius and Norkus, 2012; Norkus, 2014 have made a detailed social structure comparison using year 1923, 1990 and 2008 data.

Research which addresses various aspects of residential differentiation has been published recently. Cirtautas (2013), Žilys (2013), Krupickaitė (2014), Cirtautas (2015), and Marcińczak, Tammaru, et al. (2015) explore residential segregation in Lithuanian cities. Cirtautas explores the issue of urban sprawl, whereas Žilys was the first to calculate segregation indices in some areas of three largest Lithuanian cities, but he has used a very limited survey dataset. Krupickaitė created and analyzed Vilnius data on housing preferences together with Brade et al. (2009). Finally, this dissertation directly draws inspiration and some methods from Marcińczak, Tammaru, et al. (2015). It expands the basic findings of the study that in 2001 Vilnius had: 1) low global levels of segregation; 2) the lowest share of the middle status, the highest share of low status groups; 3) the highest share of areas where high and low status occupational groups live together. In addition to these aspects, analysis is expanded to encompass the whole country.

2. Data and methods

2.1. Data

Analysis of structure and main dimensions of residential differentiation have been made using year 2001 census data. Processes of residential differentiation in the main Lithuanian cities were assessed using additional 2011 census data on occupations. Both censuses were carried out during the post-crisis periods of modest growth or stagnant development. The Asian-Russian crisis (1998–1999) mostly affected the peripheral parts of the country, while the Global economic crisis (2008–2010) exercised a stronger influence on the development of the main cities, especially Vilnius.

Censuses count night-time population – inhabitants in their residential location during fixed moment. Year 2001 data quality can be considered as high because census was based on the registration system inherited from the Soviet period and the work of enumerators who asked questions and have filled the questionnaires. 3 % of uncounted residents records were added from population register (Statistics Lithuania, 2001). In 2011 electronic census was introduced and 34 % of inhabitants have filled census forms by themselves (Statistics Lithuania, 2011), population mobility increased and it may be expected that data is less clear than 2001. The most problematic single group to enumerate were affluent households in the individual housing of the largest cities (Statistics Lithuania, 2001; Statistics Lithuania, 2011).

Small area data

Aggregated individual data at enumerator district (ED) level have been used for analysis in this dissertation. Two higher levels of aggregation were added. First, “census tracts” with an average 1 100 population – for inter census comparability of segregation indices and for comparability with other ECE capitals. In the case of 2001 census an average ED size was 350 persons, and aggregation based on EDs numeration was made. It was both a possibility and a necessity, because of 2001 census planning was done using paper maps, some of which were missing. Because of the manual delimitation of EDs in majority of cases bounding areas had been precisely numbered according to geographical contiguity. 2011 census was planned using GIS and the average ED size was 550 persons, area numeration was not done according to geographical contiguity criteria. The solution was to use *AZTool* software developed at the University of Southampton (Cockings et al., 2011; Martin, 2003) based on the work by Stan Openshaw on automated zoning procedure which allowed to use contiguity information existing in ED boundaries shape file.

Second, local authority and city level (LAC) aggregation, was used for regional analysis and partial ED results visualization for all country area. Boundaries of 1/5 country EDs were digitized during preparation of this thesis for Eastern part of Lithuania. In addition it was found that a big share of paper year 2001 census planning maps are missing.

Variables

A starting point for variables selection used in year 2001 residential differentiation structure analysis was official open geodemographical classification of United Kingdom made by Vickers (2006) and households classification made by Openshaw et al. (1985). It was expanded by other variables available in the Lithuanian year 2001 census dataset. 140 different variables grouped into 5 main groups – housing, household, demographic, socio-economic status, employment – were used in final analysis.

For exploration of changing residential differentiation patterns in the main Lithuanian cities International Standard Classification of Occupations (ISCO) have been used. Its suitability for broad comparisons is justified by Bergman and Joye (2005).

2.2. Procedures

Principal component analysis

The main advantage of principal component analysis emphasized by Vickers (2006) is that “it removes variable redundancy from dataset, focusing on the main patterns”. That was inline with the aim of this thesis.

During the initial stage 9 algorithms of principal component analysis (PCA) available in *R* *rrcov* and *kernlab* packages have been tested and PCA scores mapped at both ED and LAC levels. No significant differences between patterns were identified, which means that the main dimensions of differentiation are data, and not computational algorithm-dependent. It was tested that KMO (Kaiser-Mayer-Olkin) index for selected 140 variables was 0.97 – data is very suitable for PCA. For the regional analysis 6 principal components which preserve 58 % of variability and have real correlated variables ($r > 0.3$) were selected.

Measurements of segregation

Most frequently used (Massey and Denton, 1988) index of dissimilarity (ID) and segregation index (SI) were calculated for economically active population – ISCO occupational groups and unemployed. The first one shows the net percentage of one group which have to relocate in order to reproduce residential pattern of the other. Second one is modification of ID and shows degree of residential dissimilarity between a selected group and the remainder of the population.

In addition to that, neighbourhood classification by socio-economic composition (Marcińczak, Tammaru, et al., 2015) and mapping of location quotients were made. ID and SI are aspatial measures, while the latter reflect local qualities of areas. Location quotients show how concentrated is particular group in a selected area in comparison to the city average. Neighbourhood classification by socio-economic composition takes into account a balance of different occupations. While a share of ISCO 1–2 groups > 50 % – area is classified as high status, while ISCO 5–9 and unemployed > 50 % – as low status. Neighbourhoods with a mix of ISCO 1–2 < 50 %, ISCO 5–9 and unemployed – 25–50 %, ISCO 3–4 < 25 % are defined as polarized.

Cluster analysis

For the cluster analysis most popular algorithm in both geodemography (Singleton and Spielman, 2014) and data mining (Wu et al., 2008) – *k-means* – have been used. It minimizes differences (sums of squares) inside groups and maximizes them between groups.

Multiple groupings (2 to 20) have been made and mapped with combination of different data sets: initial 39 variables, 20 and 6 principal components at ED and LAC levels. Two combinations were thoroughly analyzed and clusters described at ED level. The main finding was that clusters reflect some fundamental spatial regularities of residential differentiation – 20 clusters based on 39 variables solution does complement 9 clusters based on 6 PCA solution.

3. Main results

3.1. Dimensions of residential differentiation

Statistical method of principal component (PC) analysis was used mainly as a tool for data dimension reduction for the next stages of research. Nevertheless, groupings of variables identified showed some possibilities for interpretation. Because all-country small area data was used, interpretation of results was complicated, time consuming and adequate theoretical background was important. The results are very different from the analyses made in the West, but oppositions identified by Weclawowicz (1979) provided some clues and were useful. The basic premise before interpretation should be made is that we are analyzing society which experienced Soviet urbanization with some unique national features (mainly based on very low urbanization level during the inter-war period) which was just deindustrialized. It has weighty Soviet legacy, low economic resources and mass emigration has not started yet.

The deepest divide (PC1, 1 fig.) was based on the social status and housing conditions. It could be called *socio-urban status*. It was between city spaces with flats, higher education, larger number of economic activities, employees and employed women ($r < -0.6$) vs. pre-WWII wooden housing without amenities, so-called unemployed women, agricultural activities and large population age dispersion ($r > 0.5$).

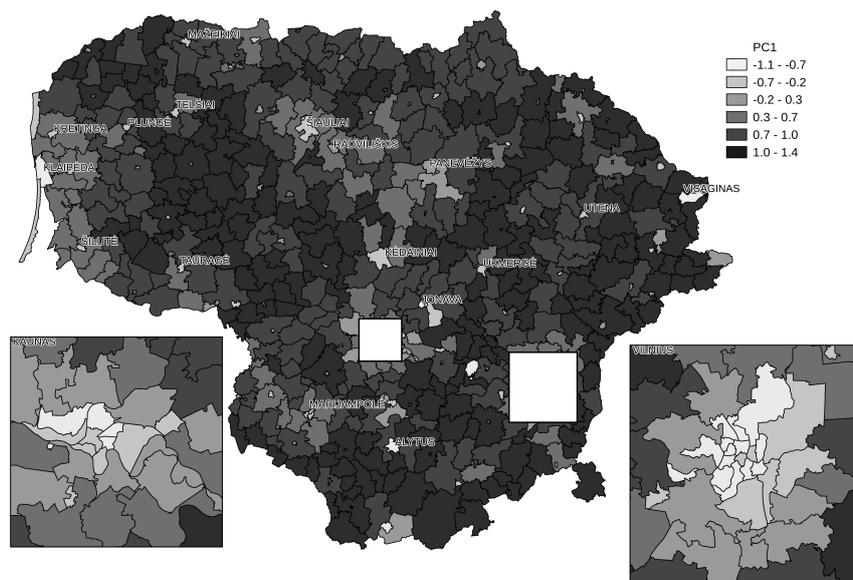


Figure 1. Distribution of component 1 scores

A second divide (PC2, 2 fig.) made alignment between variables representing *social and family status*. It opposed two sets of variables and spaces: late Soviet and post-Soviet period winners with composite households, kids, new large dwellings and no less than two cars ($r > 0.4$) vs. pensioners, no cars, never married or divorced persons ($r < -0.3$).

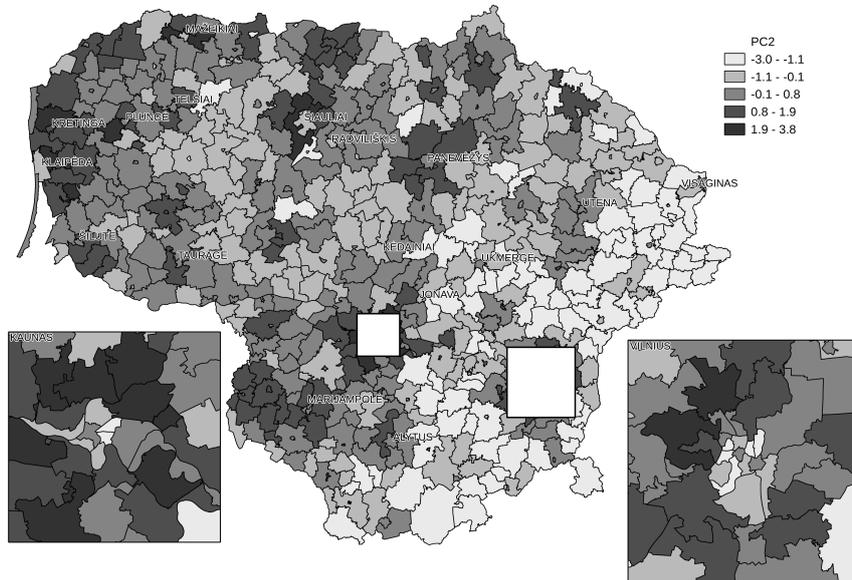


Figure 2. Distribution of component 2 scores

Third divide (PC3, 3 fig.) puts emphasis on *age and social status, intergenerational inequality*. It is between spaces with new households in the last dwellings of the Soviet period and older, well established households. Newer spaces are characterized by these indicators: higher children to pensioners ratio, overcrowded dwellings, 1980s housing ($r < -0.35$) vs. older population, later pregnancy and women marriage age, more persons who receive disability pensions, higher level of employment and SES, 1960s and brick housing ($r > 0.3$).

Fourth and latter components are more difficult to interpret, have fewer interrelated variables, and majority of correlations are below 0.4. PC4 (4 fig.) shows a country-scale *ethnic* divide. On the one side there are more brick, 1970s housing and higher share of 5–14 year old population. On the other – more Polish population and higher inequalities reflected by bigger dispersion of car number. PC5 (5 fig.) reflect some aspects of *privatization and social integration*. It distinguished territories with “stable” 45–64 year-old couples, 1970s housing, land ownership of larger than 10 ha plots and manual workers (ISCO5–9) vs. some less obvious grouping of variables: brick housing of different periods, 25–44 year old, divorced population, renters of state housing (“unstable”). PC6

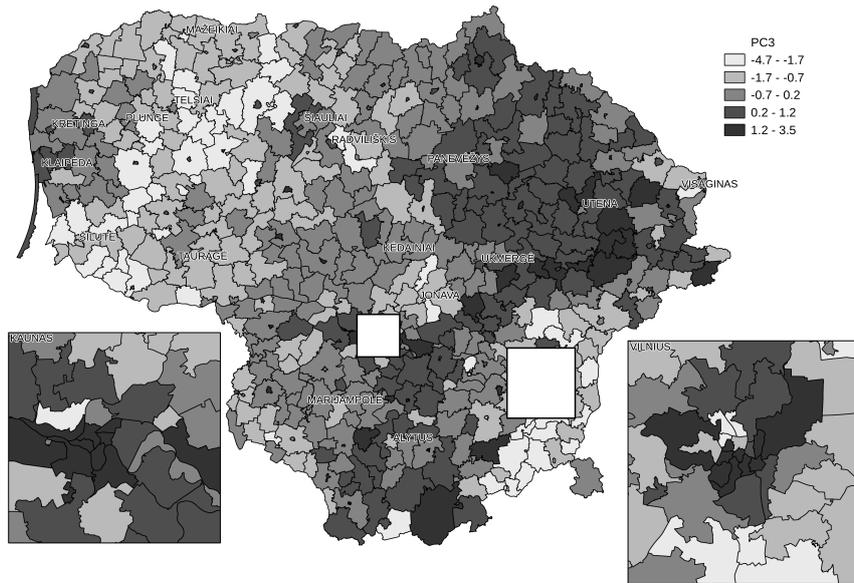


Figure 3. Distribution of component 3 scores

relates these variables: > 10 ha land plot ownership, 1980s and 1960s housing vs. low education, living on state benefits or supported by others family members, Polish ethnicity.

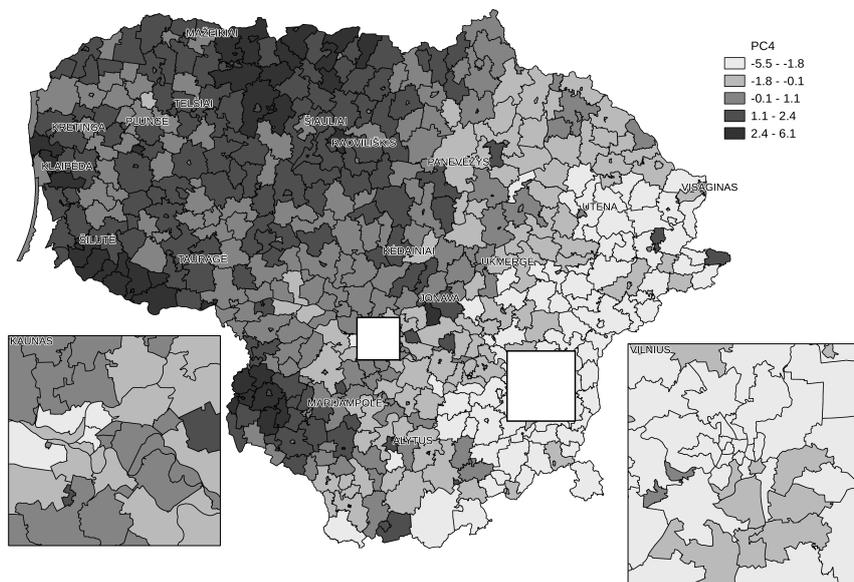


Figure 4. Distribution of component 4 scores

PC1 shows concentric pattern with the highest level of socio-urban status in the areas dominated by flats and was the lowest where there is the biggest share of oldest housing without amenities. PC2 have two patterns: it distinguishes zones with bigger households around the the largest cities and in the Western part of Lithuania. PC3 highlights areas with aging population in Eastern

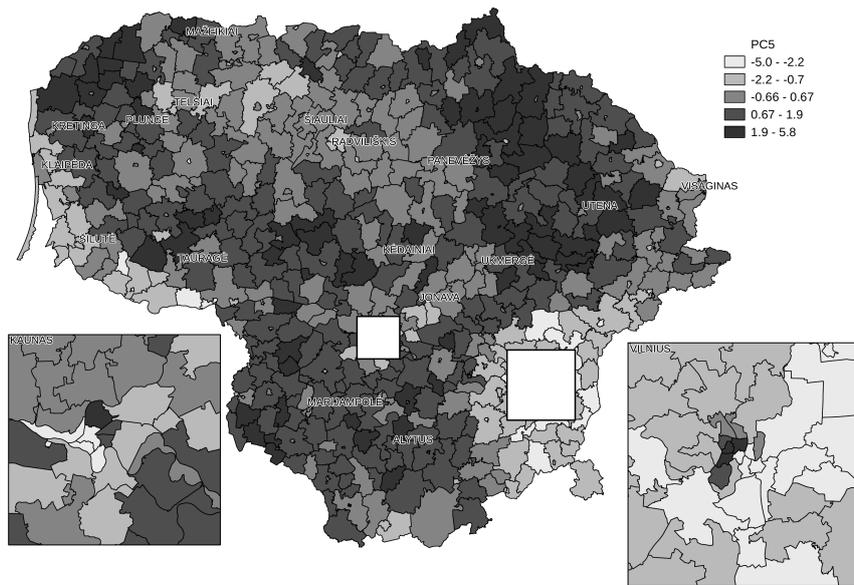


Figure 5. Distribution of component 5 scores

Lithuania, some parts of large cities and small towns. PC4 distinguishes between South-East of the country with a Polish Lithuanian citizens and less even distribution of cars among households as a sign of inequality vs. North-West with some of these traits: 1970s, brick housing, 5–14 year old population. Patterns of PC5 and PC6 scores maps are similar. They show lower rates of land ownership, education, more population dependent on state support in some Western, Northern and South-Eastern parts of the country. The biggest differences of PC5 and PC6 patterns are in the Southern part of Lithuania and inside two largest cities. In the cities some areas with more land owners and manual workers at the same time have a higher share of lower-educated and dependent on state support population.

In addition to mapping PCA scores, **variables which best represent each component** were selected. In the descriptions of spatial typology of residential differentiation principal components are represented by these variables: PC1 – dwelling type flats, occupation ISCO 1–2; PC2 – average number of persons per dwelling; PC3 – children and pensioners ratio; PC4 – Polish ethnicity; PC5 and PC6 – 1970s housing.

Finally, a joint analysis of correlations (1 tab.) shows that two groups of variables – housing and population age – have strongest connections with different PC. That finding is in line with Janson, 1971; Janson, 1980. It does show effects of planning and low population mobility, but not the existence of family life-cycle (Rossi, 1955) as a result of working housing market.

Table 1. Strongest correlations between principal components and variables

Variable	PC1	PC2	PC3	PC4	PC5	PC6
Has stove, fireplace	0.80	0.01	-0.06	0.03	0.01	0
Construction material – brick	-0.08	0.37	0.27	0.35	-0.23	0.02
Construction material – wood	0.65	-0.17	-0.02	-0.17	-0.10	-0.06
pre-1919 housing	0.45	-0.11	-0.02	-0.08	-0.12	-0.04
1919–1945 housing	0.51	-0.17	0.02	-0.16	-0.20	-0.10
1946–1960 housing	0.43	-0.08	0.13	-0.06	-0.22	-0.02
1960s housing	0.26	-0.06	0.28	0.17	-0.12	0.19
1970s housing	0.06	0.08	0.14	0.31	0.42	-0.30
1980s housing	-0.11	0.36	-0.36	-0.12	0.09	0.23
1990s housing	0.17	0.31	0	-0.08	-0.19	-0.14
Aged 0–4	0.10	0.06	-0.15	0.17	-0.05	-0.10
Aged 5–14	0.10	0.30	-0.31	0.22	-0.09	-0.06
Aged 15–24	-0.26	0.22	-0.31	-0.03	-0.03	-0.04
Aged 25–44	-0.40	0.19	-0.14	0.04	-0.22	-0.15
Aged 45–64	-0.07	-0.13	0.20	-0.13	0.27	0.02
Aged > 65	0.43	-0.29	0.36	-0.07	0.04	0.16
Aged < 5 / > 65	-0.25	0.26	-0.39	0.11	-0.08	-0.13

3.2. Changing residential differentiation in main cities

During 2001–2011 the population of the Kaunas and Klaipėda city municipalities shrunk by 17 and 15 %, respectively a decline during 1989–2001 was a bit smaller – 10 and 5 %. A total change during 1989–2011 was from 418 to 316 thousands of inhabitants for Kaunas and from 203 to 162 thousands for Klaipėda. Kaunas has lost more than 100 thousand of inhabitants and could be classified as a shrinking city with one of the biggest declines in ECE. The number of population in Vilnius city region during 1989–2011 was relatively stable. In this section we analyze how socio-economic status (SES) of population has changed during this turbulent period. Three aspects of population distribution will be taken into account: social balance, evenness of distribution and concentration. Measurements were made in three city parts – inner city, housing estates and outer city (6 fig.).

Social balance of neighbourhoods

The socio-economic composition of neighbourhoods in Vilnius is exceptional in Eastern and Central Europe (ECE) because of the largest share of bipolar areas, where low and high SES workers are living side by side (Marcinićzak, Tammaru, et al., 2015). Moreover, three main Lithuanian

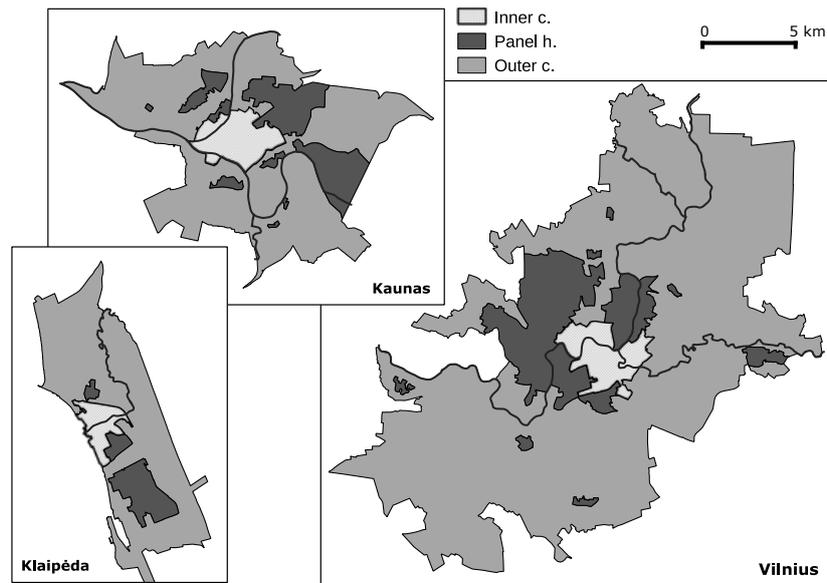


Figure 6. City parts with different housing

cities saw a largest growth of the high SES occupational groups during 2001–2011 (Valatka et al., 2015). Under three conditions: 1) population decline and aging, 2) 40 % growth of managers and professionals and 3) inflation of higher education value, new balance of neighbourhoods emerges (7 fig.) with largest changes in Vilnius and Kaunas. Important feature to note is the number of high-status neighbourhoods in Vilnius is greater than in all the remaining cities of the country.

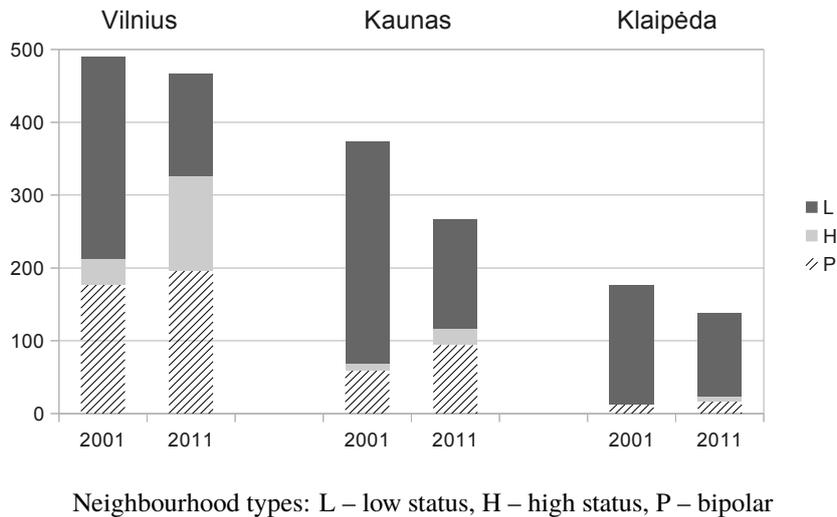


Figure 7. Social balance of neighbourhoods classified by socio-economic composition in the main cities

Decomposed analysis shows some extreme changes in social group balance in different parts (2 tab.) of the cities. First of all, central city parts, especially in Kaunas and Klaipėda, have lost for-

mer working population – 3 times decline of neighbourhood number. Neighbourhoods dominated by the low SES workers, which constituted a majority in 2001, decreased most in 2011. Neighbourhood number in Vilnius’ inner city remained more stable because of the rising number of high and bipolar SES neighbourhoods. Secondly, housing estates and outer city were much more stable in terms of the number of neighbourhoods. Nevertheless, the balance in Vilnius’ housing estates shifted greatly from low to polarized and high-status neighbourhoods – the biggest relative and absolute growth of the high SES neighbourhoods took place there. The shift in Kaunas’ housing estates was much smaller (no growth of the high SES neighbourhoods), whereas in Klaipėda it was almost non-existent: mainly population decline was visible. Finally, in 2001 the low SES neighbourhoods were most dominant in the outer cities. It still remains true in 2011, but the growth of the high SES neighbourhoods, in Vilnius’ case, and of the polarized ones, in Kaunas’ case, is strong there.

Table 2. Social balance of neighbourhoods classified by socio-economic composition in the parts of main cities

Year	City part	Vilnius			Kaunas			Klaipėda		
		H	L	P	H	L	P	H	L	P
2001	Inner c.	19	26	25	5	40	28	-	26	6
	Housing est.	10	187	138	3	187	27	-	128	5
	Outer c.	7	65	14	1	78	4	-	9	2
2011	Inner c.	29	4	15	11	7	13	1	4	8
	Housing est.	68	99	163	3	98	61	-	97	6
	Outer c.	33	38	18	9	45	20	5	14	3

Neighbourhood types: L – low status, H – high status, P – bipolar

Deindustrialization, commercialization and gentrification of the city centers, filtering out of the more affluent households has fundamentally changed the social balance in neighbourhoods of different city parts. Inner cities have lost the majority of their low SES neighbourhoods, housing estates became even more dominant form of living, while outer cities are increasing their status, but were still dominated by the low SES neighbourhoods in 2011. Another important finding is that the relative importance of Vilnius in terms of socio-economic status during 2001–2011 was growing much faster than its population size. A number of neighbourhoods dominated by the high SES workers in the capital was larger than in all the remaining country.

Spatial distances between social groups

A comparison of 12 cities has shown that the growth of spatial distance between the top and bottom occupational categories during 2001–2011 in Vilnius was one of the largest in ECE Tammaru, Marcinczak, et al. (2015). It went up more only in three compared capitals: Tallinn, Madrid and Stockholm. If we take into account that Vilnius has the largest share of housing estates with internal segmentation of SES groups in bipolar neighbourhoods, we may state that the unsurpassed competitors for Vilnius are: Tallinn with weakly spatially integrated Russian minority (Tammaru, Kährik, et al., 2015) and Madrid after 150 % unemployment growth caused by the 2008 crisis (Leal and Sorando, 2015).

We analyse the differences between Vilnius, Kaunas and Klaipėda in the figure 8. Table on the left shows the global indices of dissimilarity for the whole city of Vilnius, whereas tables on the right show the differences between the same ISCO categories in Vilnius and two other Lithuanian cities. The main finding is that spatial distances between occupational groups in second-tier cities are smaller and were growing slower during 2001–2011. Kaunas is less segregated than Vilnius (and much less than similar-sized Tallinn). In 2001 craft workers and machine operators were 5 pp less separated from managers in Kaunas and all low status groups were 5–9 pp less separated from professionals and technicians in Klaipėda than in Vilnius. During 2001–2011 separation of the low SES groups was growing fastest in the capital. As a result, in Klaipėda the spatial distance between machine operators and professionals in 2011 was much lower (12 pp) than in Vilnius.

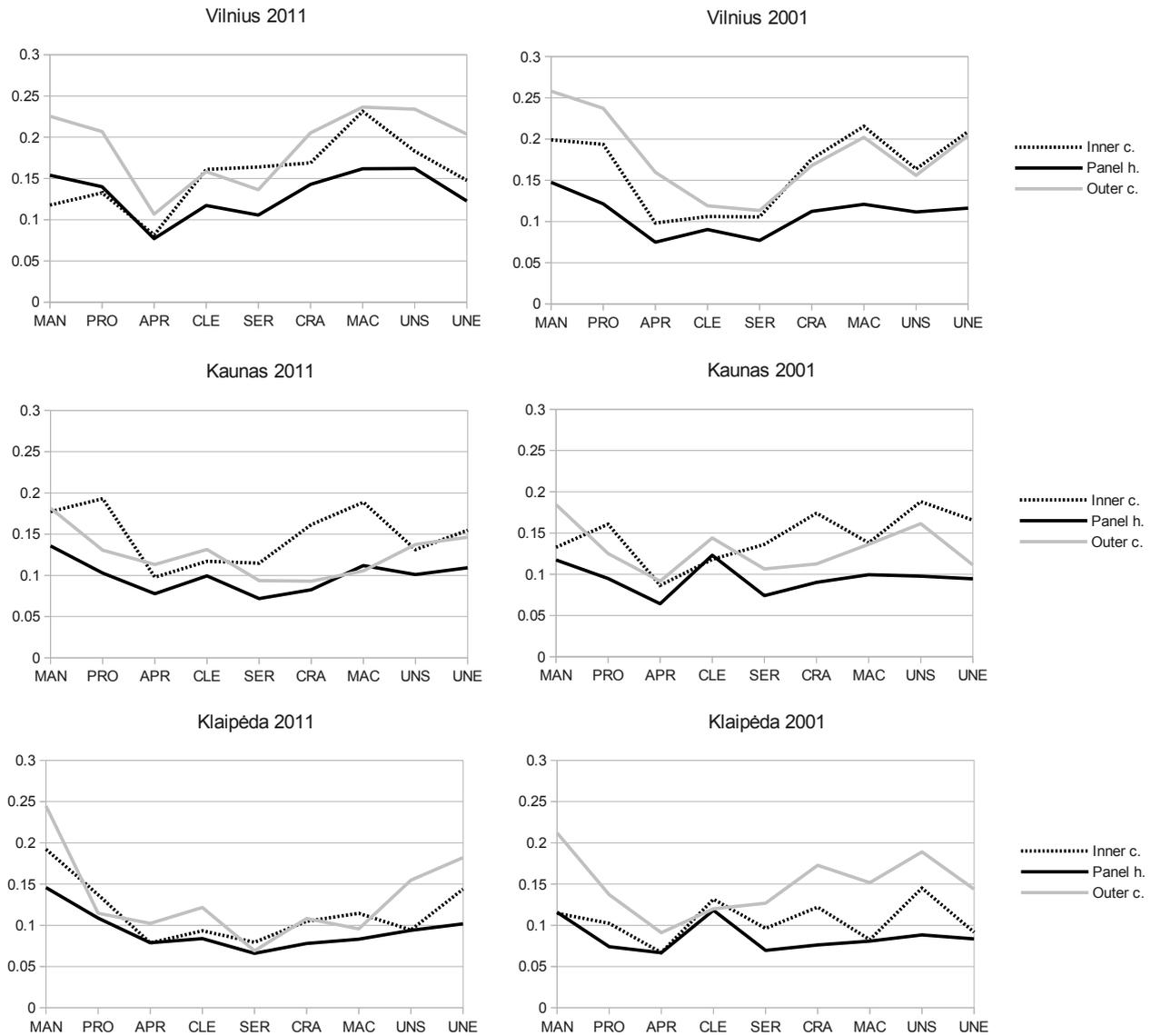
Figure 8. Indices of dissimilarity in Vilnius compared to Kaunas and Klaipėda

		MAN	PRO	APR	CLE	SER	CRA	MAC	UNS	UNE	
VILNIUS	MAN	-	10	16	24	26	30	32	31	26	
	PRO	11	-	11	19	21	25	28	27	22	
	APR	15	10	-	15	16	19	22	22	18	
	CLE	20	16	12	-	15	17	19	19	16	
	SER	22	18	13	12	-	10	13	13	10	
	CRA	26	23	18	15	11	-	11	11	11	
	MAC	28	25	20	18	14	11	-	13	13	
	UNS	25	22	18	16	12	12	13	-	12	
	UNE	26	24	19	18	13	12	15	12	-	
			2001								

		MAN	PRO	APR	CLE	SER	CRA	MAC	UNS	UNE	
VILNIUS – KAUNAS	MAN	-	0	2	2	5	7	9	8	6	
	PRO	0	-	1	2	5	7	9	8	5	
	APR	1	0	-	0	3	6	8	6	3	
	CLE	1	-1	-1	-	1	2	3	3	-1	
	SER	3	2	1	0	-	1	3	2	-1	
	CRA	6	5	4	2	1	-	1	1	0	
	MAC	5	4	4	1	2	0	-	1	0	
	UNS	4	4	3	0	0	0	0	-	1	
	UNE	4	4	2	0	0	-1	0	-2	-	
			2001								

		MAN	PRO	APR	CLE	SER	CRA	MAC	UNS	UNE	
VILNIUS-KLAIPEDA	MAN	-	-1	1	2	3	4	8	7	6	
	PRO	-1	-	3	4	7	8	12	10	8	
	APR	0	0	-	1	3	5	9	7	6	
	CLE	3	3	2	-	1	2	5	3	2	
	SER	2	4	3	2	-	2	3	4	0	
	CRA	4	7	6	3	2	-	1	1	-1	
	MAC	6	9	8	6	5	3	-	1	1	
	UNS	4	7	5	3	1	2	2	-	1	
	UNE	4	7	5	4	2	1	2	-1	-	
			2011								

MAN – managers, PRO – professionals, APR – technicians, CLE – clerks, SER – service workers, CRA – craft workers, MAC – machine operators, UNS – unskilled workers, UNE – unemployed



MAN – managers, PRO – professionals, APR – technicians, CLE – clerks, SER – service workers, CRA – craft workers, MAC – machine operators, UNS – unskilled workers, UNE – unemployed

Figure 9. Indices of dissimilarity in largest Lithuanian cities

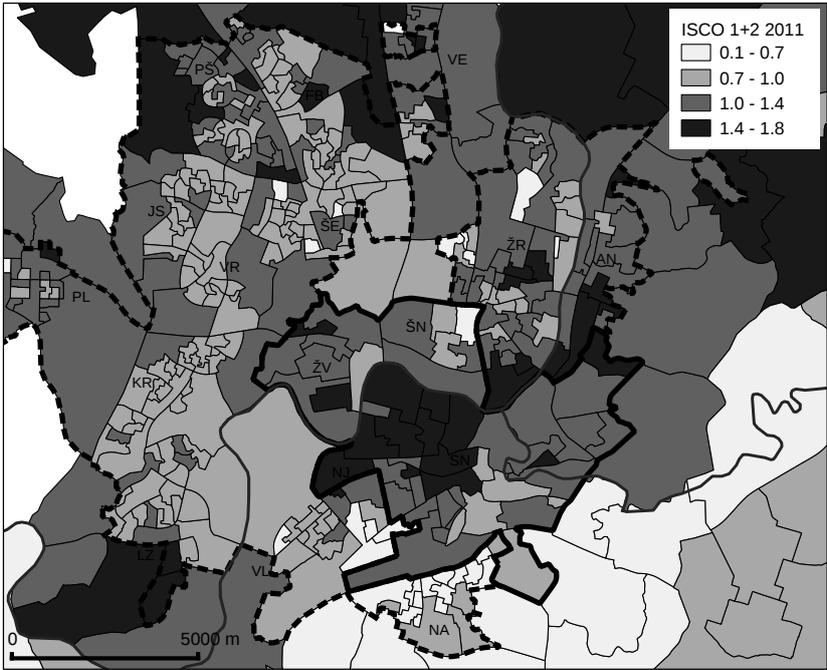
The capital and the second-tier cities saw different trends of segregation in different city parts (9 fig.). First, in the inner city of Vilnius segregation of the high SES groups went down because professionals gentrified this part of the city, while in the other two cities the opposite was true. The segregation of managers went up most in Klaipėda. Secondly, we see an obvious division of formerly least segregated Soviet housing estates sector in Vilnius. This could have been caused partly by the implementation of new housing projects, aging and filtering out of the highest-status population. Thirdly, segregation was the most obvious in the outer city of Vilnius. Kaunas shows the lowest levels of segregation, and no discernible changes occurred in the outer city. In Klaipėda’ outer city evenness of distribution increased for all occupational groups except managers.

Local concentrations of the high status groups

This section lays more emphasis on the changing inner city and Soviet housing estates (10 fig.) of Vilnius than the book chapter (Valatka et al., 2015). Relative concentration of managers and professionals was growing in the inner city (marked by continuous line on the map) and decreasing in the Soviet housing estates (dotted line).



(a) Year 2001



(b) Year 2011

Figure 10. Concentration of managers and professionals, location quotients

Former lower-status inner city parts which increased their status most are: Šnipiškės (ŠN) which has oldest working-class wooden housing; as well as the low-reputation bus and train Station Area which has some historical brick housing in Southern part of inner city. On the other hand, the highest status area Žvėrynas (ŽV) with some former villa areas saw a decreasing concentration of the high SES workers. That could be explained by increasing living standards in terms of floor space in that part of the city, as well as by population aging and by moving out of some of the most affluent population to the outer city.

Decreasing status of the Soviet housing estates is most obvious in the Western city part micro-districts: Lazdynai (LZ), Karoliniškės (KR). Population aging is most pronounced there. Lazdynai is a former award-winning (1974) modernist housing area designed in hilly landscape and had higher-status population. Karoliniškės has least attractive housing and bigger share of ethnic minorities. All other Soviet housing estates: Viršuliškės (VR), Šeškinė (ŠE), Fabijoniškės (FB), some parts of Žirmūnai (ŽR) and Antakalnis (AN) have relatively lost their status, but that was not as marked as in the case of Lazdynai.

3.3. Spatial typology of residential differentiation

Until now classifications of neighbourhoods were done mainly in the United States and the United Kingdom. Most recent works are by Vickers (2006) and Wei and Knox (2014). Next the results of the first multilevel classification of small area data in the ECE are presented.

Enumerator district level

On the lowest enumerator district (ED) level with an average population of 250–350 inhabitants at least 9 types of areas can be delimited. The main trait of small area types (5 tab.) is the obvious polarization in line with different types of housing. **Type I** represents areas with individual housing (> 65 %), **type II** – areas with flats (> 73 %). As Soviet housing estates are dominant in the cities and there are few terraced and blocked houses the distribution is very different from the one we have in the United Kingdom (Valatka, 2012).

Subtypes of types I and II have at least one indicator much higher (at least 2 times) or lower (5 times) than the country average (see tab. 5). A summary of characteristic features is presented in the table 3. The most heterogeneous (best candidates for additional division) are EDs with mixed lower status population (IIb), most homogeneous – rural areas with Polish Lithuanian citizens (Ib) and oldest housing estates (IIc).

Table 3. Descriptions of enumerator districts subtypes

ID	Main traits	Secondary traits
Ia	aging, the lowest SES	small households, old housing (pre-1960)
Ib	homogeneous, Polish ethnicity	low SES, the oldest housing (pre-1960), significant share of flats
Ic	bigger households, low SES	the highest share of 1970s–1980s housing
Id	biggest households, high SES	younger population, the newest housing
IIa	the highest SES and high diversity	significant share of historical (pre-1960) and individual (1/4) housing
IIb	the lowest SES, youngest population and the highest diversity	different post 1971 and a significant share of individual (1/5) housing
IIc	homogeneous, older population	1960s housing estates, the smallest households
IIc	homogeneous, average population age	1970s housing estates
IIe	homogeneous, young population	1980s housing estates, large households

EDs composition of cities with population of more than 25 000 of inhabitants in 2001 sorted by the share of housing estates is presented in table 4 and distribution of type I ED spatial clusters is mapped in figure 11.

Table 4. Enumerator districts composition of cities with more than 25 000 of inhabitants (%)

City	EDs	Ib	Ic	Id	IIa	IIb	IIc	IIc	IIe	IIc-IIe	Id-IIa
Visaginas	87	2	0	0	0	20	0	16	62	78	0
Klaipėda	527	0	0	4	7	18	23	25	23	71	11
Jonava	102	2	2	2	9	15	16	24	31	71	11
Mažeikiai	127	2	4	4	4	21	7	34	24	65	8
Kėdainiai	94	2	4	2	9	25	17	20	21	59	11
Šiauliai	401	2	1	10	11	18	22	17	19	58	21
Utena	100	2	0	13	14	14	13	18	26	57	27
Kaunas	1100	6	0	9	28	7	19	15	15	50	37
Panevėžys	384	7	0	12	20	14	16	15	17	48	32
Marijampolė	149	2	2	11	15	21	14	15	18	48	27
Vilnius	1443	11	0	5	31	5	9	15	23	47	36
Telšiai	100	0	7	12	6	34	15	4	22	41	18
Tauragė	92	4	9	14	9	26	12	10	13	35	23
Ukmergė	87	8	1	17	23	17	12	9	13	33	40

Lithuanian cities have very different shares – from 33 to 78 % (IIc–IIe) – of homogeneous housing estates (4 tab.). Visaginas, a city with a nuclear power plant, is leading clearly with the highest share and newest housing estates. Klaipėda, Jonava, Mažeikiai and Kėdainiai form a second group with 59–71 % of housing estates and a very small share of suburban and high SES city areas (Id and IIa). Klaipėda has overall oldest housing estates in Lithuania, while Jonava has a biggest

share of 1980s housing estates and is most similar to exceptional Visaginas. Third group – Šiauliai, Utena, Kaunas, Panevėžys, Marijampolė – have 48–58 % of housing estates and relatively large share of suburban and high SES city areas. Kaunas – the interim capital of Lithuania during the inter-war period – is leading there. Šiauliai has oldest housing estates in this group and compares to Klaipėda. **Vilnius** by the share of homogeneous housing estates takes only the 11th place in the country and trails behind Kaunas by a small margin (1 pp) in terms of the combined importance of suburban and high SES city areas. Finally, Telšiai, Tauragė and Ukmergė have less than 41 % of housing estates. Ukmergė, which was weakly developed during the Soviet times, is exceptional by the highest share of suburban and high SES city areas.

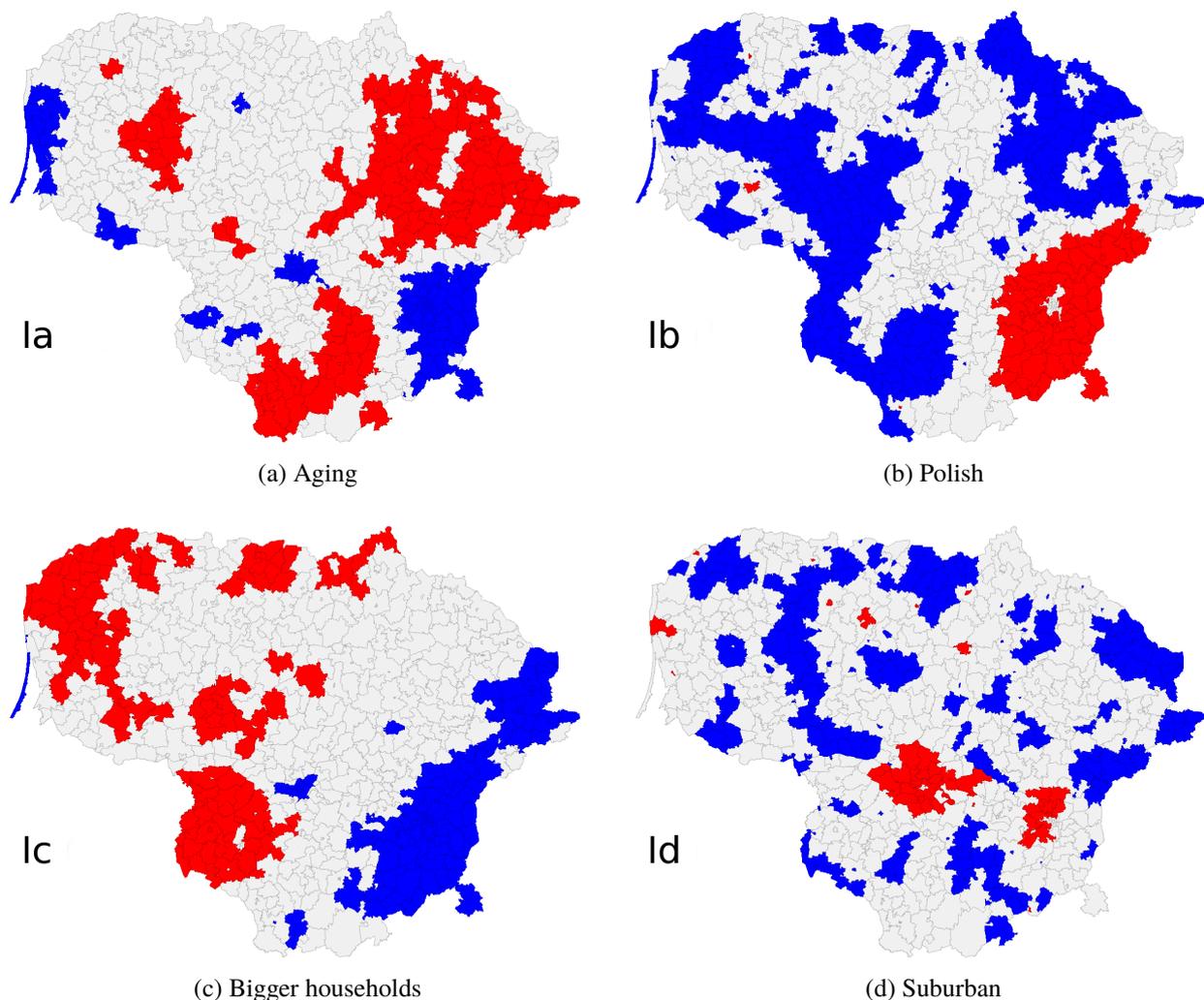


Figure 11. Statistically significant ($p = 0.05$) G_i^* type I ED clusters: the blue – negative, red – positive.

Clusters (11 fig.) with individual housing and oldest population are dominant in Eastern Lithuania (except prevalently Polish areas) and at the core of the ethnographic Žemaitija region

in Western Lithuania. Clusters with bigger households are dominant in the Western and Central agricultural areas. Suburban areas are most dominant around Kaunas and the Northern part of Vilnius.

Table 5. Average values of variables which represent each principal component best in enumerator districts

Variable	Ia	Ib	Ic	Id	IIa	IIb	IIc	IId	IIe
Occupation – ISCO 1–2 (PC1)	5	8	8	20	23	11	17	18	18
Dwelling – flats (PC1)	11	35	15	14	73	83	95	99	99
Avg. no. of persons per dwelling (PC2)	2.46	2.83	3.06	3.31	2.56	2.69	2.32	2.56	2.80
Children / pensioners ratio (PC3)	0.19	0.33	0.29	0.40	0.32	0.92	0.18	0.39	0.64
Polish ethnicity (PC4)	3	42	1	5	6	4	3	6	7
1990s housing	3	7	4	25	12	16	2	1	7
1980s housing	7	10	24	21	11	22	6	5	87
1970s housing (PC5)	12	9	29	21	9	20	11	88	3
1960s housing	16	10	17	15	16	13	60	3	1
1946–1960 housing	23	21	12	12	23	14	14	1	1
1919–1945 housing	29	33	11	5	22	10	6	1	1
pre-1919 housing	9	9	4	1	7	4	2	0	0
EDs count	1987	861	1746	860	1263	1495	975	994	1210
Within sum of squares	3163	1961	3039	2359	2887	4522	2154	2405	2383

Local authorities-city level

ED-level principal component scores data was aggregated based on population weights. Two-level analysis of LACs has followed (7 tab.): 1) division into 5 most different groups, 2) each of these groups was additionally divided into subgroups, so that no further divisions produce noticeable differences anymore. Despite the fact that geographical coordinates were not used in classification, the results show obvious spatial clustering of LACs – figure 12.

Mapping of the main LAC groups reveals how after the Soviet period three most general types of territories were distributed in Lithuania: **R** – aging rural areas with the lowest children/pensioners ratio and the biggest share of individual housing (groups 1 and 3.2); **T** – rural areas with some small agricultural towns, higher share of flats and the highest number of persons per dwelling (3.1 and 2); **U** – urban areas (groups 4 and 5) with higher socio-economic status, the smallest share of individual housing and the highest children/pensioners ratio.

We see a smooth transition (12 fig.) from Western T type into Central R type and then into Eastern, prevalently Polish, T type in the rural areas of the country. Results of the second-level analysis are presented in table 7, and were used for the division of country into regions (13 fig.).

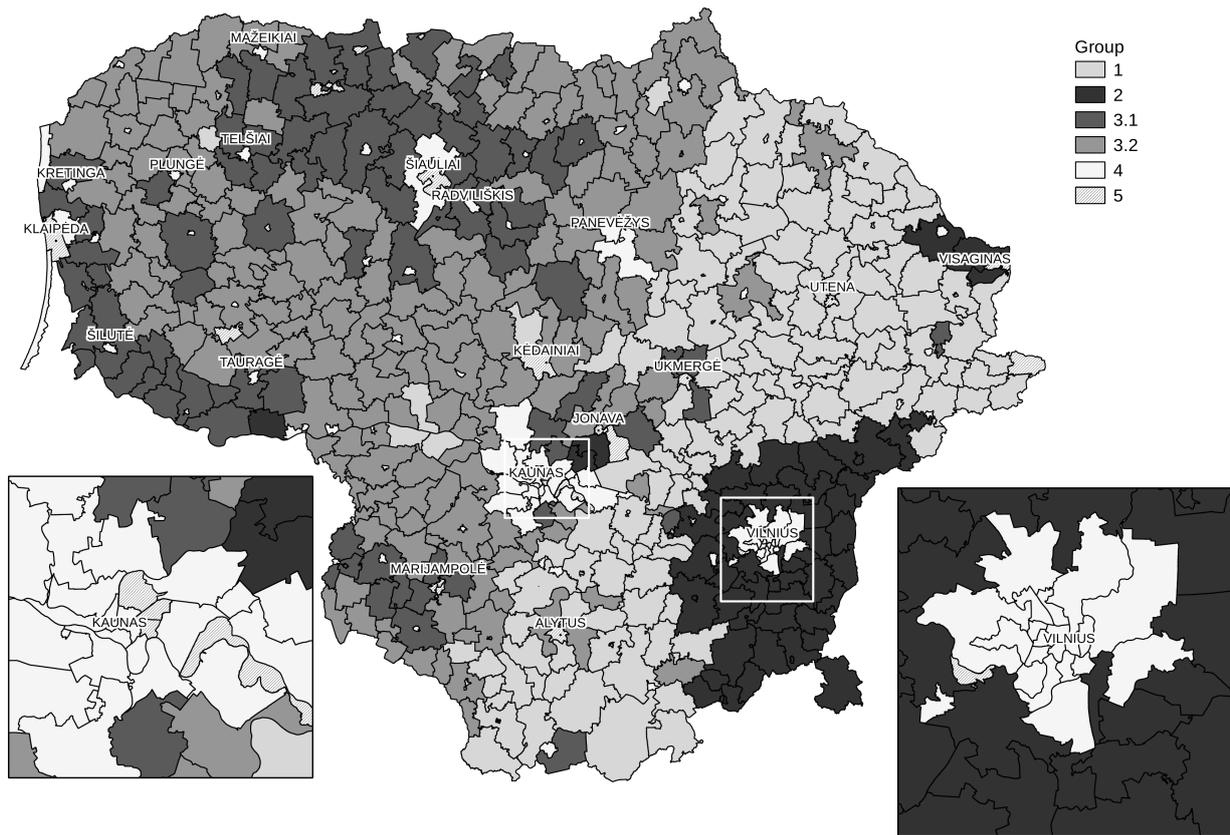


Figure 12. Distribution of local authority-city level types

Linkages between enumerator district and local authority-city levels

Results of ED and LAC levels typologies were linked. It was found that each LAC type is a mixture of a small number of different EDs. R and T types are groups of 2 ED types, and U type is made of 5–6 ED types. This finding shows that larger, heterogeneous spatial units are combinations of smaller and homogeneous ones. We can experience such composite, higher level, spatial units only through movement.

Table 6. Share of enumerator district types in local authority-city groups (%)

LAC type	LACs count	Ia	Ib	Ic	Id	IIa	IIb	IIc	IId	Ile
1	145	70	2	22	1	1	2	1	0	0
2	56	6	62	2	5	3	10	0	3	9
3.1	85	28	2	40	3	0	22	1	1	3
3.2	178	45	1	48	2	0	4	0	0	0
4	111	2	7	4	13	22	16	11	10	15
5	22	1	2	1	6	10	16	20	24	20

Variable	1	1.1	1.2	1.3	1.4	2	2.1	2.2	2.3	3	3.1	3.2	4	4.1	4.2	4.3	4.4	4.5	4.6	4.7	5
Occupation – ISCO 1–2 (PC1)	7	7	7	7	12	9	5	12	9	6	7	6	18	14	14	26	25	18	23	11	15
Dwelling – flats (PC1)	14	9	8	13	42	41	12	73	33	21	32	14	73	72	35	83	98	67	94	51	86
Avg. no. of persons per dwelling (PC2)	2.33	2.01	2.37	2.46	2.26	2.82	2.51	2.74	3.02	2.95	3.03	2.9	2.71	2.68	3.16	2.51	2.58	2.78	2.88	2.65	2.63
Children / pensioners ratio (PC3)	0.17	0.13	0.17	0.20	0.17	0.41	0.22	0.58	0.38	0.31	0.37	0.28	0.46	0.51	0.47	0.35	0.22	0.49	0.57	0.29	0.53
Polish ethnicity (PC4)	3	12	1	3	1	50	66	29	57	0	0	0	7	1	3	11	18	17	13	0	2
1990s housing	3	2	3	3	3	8	3	8	9	5	5	4	11	11	16	6	2	16	12	7	8
1980s housing	14	11	15	14	11	26	12	50	18	18	20	17	25	23	23	11	7	18	71	13	24
1970s housing (PC5)	15	10	16	17	16	16	12	20	16	22	21	22	20	23	25	13	81	16	9	20	30
1960s housing	14	12	14	15	16	10	11	6	13	17	17	17	16	15	15	28	3	14	2	17	19
1946–1960 housing	21	21	19	20	28	14	21	7	16	15	12	16	13	15	11	12	0	14	2	21	10
1919–1945 housing	26	34	25	24	17	20	35	7	22	17	16	18	12	9	8	19	6	17	3	16	6
pre-1919 housing	7	9	7	6	9	4	5	2	6	7	8	6	4	3	2	9	0	5	0	6	1
LACs number	145	31	52	45	17	56	23	10	23	263	85	178	111	39	17	10	2	14	5	24	25

Table 7. Average values of variables which represent each principal component best in local authority-city types

3.4. Regions of residential differentiation

Areas of Lithuania most clearly differentiate according to two criteria: 1) size, dominance and internal EDs composition of the settlements with more than 3 000 inhabitants, and 2) characteristics of rural areas identified by the LACs classification. Based on these criteria 18 formative and 2 main regions were identified (fig. 13):

1. **Western and Central Lithuania** – with the total population of 2.1 million, 4 cities having more than 100 thousands and 3 couplings of smaller cities with more than 50 thousands of inhabitants. Development of regions' largest cities was more intense and started earlier in the Soviet period, and currently they are shrinking most. Rural areas of this region have greater number of agricultural towns too.

2. **Eastern Lithuania** – with the total population of 1.3 million, the national capital, newer and smaller (largest one – Alytus with 70 thousands of inhabitants) industrial cities, aging and overall less densely populated rural areas.

The quantitative features of the 18 formative regions vary quiet a lot: 4 of them have the highest share of population (> 87 %) in the cities, 4 – a high (> 68 %), 5 – average (> 50 %) and 5 – a small (< 46 %) share. In these – most general, only quantitative – terms composition of both regions is the same, except that Eastern Lithuania has no any formative regions with a high share of population in the cities. Moreover, a median population size in the smallest rural settlements is up to 6 times larger in Western Lithuania.

Finally, a simple combination of the two main regions is enriched by a third part – **Vilnius subregion** with the highest contrasts in the country. It has a high share of Polish Lithuanian citizens and flats were more abundant form of housing there than in other rural areas. The capital – core of subregion – has the newest and the highest SES Soviet housing estates in the country, the highest level of residential differentiation which was growing the fastest during 2001–2011 and the highest share of bipolar and high SES neighbourhoods. On the other hand, the periphery of Vilnius had the oldest housing and the lowest SES of population.

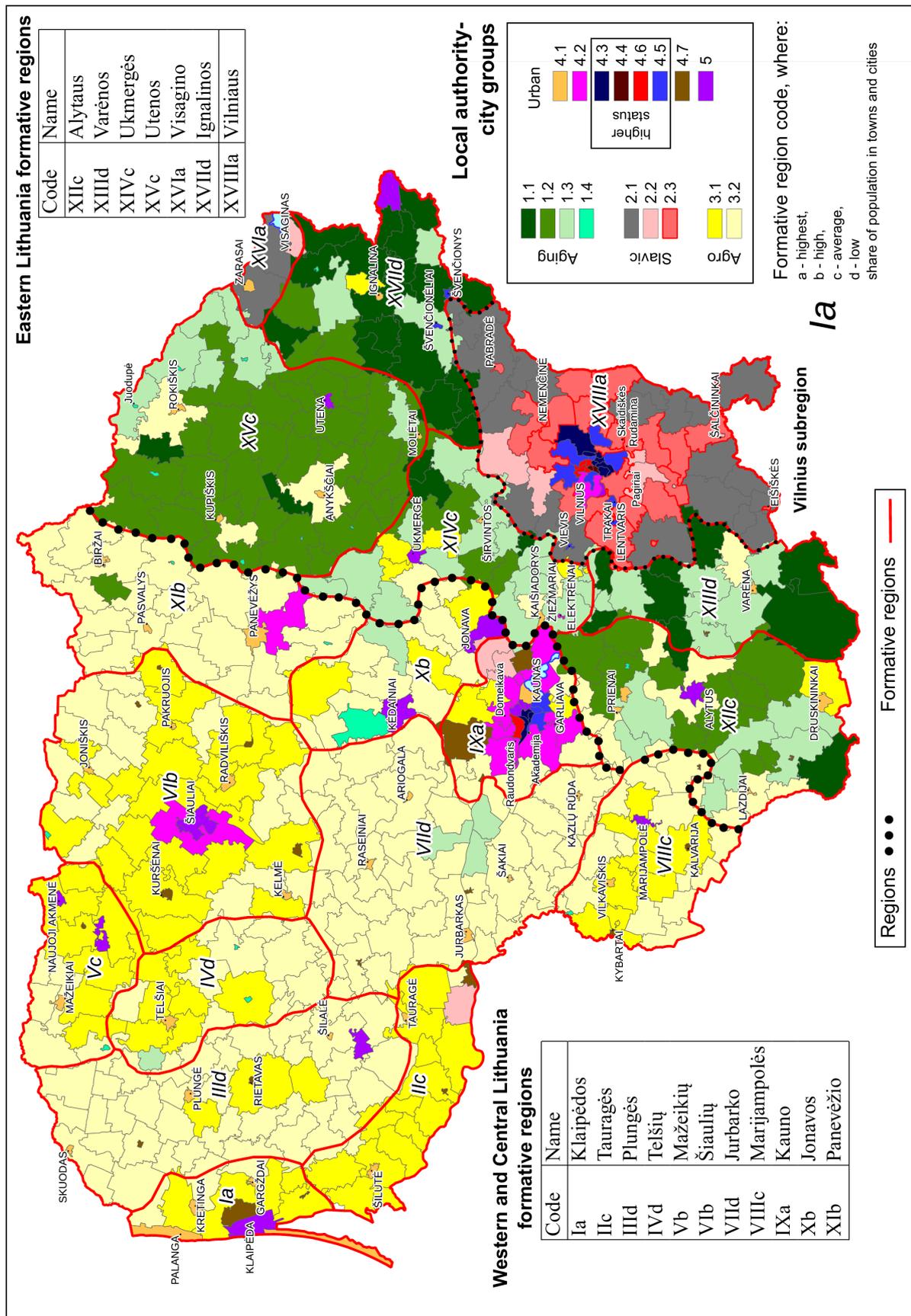


Figure 13. Regions of residential differentiation

4. Conclusions

1. Under the circumstances characteristic to post-Soviet countries – growing inequality, uneven spatial development, rapid depopulation and challenges of immigration – experience and insights of the scholars of economic core countries, where market-based explanations are effective, cultural and economic differences are sharpest, becomes more valuable while seeking to understand the events and to search for workable solutions.
2. Research on residential differentiation needs a combination of social theory, detailed data and tested tools of measurement. It is essential to refine the criteria for defining areal and social groups, to involve additional sources of data and to use research design which helps to distinguish causes and effects.
3. Different areas of Lithuania have experienced uneven development during 20th century. In 2001 the highest contrasts were between: 1) pre-Soviet, now underdeveloped rural areas and massive Soviet housing estates, 2) suburbs which started developing in the 1980s and areas with aging population without cars, 3) higher status, established households and new families in crowded housing estates built just before the collapse of the USSR.
4. A share of areas with higher status inhabitants, the pace of its growth since 2001 confirms a vital role of the capital city, Vilnius. At the same time the rapidity of residential segregation, high share of neighbourhoods with bipolar socio-economic composition, city parts with identified negative indicators show that area-oriented state and municipality housing and social policies are needed.
5. Problematic state of unified settlement system created during the Soviet period requires further development of geographical and interdisciplinary research on residential differentiation. Structure and factors, neighbourhood and segregation effects, household composition and spatial distribution, ethnographic research of different area types produces a wide and rich field waiting for exploration.

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Santrauka

Temos aktualumas

Žlugus Sovietų Sąjungai Lietuvoje prasidėjo dideli visuomenės socialinės struktūros ir ekonomikos pokyčiai (Norkus, 2008; Norkus, 2014), kurių mastus yra lengviau nuvertinti, įsivaizduoti iškreiptai nei poverinti ir suprasti. Dar daugiau, visi šie pokyčiai vyko specifiniame bendrame kontekste, kuriame per paskutiniuosius dešimtmečius ekonominė nelygybė ženkliai išaugo daugelyje pasaulio šalių ir miestų. Nors globalius pokyčius tiesiogiai pajauti yra sunku, tačiau auganti ekonominė nelygybė, sovietinių daugiabučių mikrorajonų tvarkymo problemos, kylančios dėl valstybės pasitraukimo iš būsto sektoriaus ir nepakankamų privačių investicijų, galimybių skolintis ir spekuliuoti nekilnojamo turto rinkoje atsiradimas, miestų mažėjimas, dažnai lydimas driekos, ir retai apgyvendintų teritorijų šalyje sklidimas liečia daugelį. Realizuojasi numatytos grėsmės (Aplinkos ministerija, 2004) – vyksta demografiniai pokyčiai dėl migracijos ir senėjimo bei didėja socialinė segregacija (Tammaru, Marcinczak, et al., 2015). Visuomenei informuoti reikalingas geografinis modelis, kuris padėtų suvokti po audringų dekoloktyvizacijos, deindustrializacijos, privatizacijos procesų susidariusią tikrovę.

Svarbu apibendrinti jau atliktus tyrimus, užtikrinti rezultatų tarptautinį ir chronologinį palyginamumą įsisavinus jau taikomus rezidencinės diferenciacijos tyrimo metodus ir duomenų tvarkymo principus. Turint teritoriškai detalios informacijos įmanoma išryškinti ir geriau suprasti mūsų visuomenės bruožus bei vykstančius procesus ir taip prisidėti formuluojant atsakymą į klausimą: *kokia posovietinio laikotarpio rezidencinės diferenciacijos skirtumų prigimtis ir reikšmė šiandienai?*

Šio **darbo tikslas** – pradėti detalius rezidencinės diferenciacijos tyrimus Lietuvoje naudojant surašymų mažų teritorijų duomenis. Jam pasiekti išsikelti šie **uždaviniai**:

- 1) apibendrinti rezidencinės diferenciacijos tyrimų patirtį;
- 2) operacionalizuoti rezidencinės diferenciacijos posovietinėmis sąlygomis tyrimus;
- 3) išskirti bendruosius rezidencinės diferenciacijos Lietuvoje bruožus;
- 4) nustatyti rezidencinės diferenciacijos dėsningumus didžiuosiuose Lietuvos miestuose;
- 5) identifikuoti Lietuvai būdingus teritorijų tipus;
- 6) pateikti rezidencinės diferenciacijos teritorinį apibendrinimą.

Institucionalizuotuose socialiniuose moksluose kompleksinės struktūros, būdingos globaliam ir lokaliai lygmeniui, ilgą laiką buvo ignoruojamos (Wallerstein, 2002). Šiuo tyrimu siekiama užpildyti kiekybinių socialinės struktūros, visuomenės ekologinių tyrimų spragą Rytų Europos šalyse ir sukurti atskaitos tašką tolimesniems lyginimams Lietuvoje.

Darbo mokslinis naujumas:

- 1) atliekant daugiadimensę rezidencinės diferenciacijos analizę pritaikyta mažų teritorijų duomenų koncepcija. Tai pirmasis Lietuvoje geografinis tyrimas, pasižymintis maksimaliu vertinamos visuomeninės informacijos teritoriniu detalumu ir taikantis keletą klasikinių rezidencinės diferenciacijos matavimo modelių;
- 2) nustatytos pagrindinės rezidencinės diferenciacijos dimensijos ir tarpusavyje mažiausiai susiję rodikliai, leidžiantys atlikti išsamų teritorinį apibendrinimą;
- 3) rezidencinės diferenciacijos tyrimas miestuose atliktas remiantis svarbiausiu požymiu – priklausymu profesinei grupei. Ankstesni darbai Lietuvoje akcentavo gyventojų išsilavinimo ir pajamų šaltinių svarbą (t. y. klasikinių socialinės struktūros modelių pagalbinis požymius);
- 4) Europos miestų kontekste įvertinti tyrimo metu nustatyti bendrieji ir lokalūs Vilniaus, Kauno ir Klaipėdos miestų rezidencinės diferenciacijos 2001–2011 m. dėsningumai;
- 5) nustatyti santykinai homogeniškų Lietuvos teritorijų tipai, jų grupės ir atliktas rajonavimas atskleidžia naujas sąsajas tarp skirtingų teritorijų, jų rodiklių, nurodo tipų koncentracijos vietas. Gauti rezultatai skatina naujai žvelgti į posovietmečiu susiformavusių miestų, kaimų ir retai apgyvendintų teritorijų geografines ribas ir bruožus.

Darbo pritaikomumas:

- 1) iš sovietmečio paveldėta policentrinė Lietuvos apgyvendinimo sistema, jos irimas, miestų mažėjimas lemia erdvinių skirtumų analizės poreikį. Naujausių surašymų duomenų analizės rezultatai taikytini teritorijų planavimo darbuose, nustatant erdvinius miesto ir kaimo teritorijų raidos prioritetus;
- 2) atlikti apibendrinimai gali būti detalizuoti ir teikiami visuomenei siekiant skatinti būstų savininkų savimonę, pareigingumą ir atsakingumą valdant nekilnojamąjį turtą, taip pat siekiant didesnio bei tinkamesnio valstybės ir savivaldybių dėmesio būsto sektoriui;

- 3) atskleistos svarbiausių ir daugiausiai kainuojančių valstybės socialinių tyrimų – surašymų – metu renkamų duomenų taikymo rezidencinės diferenciacijos tyrimuose galimybės. Mažų teritorijų duomenys (MTD) analizuojami Vilniaus universitete ir Lietuvos socialinių tyrimų centre;
- 4) įskaitmeninta 2001 m. visuotinio surašymo žemėlapių dalis leidžia atlikti detalius rezidencinės diferenciacijos kaitos tyrimus;
- 5) taikant surašymų MTD sudaromos prielaidos socialinių tyrimų geografizavimui ir atvirkščiai – taikant R. Eriksono, J. Goldthorpo ir L. Portocarero klasių teorijai (EPG) artimą modelį yra sociologizuojama lietuviška geografijos tradicija;
- 6) išskirtomis rezidencinės diferenciacijos dimensijomis, susijusių rodiklių grupėmis, atskirais jas geriausiai apibūdinančiais požymiais, teritorijų tipų ir regionų ribomis galima remtis vykdant naujus visuomenės raidos tyrimus, atsiranda galimybės imčių sudėtį vertinti ir nustatyti pagal geografinius kriterijus;
- 7) nustatyti rezidencinės diferenciacijos teritoriniai dėsniniai ir įgyta atviro kodo programinės įrangos – *R* statistinio programavimo kalbos, jos skaičiavimo bei grafinės programinės aplinkos, taip pat *TeX* tipografinės sistemos – taikymo patirtis gali būti panaudoti pedagoginiais tikslais.

Ginamieji teiginiai

1. Rezidencinės diferenciacijos dėsniniai išsamiausiai atskleidžiami naudojant keletą skirtingų matavimo modelių – pagrindinių komponentų, socialinių grupių balanso, segregacijos indeksus, vietos koeficientų žemėlapius, panašių teritorijų klasterizavimą.
2. Socialinius rezidencinės diferenciacijos bruožus bei pokyčius efektyviausia tirti remiantis klasikinėmis socialinės struktūros teorijomis, akcentuojant gyventojų priklausymą profesinėms grupėms.
3. Posovietinei rezidencinei diferenciacijai būdingi ribotų ekonominių galimybių bei nekilnojamojo turto sektoriaus trūkumų nulemti stiprūs būstų ir gyventojų bruožų sąryšiai atspindi mažą gyventojų mobilumą.
4. Didžiuosiuose miestuose sparčiausiai mažėjo darbininkų apgyvendintų teritorijų ir formavosi bipolinė dirbančiųjų profesinė struktūra, perauganti į vidutinio lygio rezidencinę

diferenciaciją net ir buvusiam vienalytiškiausiame miesto daugiabučių sektoriuje (Vilniaus atveju), aukštesnio statuso gyventojai koncentruojasi miestų centrinėse ir išorinėse dalyse.

5. Išskirtini 9 tarpusavyje objektyviai besiskiriantys santykinai homogeniškų teritorijų tipai, kurie sudaro statistiškai reikšmingus erdvinius klasterius ir savitus derinius aukštesnio lygmens seniūnijų-miestų grupėse.
6. Lietuvoje galima išskirti 18 į 2 regionus grupuotinių rezidencinės diferenciacijos rajonų, pasižyminčių specifiniu centrinių miestų ir rečiau apgyvendintų teritorijų santykiu.

Darbo struktūra

Darbas sudarytas iš šių dalių: įvado, tyrimų apžvalgos, darbo metodologijos, tyrimų rezultatų, išvadų, literatūros sąrašo ir priedų. Iš viso darbą sudaro 168 puslapiai. Jame yra 35 paveikslai ir 26 lentelės, 5 priedai, cituojami 176 literatūros šaltiniai.

Rezultatų aprobacija

Darbo tema paskelbti ir publikuoti 3 straipsniai bei parengtas knygos skyrius. Išsamus su darbo tema susijusių publikacijų ir kitų darbų sąrašas pateikiamas prieš naudotos literatūros sąrašą.

Apibendrinimas

1. Perspektyviausios rezidencinės diferenciacijos tyrimų kryptys yra išsamiais duomenimis grįsti kaimynystės ir segregacijos poveikio tyrimai, o vertinant pagal miestų dalis daugiausiai dėmesio skirti reikėtų daugiabučių mikrorajonų problematikai.
2. Socialinių reiškinių daugiadimensiškumas reikalauja eklektiško požiūrio į rezidencinės diferenciacijos tyrimus. Duomenų apdorojimą tokiomis sąlygomis užtikrina statistinis programavimas.
3. Atlikta analizė išryškino ribotų ekonominių galimybių masinės emigracijos dar nepatyrusios posovietinės visuomenės rezidencinės diferenciacijos bruožus. Identifikuotos ryškiausios skirtys tarp: 1) ikisovietinės kaimo raidos *ir* masinių sovietinių daugiabučių teritorijų; 2) sovietmečio pabaigoje atsiradusių sudėtinių šeimų apgyvendintų priemiesčių *ir* pensinio amžiaus gyventojų be automobilių apgyvendintų teritorijų; 3) komfortabiliai

gyvenančių vyresnio amžiaus, aukšto socialinio-ekonominio statuso, sovietmečiu visuomenėje įsitvirtinusių gyventojų *ir* jaunų šeimų, iki Nepriklausomybės (1981–1990 m.) statytuose perpildytuose būstuose.

4. Socialinės segregacijos procesas didžiuosiuose Lietuvos miestuose vyksta nevienodai. Vilniaus miesto teritorijų, kuriose vyrauja aukšto statuso gyventojai, gausa ir augimas po 2001 m. patvirtina, kad sostinei tenka ekonomiškai ir kultūriškai itin svarbus vaidmuo. Rezidencinės diferenciacijos tempai, poliarizuotų teritorijų gausa, ryškėjančios žemo statuso gyventojų koncentracijos vietos ir blogiausiai rodikliais pasižymintys mikrorajonai rodo, kad sostinėje yra reikalingos teritoriškai orientuotos būsto ir socialinės politikos programos. Didelės gyventojų dalies netekusiuose Kauno ir Klaipėdos miestuose ekonomiškai aktyvių gyventojų grupių pasiskirstymo tolygumas pakito mažai.
5. Surašymo apylinkių ir seniūnijų-miestų tipų sklaidai būdingas neatsitiktinis, aiškiai išreikštas regioninis pobūdis. Šie rezultatai suteikia pagrindą tolimesniems geografiniams ir tarpdisciplininiais – rezidencinės diferenciacijos veiksnių ir struktūros, kaimynysčių bei segregacijos poveikio, namų ūkių tipų ir erdvinės sklaidos, etnografiniams mažų teritorijų tipų tyrimams.
6. Lietuvoje 2001 m. nustatytas dviejų stambiausių rezidencinės diferenciacijos regionų ribas dar reikia patvirtinti ir tikslinti atlikus 2011 m. situacijos tyrimą. Akivaizdūs erdviniai skirtumai galėtų tapti pagrindu stiprinti regioninę politiką Lietuvoje.
7. Mažų teritorijų duomenimis grįsti tyrimų rezultatai trumpalaikė perspektyva naudingai galėtų būti pritaikyti pagrindžiant naujas rinkimų apygardų ribas, taip pat nustatant būsto sektoriaus renovacijos prioritetus. Ilgalaikė perspektyva teritoriškai detalūs tyrimai bus reikalingi tiriant ir siekiant kontroliuoti imigrantų sklaidą šalyje, augančios segregacijos sąlygomis ieškant nusikalstamumo reiškinių aiškinimų, vertinant aukštesnę socialinę integraciją turinčios užtikrinti valstybinės švietimo sistemos efektyvumą.

About the author

Vytautas Valatka was born in Utena in 1982. In 2001 he finished secondary school no. 18, currently „Minties“ gymnasium in Panevėžys. In the same year he began bachelor studies of geography in Vilnius university, which were accomplished in 2005. He continued studies of geography as a master student. During this period he received Erasmus fellowship in Norway, University of Bergen (2005, autumn semester).

After his master studies he has made and summarized structured interviews of experts (headed by prof. Dovilė Krupickaitė) in comparative housing preferences study „Between Gentrification and a Downward Spiral: Socio-spatial change and persistence in residential neighbourhoods of selected Central and Eastern European urban regions“ (Leibnitz Institut fuer Laenderkunde, 2007–2009). His master work on small area data use has received a nomination from Lithuanian Research Council.

In 2008 V. Valatka has started his PhD studies and at the same time has worked as an editor in chief of „Scientific American“ journal Lithuanian edition. Later (2009–2010) – as a senior specialist in Population Census Office, Statistics Lithuania. During 2010–2015 he or with co-authors published four academic publications (see 38 p. for a list of them) and participated in a couple of conferences including British Society for Population Studies annual conference (Nottingham, 2012) and EUGEO congress (Rome, 2013).

Since 2011 V. Valatka works with detailed Census data and uses open source tools. During 2011/07–2011/10 and 2013/09–2013/11 he was visiting University of Tartu as Erasmus trainee and as a PhD student financed by Estonian government „Archimedes“ foundation. Since 2014 he is working as younger researcher in Lithuanian Social Research Center project „Growing Lithuanian city regions and their spatial segregation“ MIP-086/2014 (headed by prof. D. Burneika).

V. Valatka is a member of Lithuanian Geographical and Sociological societies. During bachelor studies he was an active member of Students of Natural Sciences Society (SGMD), and students representative in the Faculty council (2003–2004). During PhD studies he was students representative at Vilnius University Research committee (2008–2009) and the Senate (2010–2011).

Research interests: urban and social geography, post-Soviet studies, quantitative methods, neighbourhood and segregation effects.