ESTIMATING THE LEVEL OF POLYCENTRICITY OF LATVIA AND PLANNING REGIONS WITHIN THE CONTEXT OF THE MORPHOLOGICAL PERSPECTIVE

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The aim of the article is to investigate the level of polycentricity of Latvia and planning regions by using mathematical methods, draw conclusions, and formulate proposals. The article defines the methods that can be used for estimating the level of polycentric development within the context of the morphological perspective. The following practical study has been conducted on the basis of the identified estimation methods: ranking of Latvian cities – development centres of national and regional significance – has been carried out according to the basic concepts of the Latvian spatial structure and research method, and morphological estimation of the level of polycentricity of Latvia and planning regions has been made for the period 1989–2012. The study ends with the empirical analysis and interpretation of the results obtained. Such scientific methods as logically constructive method, monographic method, and regression analysis have been employed in the article.

Results of the study confirm trends towards monocentric development in five Latvian regions and country in general. The tendency towards monocentric development can be observed in all Latvian regions for the period 1989-2012.

Keywords: *Polycentric Development, Level of polycentricity, Rank-size Estimations.*

Introduction

The polycentric development is a concept widely used in scientific studies, and starting from the 1990s it has gained a central role in the scientific debate on regional economics and planning. Following the ESDP, polycentric regions have been assumed to have the potential for virtuous performances in terms of economic competitiveness, social cohesion and environmental sustainability (European Communities, 1999). Polycentric development has been identified as one of the strategic priorities in the member states of the European Union, including Latvia. Estimation of the polycentric development includes studies of regional and city networks.

The novelty of the study conducted is related to detailed estimation of the polycentric development in Latvia within the context of the morphological perspective both at the regional and national levels for the period 1989-2012.

The aim of the study is to investigate the level of polycentricity of Latvia and planning regions by using mathematical methods, and formulate appropriate proposals. In order to achieve the aim set in the study the following tasks have been carried out:

1) The method for estimating the level of polycentricity within the context of the morphological perspective has been defined;

2) Ranking of Latvian cities – development centres of national and regional significance – has been carried out according to the basic concepts of the Latvian spatial structure and research methodology;

3) Morphological estimation of the level of polycentricity of Latvia and planning regions has been made for the period 1989-2012;

4) Empirical analysis and interpretation of the results obtained have been made.

Such scientific methods as logically constructive method, monographic method, and regression analysis have been employed in the study. Results of the study confirm trends towards monocentric development in five Latvian regions and country in general for the period 1989-2012.

Methods for Estimating the Level of Polycentricity within the Context of the Morphological Perspective

A polycentric phenomenon occurs in an urban territory which tends to cluster in several centres of activity (Anas et al., 1998). The practical estimation of the level of polycentricity requires the notion of the main features characterizing polycentric regions by focusing on the following: the size and distribution of cities in the polycentric region or morphological dimension. Firstly, morphological polycentricity mainly focuses on the fact that centres must be physically separated, with empty spaces between each other. At the same time, centres must not be too far from each other, since there must be an interaction and a minimum proximity that allow the region to be considered a single territorial entity. Secondly, from a morphological perspective, centres must not be too dissimilar in terms of dimension, since there must not be any evidence of primacy at the top of distribution (Hall, 2009). Hence, the hierarchical ranking of cities is usually assessed looking at their population, mainly focusing on the size-distribution of cities (Beckmann, 1958). Morphologically, an urban centre could simply be defined as an agglomeration of jobs and population. In identification of sub-centres, an agglomeration is considered to be a centre if it exceeds certain thresholds of absolute population (or jobs) and employment density (Giuliano and Small, 1991).

The morphological dimension of polycentricity refers to the spatial distribution of economic activity across a region.

Within a region, economic activity exploits in several ways. The most straightforward aspect to be considered is the distribution of population in cities belonging to the region. One may hypothetically distinguish between two extreme types of regions: the pure polycentric region and the pure monocentric region. The former would be characterised by an even distribution of economic activity across all cities. By considering population as proxy of economic activity, this basically would mean that every city holds the same amount of population or, in other words, the regional system lacks hierarchy.

Different studies have been carried out in the scientific environment approaching polycentricity from a morphological perspective (Lambooy, 1998; NordRegio, 2005; Parr, 1985; Meijers, 2008). Literature describes the methods for estimating the level of morphological polycentricity. Dalgaard C.J. and Vastrup J. (2001) have used variation coefficient in their calculations. The method of variation coefficient is also employed by V.J. Castro (2004) who uses generally agreed indices (size, location, and connectivity) on the basis of mathematical methods – based on dispersion (σ) the square deviation (σ²) is calculated and then the diversion coefficient is determined. This index is expressing in a comparative way the spread related to the average value. The methods employed by D.Arribas-Bel and F.Sanz Gracia in turn are based on statistics of local area like city area, city inner scale, employment and geographical data, and spatial value, and they use the formula developed by Luc Anselin (Arizon State University) whose calculations indicate a significant spatial autocorrelation in each place (Arribas-Bel D., Sanz Gracia F, 2011). Studies lead to descriptions of cities – larger, denser, wealthier, with a smaller number of the poor. Borbély Lïszló (2011) has formulated the General Regional Polycentric Index. Criteria method has been employed in calculations – the connectivity has been defined as the request according to which cities and towns in a polycentric system have relatively good accessibility.

P.Veneri and D.Burgalassi are the authors who have focused on calculation of the level of morphological polycentricity. In their calculations they have used the mathematical method, namely the regression analysis, and one of the morphological indicators used has been the primacy of the biggest city. According to the order of calculation, the first one to consider is the ratio of people living in the main city over the total population in region, as shown in equation (1), where n=1 indicates the main city (Veneri, Burgalassi, 2010):

$$weight = \frac{pop(1)}{\sum_{n=1}^{N} pop(n)} \qquad (1)$$

This indicator is applied to describe the role of the main city in respect to the region: the higher the weight, the higher the monocentricity of the region.

A more complete indicator is given by taking into account the size distribution of cities belonging to the region. Cities are ranked according to their population and then the equation (2) is used (Parr, 1985):

$$\ln pop = \alpha + \beta \ln rangs \qquad (2)$$

where *pop*- population number in urban areas of regions, *rang* – city ranks, *α and β parameters.*

This calculation has been known as the Rank-Size rule (Gabaix, Ionnides, 2004). Rank-size distribution can be used as a tool for measuring polycentricity – the higher the absolute value of *β*, the more polycentric the area defined in the study (region or city). Calculations result in *β* – the linear regression coefficient of city ranks and population in city regions.

Comparing with the calculations of the primacy of the biggest city, the rank-size distribution or the calculation of the linear regression coefficient of city ranks and population in city regions is more complete and reliable measure of the level of polycentricity within the framework of the region itself. In fact, it synthesises the hierarchies in terms of population and, hence, economic activity across the area. Rank-size calculations help to define the role of the threshold used (like the number of cites taken into consideration to compute the slope of the rank-size regression), which is crucial for the value of the coefficient. Researcher E. Meijers has defined a number of ways how to identify the threshold to be used – to take into account the cities over a certain amount of population (e.g. starting from 20,000 inhabitants); or to consider only the biggest n cities (e.g. the biggest 30 cities); while the third approach is to take into consideration the number of cities according to which population reaches a certain amount of total regional population by taking the median as a threshold (Meijers, 2008).

The method developed by P.Veneri and D.Burglassi has been employed for calculating the level of polycentricity of Latvia and planning regions that includes the mathematical calculations of the primacy of the biggest city and the rank-size distribution.

Indicators of polycentric development in Latvian regions

According to Sustainable Development Strategy of Latvia until 2030 (approved in Saeima of the Republic of Latvia in 2010.06.10), taking into consideration the size of settlements, range of services, development potential, service territory and location, as well as basing on development planning documents of the regions, Latvia has defined such classification of development centres: development centres of international, national, regional, and county significance (Latvijas ilgtspējīgas attīstības stratēģija līdz 2030. gadam, 2010). Riga is development centre of international significance; the largest cities where the industry, transport, public services and social infrastructure is developed are development centres of national significance. These are Daugavpils, Jelgava, Jekabpils, Liepaja, Rezekne, Valmiera, Ventspils and Jurmala. Development centres of regional significance, in their turn, are towns which are important culture and/or production centres of the region with developed social infrastructure and varied services – Kuldiga, Talsi, Tukums, Saldus, Dobele, Bauska, Ogre, Aizkraukle, Sigulda, Cesis, Limbazi, Smiltene, Aluksne, Gulbene, Balvi, Preili, Livani, Ludza, Kraslava, Madona, Valka. All defined centres are territorially located in five planning regions – Riga, Vidzeme, Kurzeme, Zemgale, and Latgale (LR MK noteikumi Nr.391, 2009).

With an aim to represent spatial form of Latvian regions within the morphological context, as well as to define process

dynamics during the existence of Latvian country (1989–2012), analysis use data on amount of Latvian inhabitants in such time rows – years 1989, 1995, 2000, 2010, and 2012, including data on 30 cities and towns of international, national and regional significance.

In 1989, after the result of Census, the total number of Latvian inhabitants was 2666567, 1708572 or 64% of whom lived in 30 regional towns of Latvia (Statistiskais biļetens, 1990). During the time the number of population gradually decreases in country; results of Census in 2000 show that total number of population was 2 381 715, 1 476 311 or 62% of whom lived in 30 cities, but in 2010 the total number of population was 2 120 504, 1 306 866 or 61.6 % of whom lived in 30 cities; in 2012 there were 2 041 763 inhabitants and 1 255 740 or 61.5 % lived in 30 cities and towns of the country (LR Centrālā statistikas pārvalde, Tabula ISG12., Tabula ISG15). Data in the Table 3 show that in 23 years' period Riga planning region is the most settled region, since 37 % of total population lived in the cities and towns of international, national and regional significance which are located in this planning region; the less inhabited cities and towns of national and regional significance are located in Vidzeme region – only 6 % of all inhabitants.

Results of Estimating the Level of Polycentricity in Latvia and planning regions within the Context of the Morphological Perspective

In morphological estimation of Latvian regions the authors initially took in account 30 administrative cities and towns (municipalities) as subject of analysis, taking into consideration their distribution of administrative cities, determined in Latvia (international, national and regional significance); they were also determined to fulfil the role of thresholds. Statistical data on chosen thirty (1 – international, 8 – national, 21 - regional) cities and towns were used. On the basis of statistical data the number of population in 30 Latvian cities and towns within the division of five planning region was identified. According to formula (2) the authors also determined rank-size in distribution by cities in each planning region for period of time, which is stated in the current research (from 1989 to 2012). Explanation of connections for research result is the following:

1) The higher place city takes on the non-linear curve, the more inhabitants live in this administrative unit, and correspondingly – the fewer inhabitants live in one of administrative units, the lower rank the city/town takes on the non-linear curve. The role of the main city against region: the higher is the rank weight for one city/town, the higher the monocentricity of the region.

2) If the non-linear curve holds more than one city/town, which are characterized by homogenous rank (the number of population, namely), the line forms smoother which, in its turn, points at polycentric spatial form. Polycentric spatial form indicates administrative units, existent in regions, with comparatively equal number of population.

3) If the non-linear curve holds more than one city/town, the rank of which is heterogeneous (sharp changes in the number of population, namely), the line is curved, pointing at monocentric spatial form.

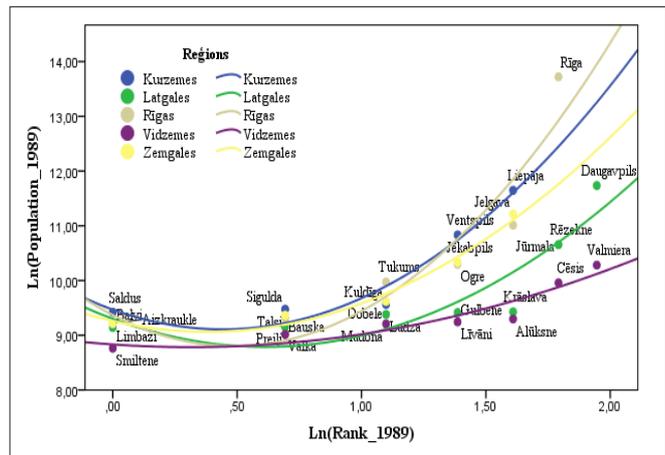The results for year 1989, which is initial base of performed research, is provided in Figure 1:

Figure 1. Distribution diagram of thirty Latvian cities and towns of international, national and regional significance in plane of size and population number with cubic regression line, 1989
Source: Figure made by the authors.

The results for year 2012, which is the final base of performed research, is provided in Figure 2:
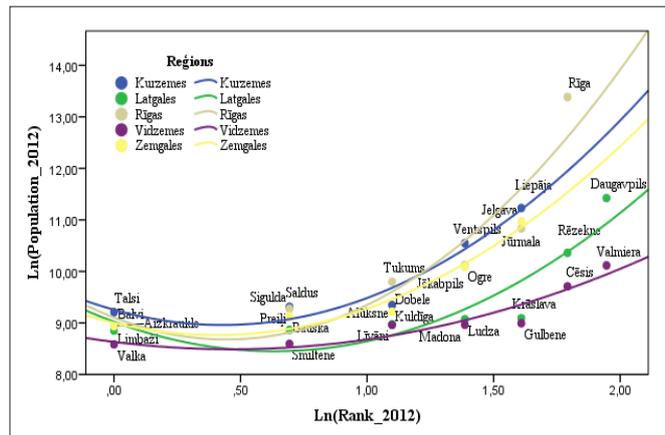
Figure 2. Distribution diagram of thirty Latvian cities and towns of international, national and regional significance in plane of size and population number with cubic regression line, 2012
Source: Figure made by the authors.

From the figures presented it can be seen that, despite of total decrease in population number, the rank positions of 30 Latvian cities and towns have not significantly changed from 1989 to 2012, which, in its turn, indicates on stability of spatial form of Latvian regions over the years. Every region has one explicit centre: the main city in Riga region is Riga, the centre of Kurzeme – Liepaja, Zemgale – Jelgava, Latgale – Daugavpils, Vidzeme – Valmiera. Each of five regions on non-linear curve located cities and towns with heterogeneous rank (sharp changes in the number of population, namely), therefore line forms in curved way, pointing at monocentric spatial form in each of planning regions of Latvia. Assessing polycentric development levels of planning regions it must be noted that trend of monocentric development is the most

vividly seen in Riga region, but Vidzeme region represents polycentric development trends.

With an aim to achieve more absolute indicator in assessment of spatial form the further part of the current research analyzed data on size distribution of cities/towns of particular region. For the purposes of rank size estimations the authors used calculation of the formula (2) and received the following data in regard to Latvian regions within the period defined by the research *(for the trend representation the calculation results for years 1989 and 2012 were included)*:

Table 1. The calculation of linear regression coefficient for city ranks and population number in urban areas of Latvian regions, 1989

	Unstandardized Coefficients		Standardized Coefficients
	B		Beta
Region	Ln (Rank_1989)	(Constant)	Ln (Rank_1989)
Kurzeme	1,278	8,964	0,808
Latgale	1,024	8,597	0,714
Riga	1,976	8,421	0,783
Vidzeme	0,674	8,575	0,864
Zemgale	1,112	8,886	0,855

Source: Table made by the authors.

Table 2. The calculation of linear regression coefficient for city ranks and population number in urban areas of Latvian regions, 2012

	Unstandardized Coefficients		Standardized Coefficients
	B		Beta
Region	Ln (Rank_2012)	(Constant)	Ln (Rank_2012)
Kurzeme	1,166	8,813	0,814
Latgale	1,013	8,286	0,700
Riga	1,948	8,256	0,802
Vidzeme	0,689	8,292	0,823
Zemgale	1,115	8,603	0,833

Source: Table made by the authors.

The research has stated level of hierarchy, thus the polycentric development level in planning regions of Latvia has been defined. According to methodological direction – the higher is the value of calculated *ß, the* higher is the level of polycentric development in the defined administrative territory. Estimating the situation in both 1989 and 2012 it can be understood that standardized coefficient characterizes comparatively homogenous level of monocentric development in planning regions of Latvia and does not represent crucial changes over the years. Since 1989 the level of polycentric development is increased in Kurzeme and Riga planning regions, but due to the impact of monocentric development it decreased in Latgale, Zemgale and Vidzeme planning region. The analysis of the current data indicates on impact increase of the central region of state – Riga.

To determine which city indicators must be taken into consideration for every region and to measure the level of polycentric development the analysis of city indicators of each region was provided. The authors defined total number of population in cities defined by the research in each region:

Table 3. The population number in 30 cities according to Latvian regions, 1989–2012

Year	Population number in planning regions				
	Kurzeme	Latgale	Riga	Vidzeme	Zemgale
1989	204718	222698	1043209	96170	141777
1995	178870	213170	950768	88320	126023
2000	172295	205249	887103	88406	123258
2005	163164	190089	829687	84960	120529
2010	153248	171360	788089	79488	114681
2012	145971	162584	762332	75568	109285

Source: Statistiskais biļetens, 1990; LR Centrālā statistikas pārvalde, Tabula ISG12., Tabula ISG15. The authors' summary.

The weight prime cities, which were analysed in further research, were determined for each region. In the research of planning regions of Latvia the following nine cities of international and national significance were put forward (table 4).

The further analysis calculated weight of each prime city of the planning region among other cities of the region (table 5).

Table 4. The population number in Latvian cities of international and national significance, 1989–2012

Year	Liepaja	Ventspils	Daugavpils	Rezekne	Riga	Jurmala	Valmiera	Jelgava	Jekabpils	Sum
P_1989	114486	50646	124910	42477	910455	60600	29190	74105	30865	1437734
P_1995	96294	45147	120897	41711	824988	57285	29069	66231	28693	1310315
P_2000	89641	43951	115574	39430	766381	55673	27799	63743	27911	1230103
P_2005	83762	42562	107269	36458	712262	53446	27092	63684	26703	1153238
P_2010	78913	39881	95962	33456	673433	51749	25888	60923	25233	1085438
P_2012	75372	38068	91478	31559	650478	50616	24722	58280	24017	1044590

Source: Statistiskais biļetens, 1990; LR Centrālā statistikas pārvalde, Tabula ISG12. The authors' summary.

Table 5. Weight of Latvian cities of international and national significance among other cities, 1989–2012

	City	Region	Year 1989		Year 2012	
			Population number in the city P_1989	Primacy of the city (1989)	Population number in the city P_2012	Primacy of the city (2012)
1	Liepaja	Kurzeme	114486	0,559	75372	0,516
2	Ventspils	Kurzeme	50646	0,247	38068	0,261
3	Daugavpils	Latgale	124910	0,561	91478	0,563
4	Rezekne	Latgale	42477	0,191	31559	0,194
5	Riga	Rīga	910455	0,873	650478	0,853
6	Jurmala	Rīga	60600	0,058	50616	0,066
7	Valmiera	Vidzeme	29190	0,304	24722	0,327
8	Jelgava	Zemgale	74105	0,523	58280	0,533
9	Jekabpils	Zemgale	30865	0,218	24017	0,220

Source: Table made by the authors.

Performed analysis indicates on the fact that weight of chosen cities show insignificant changes over the years – taking into consideration the decrease of population number the Latvian cities of international and national significance maintains their positions over the years, respectively. The analysis results for prime weight cities have been represented in Figure 3:
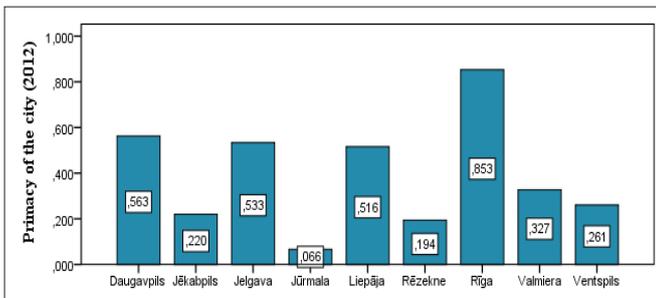

Figure 3 Weight of Latvian cities of international and national significance among other cities, 2012
Source: Table made by the authors.

From the data, recorded in Figure 3, the analysis on comparability of city weight from one region with significance of prime cities of other regions was provided. Two city groups with identical weight can be divided:

1) Daugavpils (Latgale), Jelgava (Zemgale) and Liepaja (Kurzeme). Coefficient indicator is from 0,516 to 0,563;
2) Jekabpils (Zemgale), Rezekne (Latgale), Valmiera (Vidzeme) and Ventspils (Kurzeme). Coefficient indicator is from 0,194 to 0,327.

In the result of city grouping the result can be identified: three planning regions of Latvia (Kurzeme, Zemgale and Latgale) show common traits - in each region there is one city with higher level of weight with another position of significant city in the same region at the same time. There is only one city in Vidzeme region, the significance of which is of equal value with the second cities of previously mentioned three regions. The cities of Riga planning period, i. e., Riga and Jurmala, show radical weight difference; this situation can be explained with prevalence of Riga which the capital of the country over all other cities. In Latvia trends of monocentric development can be observed since the city weight of prime regions in various planning regions differs. It must be noted that in future it is possible to move closer to balanced polycentric development of the country if the development of

cities with the second weight is promoted to the level of prime city in the region.

Further analysis has been performed with an aim to clarify the situation in five planning regions of Latvia if compared with prime city weight among other cities of particular planning region. There are five cities in Kurzeme planning region, which take the following weight scale among each other (Figure 4):
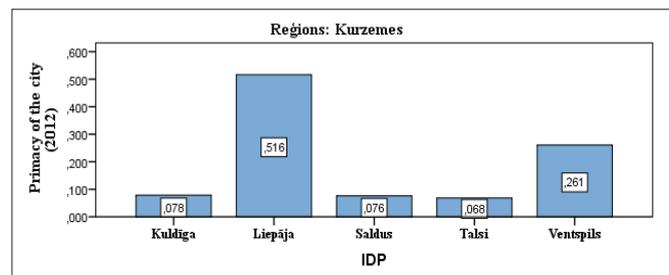

Figure 4. Weight of cities of national and regional significance in Kurzeme planning region, 2012
Source: Figure made by the authors.

Kurzeme planning region represents trends of monocentric development since the prime city Liepaja takes a significant part from rank of other towns – 51.6%. Region has to strengthen weight of other towns (Kuldiga, Saldus, and Talsi).

There are seven cities and towns in Latgale planning region, which take the following weight scale among each other (Figure 5):
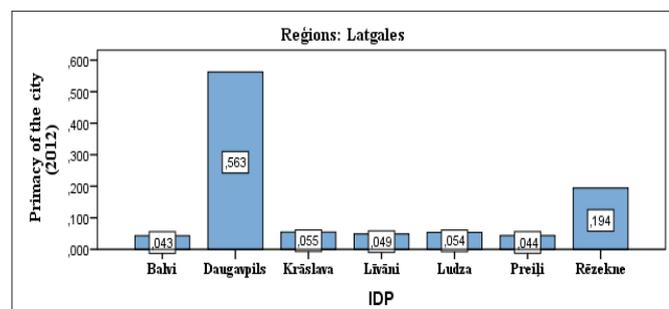

Figure 5. Weight of cities and towns of national and regional significance in Latgale planning region, 2012
Source: Figure made by the authors.

Latgale planning region represents trends of monocentric development since the prime city Daugavpils takes a

significant part from rank of other towns – 56.3%. Region has to strengthen weight of other towns (Rezekne, Preili, Ludza, Livani, Kraslava, and Balvi).

There are seven cities and towns in Vidzeme planning region, which take the following weight scale among each other (Figure 6):
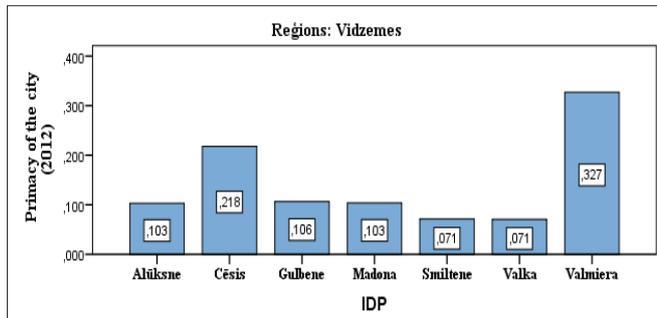

Figure 6. Weight of cities and towns of national and regional significance in Vidzeme planning region, 2012
Source: Figure made by the authors.

Vidzeme planning region represents trends of polycentric development since the prime city Valmiera takes a considerably insignificant part from rank of other towns. Region has to strengthen weight of some towns (Valka, Smiltene) in order to achieve equal development level of towns.

There are five cities in Zemgale planning region, which take the following weight scale among each other (Figure 7):
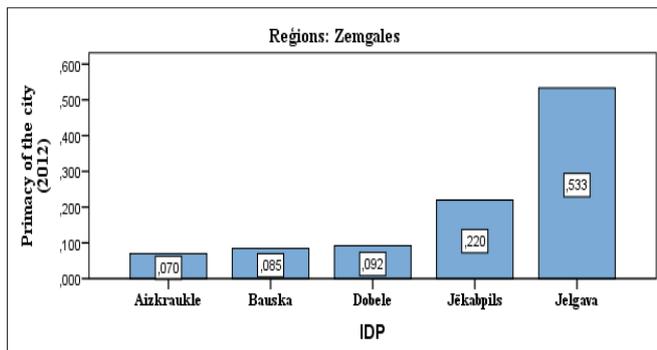

Figure 7. Weight of cities and towns of national and regional significance in Zemgale planning region, 2012
Source: Figure made by the authors.

Zemgale planning region represents trends of monocentric development since the prime city Jelgava takes a significant part from rank of other towns – 53.3%. Region has to strengthen the weight of other towns (Aizkraukle, Bauska, Dobele, and Jekabpils).

There are five cities in Riga planning region, which take the following weight scale among each other (Figure 8).

Riga planning region represents trends of monocentric development since the prime city Riga takes a significant part from rank of other towns – 85.3%. In long-term weight strengthening of other towns in this region (i. e. Jurmala, Limbazi, Ogre, Sigulda, Tukums) is burdened since Riga is the capital city and city of international significance and it will continue to accumulate a significant part of resources not only from Riga region, but also from all state and increase its weight.
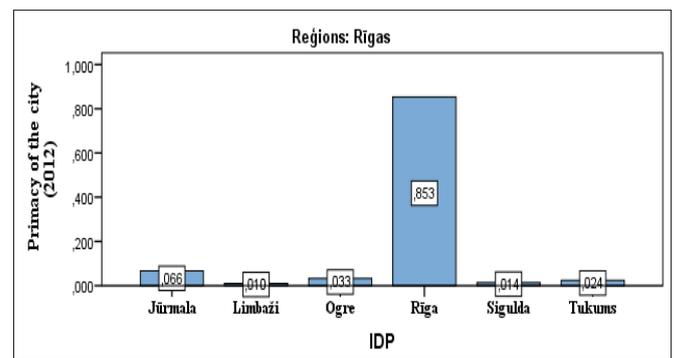

Figure 8. Weight of cities and towns of national and regional significance in Riga planning region, 2012
Source: Figure made by the authors.

With an aim to clarify indicators of polycentric development in all territory of the country the comparative analysis of nine cities and towns of international and national significance, taking territory of the state as united region was performed (Figure 9):
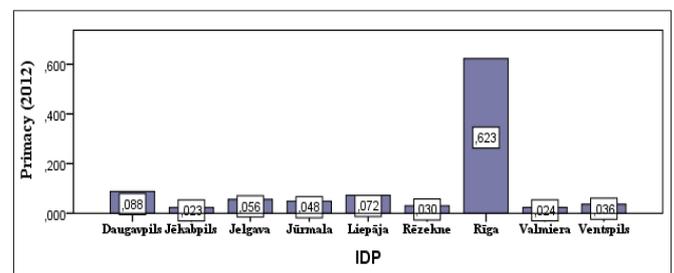

Figure 9. Weight of cities of international and national significance in Latvia, 2012
Source: Figure made by the authors.

In total Latvia shows explicit trends of monocentric development since the prime city Riga takes a significant part from significance scale of other towns (estimating all country as a united region) -62.3% In order to promote polycentric development in the country the weight strengthening for rest cities of national significance (Daugavpils, Jekabpils, Jelgava, Jurmala, Liepaja, Rezekne, Valmiera Ventspils) is necessary, additionally providing development for towns of regional significance (21 town).

With an aim to perform morphological estimations for Latvian country the administrative towns (municipalities) after their divisions in cities and towns of international and national significance determined in Latvia was taken as subjects of analysis; they were also determined to fulfil the role of thresholds. Statistical data on chosen nine (1 – international, 8 – national) cities were used. On the basis of statistical data the population number in nine cities of Latvia, which is taken as united region, was determined; the authors also identified rank size by cities for period of time, which is stated in the current research according to formula (2). The results of performed analysis have been represented in Figure 10.

According to received data it can be considered that the situation in Latvia is mostly characterized by trends of monocentric development. In result of performed analysis a non-linear curve with cities with heterogeneous rank has been developed, therefore curve is bent which, in its turn, points

at monocentric spatial form in territory of Latvia. According to estimation method Riga takes a high rank on non-linear curve – the greater the rank weight for one city, the higher level of monocentry in region (country) in general.
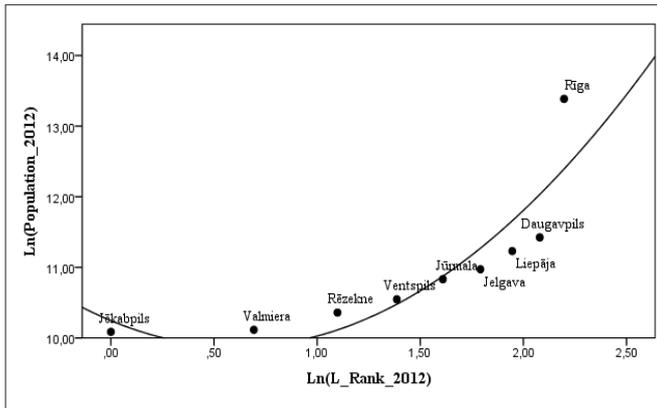

Figure 10. Distribution diagram of nine Latvian cities of international and national significance in plane of size and population number with cubic regression line, 2012
Figure made by the authors.

With an aim to receive more complete indicator in estimation of spatial form of Latvia, the further part of the research analyses data on size distribution of nine cities (cities are organized according to their population number). The calculation of formula (2) is being used for this purpose and the following data about Latvia in determined period of time are acquired:

Table 6. The calculation of linear regression coefficient for city ranks and population number in urban areas of Latvia, 1989–2012

Year	Unstandardized Coefficients		Standardized Coefficients
	B		Beta
	Ln(L_Rank_)	(Constant)	Ln(L_Rank_)
1989	1,120	9,678	**0,766**
1995	1,081	9,658	**0,752**
2000	1,069	9,629	**0,753**
2012	1,057	9,492	**0,752**

Source: Table made by the authors.

The research has stated level of hierarchy, thus the polycentric development level in Latvia has been defined. According to methodological direction the higher value of calculated β, the higher level of polycentric development in the defined administrative territory. Estimating the situation from 1989 to 2012 it can be considered that standardized coefficient characterizes comparatively homogenous level of monocentric development in Latvia and does not represent crucial changes over the years. In 1989 this coefficient was 0.766 units, but in 2012 – 0.752 units. Since 1989 the standardized coefficient has decreased for 0.014 units, confirming the increase of monocentric development level in Latvia.

Conclusion

On the basis of empiric analysis and interpretation of acquired results the following research conclusions and suggestions are made:

1) The morphological dimension of regional polycentricity refers to the spatial distribution of economic activity across a region. The most straightforward aspect to be considered is the distribution of population in cities belonging to the region. It is possible to determine more complete indicators on morphologic development level by using proportion of residents living in a city over the total population number of the region, as well as taking into consideration the size distribution of cities in one region.

2) In morphological estimation the administrative units – 30 cities and towns in Latvia of international, national and regional significance within five planning regions have been analysed, as well as according to formula (1) the rank size of cities and towns within the determined period of time has been determined. In the result of the research cubic regression curves for city size and population number of the each region are made and the authors came to conclusion that since 1989 to 2012 the rank positions of 30 Latvian cities and towns have not significantly changed, which indicates on the fact that spatial form of Latvian regions has not changed over the years. Each region located cities/towns with heterogeneous rank on non-linear curve, therefore line forms in curved way, pointing at monocentric spatial form in each of planning regions of Latvia.

3) In the current research the data on size distribution of cities and towns, belonging to one region, is analysed according to formula (2). Standardized coefficient represents comparatively homogenous level of monocentric development in all planning regions of Latvia and does not show drastic changes in 1989 – 2012. The level of polycentric development is increased in Kurzeme and Riga planning regions, but due to the impact of monocentric development it decreased in Latgale, Zemgale and Vidzeme planning region.

4) Additionally the authors defined cities and towns that must be taken into consideration for each region to estimate their level of polycentric development, as well as calculated and estimated prime city weight of each region among other towns of the same region for every planning region of Latvia. The conclusion is following: Kurzeme, Latgale, Zemgale and Riga planning region show trends of monocentric development since the main city in each region takes a dominating part in significance scale of other towns, but Vidzeme planning region, in its turn, show trends of polycentric development since all cities and towns take relatively insignificant weight part over other towns.

5) With an aim to clarify the situation in all territory of the country the comparative analysis of nine cities of international and national significance assuming the country as a united region is made. In total Latvia shows explicit trends of monocentric development

since the prime city Riga takes a significant part from significance scale of other towns.

6) In morphological assessment of Latvia in general the authors defined rank size of the largest cities, developed cubic regression line on city size and population number that represents trend of monocentric development in the country.

7) For the estimation of spatial form in Latvia the analysis of state city size distribution was developed. The standardized coefficient in the period of research represents comparatively homogenous level of monocentric development in Latvia. In 2012 this indicator has been expressed with 0.752 units and it is decreased for 0.014 units since 1989 confirming the increase of monocentric development level.

8) In the result of research the authors develop the following suggestions: In order to achieve polycentric development in the level of planning regions, the weight of the second largest city must be increased, as well as the development of towns of regional significance (21 town) must be promoted drawing their weight nearer to the prime city of region. In order to promote polycentric development in the country the events for weight equalization for cities of national significance, such as Daugavpils, Jekabpils, Jelgava, Jurmala, Liepaja, Rezekne, Valmiera, Ventspils over the weight of state capital Riga is necessary.

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