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# POLYCENTRIC DEVELOPMENT: THE CASE OF LATVIA

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#### Introduction

Polycentric development is a widely-used term both in academic research and in the normative agenda. Since 1999 the concept of polycentricity has ceased to be only a theoretical interpretation of contemporary spatial organization, especially regarding metropolitan regions. In fact with the ESDP, polycentricity has also begun to assume a normative relevance (Davoudi, 2003), with a set of normative tools that are supposed to be applied to achieve crucial European Union (EU) policy objectives. Issues of economic development are closely connected to development of regions and city networks. Countries with a polycentric development model have better possibilities of balanced development if compared with countries with monocentric direction. The direction of monocentric countries to polycentric development is prevented by low competitiveness, insufficient development in cities and weak connection with neighbouring territories. Though, it needs to be mentioned that in the field of polycentric conception there are no unified methodology and united measurement methods. One of the main problems, which appear in performing analysis of polycentric regions and proposed regional development policy, is that there are no widely used standards to identify them. At the same time, the European Union unites countries with different characteristics in terms of area, population, and size of development centres. A unified approach could be necessary in order to use analysis data and planning results without taking into consideration the size of country and population. With this the comparative assessment of countries in terms of polycentric development, determination of efficiency and conformity of applied regional development supportive tools, as well as evaluation of set-out priorities would be possible. The unified standard shall be flexible enough to apply it in different administratively territorial structures in different countries.

The aim of the article is to identify current research methodology of polycentric development, as well as evaluate its applicability for the assessment of regional development tendencies in Latvia.

#### JEL codes:

- **O21 Planning Models. Planning Policy**
- R12 Size and Spatial Distributions of Regional Economic Activity
- **R58 Regional Development Planning and Policy**

#### 1. Review of policentricity perspectives

Polycentricity can be conceptualised from two different perspectives: the *morphological* and the *functional*. Some studies approach polycentricity from a morphological perspective (Lambooy, 1998; NordRegio, 2004; Parr, 2004; Meijers, 2008), while others adopt a functional perspective (Van der Laan, 1998; Hall and Pain, 2006; Limtanakool et al., 2007). As a consequence, different approaches lead to different measures, which in turn could differ in many respects (Burger and Meijers, 2010). A polycentric region is ideally characterized by the presence of different and physically separated cities. Taken together, these centres constitute a system characterised by a flat "hierarchy". However, this definition leads to a question: how to decline this "hierarchy" - this question has been tackled from different approaches. Namely, polycentricity can be conceptualised from both a functional and morphological (or geographical) perspective. In both the cases, a polycentric region is supposed to be characterised by the coexistence of more than one urban centre (Riguelle et al., 2007). However, there are several points in which the two approaches substantially differ. Firstly, morphological polycentricity focuses mainly on the fact that centres must be clearly physically separated, with empty spaces between each other. At the same time, centres must not be too far each other, since there must be an interaction and a minimum proximity that allows the region to be considered as 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). On the other hand, from a functional perspective, the focus is put mainly on the distribution of functions and, as a consequence, on the centralities emerging within the region from the interaction among urban centres. From the functional approach, the hierarchical ranking between cities is assessed with interaction measures, often based on flows of people, goods or information, by making use of tools borrowed from network analysis.

These distinctions allow highlighting of what is probably the most important difference between the functional and the morphological approaches to polycentricity. Such a difference should be referred to the concept of 'centre', which is at the origin of the notion of polycentricity. Morphologically, an urban centre could be simply defined as an agglomeration of jobs and population. In the literature aimed at sub-centres' identification, 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). On the other hand, from a functional perspective, an urban centre is a place that wields power in the territory around it. Using Christaller's phrasing, a centre can be considered a place that supplies central functions to its surrounding territory. From this side the concept of centre is very similar to that of 'central place'. Hence, a region could be viewed as functionally polycentric if it is organised around two or more centres or focal points, places that supply central functions to the whole region or - at least - to a portion of it.

	Eurotional nonenactiva
	Summary of the author.
Table 1.1. Comparise	on of diferences in policentricity perspectives.

Morphological perspective	Functional perspective
The centre is agglomeration of working	Centre is a place, which manages all
places and population.	neighbouring territories.
Centres are similar in terms of size; each	Two or more centres provide functions for
region has one centre.	the region.
Centres are physically separated with	The distribution of functions in territory,
empty territories among them; nonetheless	which appears in the result of mutual
they lay comparatively close to each other	interaction of centres.
for minimal mutual interaction.	

Notwithstanding the differences between the concepts of polycentricity from the two perspectives, it appears reasonable to think that functional and morphological indicators of polycentricity could be - at least to some extent -positively correlated. This is because, despite the different concept of 'centre' at the base of the two definitions, both perspectives are aimed at investigating the same phenomenon, that is to measure the degree to which a region is characterised by the coexistence of several centres, instead of being organised around a single core.

#### 2. Assessment methods for polycentric development

Urban territories cover the greatest part of population, production, and consumption. It could be one of the most important units in economic, social and environment analysis, as well as used as a base for strategies of development policy. Though one of the problems, which appear when urban territories are used for territory unit analysis, is that there are no widely accepted standards in European countries, which could assess them. This problem obstructs to perform comparative researches among those European countries, which use analysis of urban territory units. This methodology shall fulfil three rules: firstly, it must be useful for analysis and planning, necessary for assessment of real economic, social and environment issues. Secondly, it must quite general in order to approbate it in all European countries. Thirdly, it must be flexible enough to use it for different administratively territorial structures in European countries.

The author has performed summary and assessment of available empiric methodologies, identifying polycentric development methods of morphological and functional perspective.

Methods of morpho	logical perspective	Methods of funct	ional perspective
Title	Data of the authors	Title	Data of the authors
Research of urban	European	Functional Urban	Berry(1967)
policentricity with	Investment Bank	Regions (FUR)	Cheshire and Hay,
spatial analysis	Dani Arribas-Bel		(1989)
method or	and Fernando Sanz		GEMACA II (1996
methodology of	Graciab (2011)		and 2001)
European			
<b>Development Bank</b>			
Spatial	Borbély Lįszló	Dynamic	Clusa and Roca
Aggregation of	(2011)	Metropolitan	(1997)
<b>Cities and Rural</b>		Areas (DMAs)	
Areas. The General		<b>Functional Urban</b>	ESPON (2006)
Regional		Areas (FUAs)	
Polycentric Index			
Determination	Veneri and	Determination	Veneri and
method of	Burgalassi (2010)	method of	Burgalassi (2010)
morphological		functional	
polycentricity level		polycentricity level	

Table 2.1. Assessment methods of polycentric development.

#### Summary of the author.

## 2.1. Functional Urban Regions (FUR)

The concept of Functional Urban Regions (FUR) was firstly used by Berry (1967), analysing the example of the USA. This methodology was developed in Europe by Cheshire and Hay (1989). The main reason for using this methodology was to define comparative pairs of urban units in Europe. FUR method can be applicable in metropolis areas (Cheshire and Hay, 1989) and their identification; methodology uses functional approach since on the basis of economic relationship its boundaries are defined (Davoudi, 2008). Taking into consideration these assumptions GEMACA (1996 and 2001) works on North-West European urban system were developed. The main rules of FUR methodology is as follows: one or more neighbouring municipalities the density of which is at least 7 working places per 1 hectare and at least 20.000 working places form the "core". "Inland", in its turn, is created from all neighbouring municipalities, where at least 10% of all residents cooperate with the "core". There are municipalities, which are completely covered by FUR.

## 2.2. Dynamic Metropolitan Areas (DMAs)

DMA methodology enables to determine metropolitan areas and allows using bottom-up or top-down methods. In the first case, cities are classified into successive regions forming metropolises, since the second aim is to divide cities in units or sets and then decide which of them have and which have not metropolitan characteristics. By now most of procedures included in the methodology are based on the bottom-up approach. Metropolitan Map has been developed as a result of network methodology and based on the adjustment of Clusa & Roca (1997) and Rocateal (2005) to the US Federal Registry Methodology. Similarly to FUR method, DMA consists of the central nucleus and inland. The main differences is that it is possible to use trends in labour markets more efficiently in the initial relative threshold of commuting with regard to formation of the major nucleus and its inland infrastructure parts, since there is a self-sufficient and recursive network among the cities. The previous step has been adopted in order to better differentiate the central city from non-central cities, as well as to take into account polycentric nature and different aspects in this area. Procedure is named Dynamic Metropolitan Areas (DMAs). According to this methodology, the aim of the DMA algorithm at the first stage is to specify the "nucleus" in metropolis formed in the "first stage centres" and their primary safety belt. First stage centres should have at least 50,000 residents. The "nucleus" consists of one or several first stage centres and surrounding municipalities exchanging at least 15 % of their residential employees. At the second stage, which differs from the US procedures, "inland" is formed of four repetitions. If cooperation network among cities is used, it can be seen in this part of procedure. The first part involves municipalities with at least 15 % of residents or employees travelling to the central nucleus. This criterion is applied to other three cases using result of the previous iteration as the "nucleus" as follows:

## inland 1= nucleus + municipal commuting 15 % of their residential employment nucleus;

#### inland 2 = inland 1 + municipal commuting 15% of their residential employment inland 1, etc.

Coexistence criteria are applied after the last iteration in order to completely enclose all isolated municipalities with others belonging to and included in the metropolis, while those being far away rather than near have been excluded. However, it is rather difficult to find several nuclei near in large cities, if there is no city near with more than 50,000 residents. It is difficult to differentiate first stage centres from the second stage sub-centres or avoid transfer of polycentric metropolitan areas to sub-centres of different fields. In order to separate first stage centres (central cities) from other large municipalities, application of previous procedures may be carried out in order to:

Calculate commuting percentage among all potential "first" centres. If one of those cities sends more than 15 % of its residents to work in other city, then the first is considered to be a sub-centre. If both parts of the city "cooperate" exchanging more than 15 % of the total commuting, then a unique nucleus in the metropolitan area should be provided.

2) Propose recursive procedure before application of nucleus-inland steps in order to differentiate first stage centres from other second stage sub-centres. Thus, if any of four iterations in the first stage centre discovers a potential as a major city or other inland metropolis, this city has been taken out of the list of first stage centres and application starts anew until all first stage centres separate from second stage subcentres with more than 50 000 residents.

FUR and DMAs methodology is based on the city evaluation graded into four intervals or classes according to the total number of residents: level A includes city areas with more than 1 million residents, level B – between 250 000 and 1 million residents, level C – between 100 000 and 250 000 million residents, and level D – city areas with 100 000 and less residents.

#### 2.3. Functional Urban Areas (FUAs) ESPON

Polycentricity in the European Union is mainly analysed on the basis of definitions and assumptions included in the latest studies of the European Spatial Planning Observation Network (ESPON). This especially applies to the marked off spatial units based on the used concepts. Four analytical levels may be distinguished, namely European Level (macro level), interregional (meso level), interdistrict (micro level) and local city level. According to analytical levels three territorial units are defined, and this allows to empirically analyse polycentricity – nuclear of the city (corresponds to the administrative city), metropolis agglomeration and metropolis region, functional communications are mainly in "city areas", and they have been renamed "functional urban areas". Development of the polycentric city system is evaluated within the method on three territorial levels: polycentricity within the metropolitan region (micro), polycentricity in the European-level metropolitan area (meso), position within the European-level metropolitan area in the European polycentric structure (macro). Polycentric studies are carried out according to the following levels:

- 1. The micro level: polycentricity within the metropolitan region. Polycentric development on the micro level is analysed with regard to all three units city nucleus, functional metropolitan agglomeration and external metropolitan ring. Empirical analysis involves not only focusing on empirical results and general units as such but also concentration on analysis of the use of interconnected elements in the metropolitan region. These could be cities and municipalities, cross-border networks, infrastructural networks, etc.
- The meso level: polycentricity among metropolitan regions. This involves identification and characterisation of links existing among regions of capitals. Polycentricity is analysed in all metropolitan regions which are members of the European-level metropolitan area.

3. The macro level: polycentricity is analysed and compared with other metropolises, as well as metropolitan groups in other European-level metropolitan areas. Quality and intensity in the inner polycentric structure may be evaluated through the comparison with its external relations.



The empirical analysis is concentrated on identification of core cities, major development centres and regional development engines. By using a set of indicators, the analysis reveals the degree of polycentricity at three examined territorial levels. Methodology of ESPON studies is based on the analysis, which focuses on morphological and relational polycentricity in the fields of technical conditions (e.g. transport linkages), people and economic activities (e.g. commuting) and ideas (e.g. sharing common goals, agendas and policies). Location of main employment nodes and its mutual relations and linkages to residential areas are analysed within the polycentricity. The identification of employment nodes (concentrations) on the municipal level is carried out. Number of residents and number of jobs, in particular on higher levels, is used to construct indicators of morphological polycentricity. Analysis covers a specific period of time. In addition, external data - matrix of flows between employment centres, hierarchical and reciprocal relations between employment centres are investigated. Polycentric strategic relations and planning approaches are described. As a result of the method it is possible to conduct assessment of polycentricity, European polycentric structure of the European-level metropolitan areas based on interpretation, synthetic indicators and maps. ESPON studies are carried out in order to identify the existing and potential cooperation fields among major metropolises in Europe. The given methodology is applied in order to identify and better understand crossborder organization and positioning of metropolises and to examine ways of using the current potential more efficiently. Spatial analysis is employed as an important tool for morphological and functional analyses within the ESPON programme. Development of methodology has been started for GEMACA I / II and POLYNET European research projects, and this new approach has been further developed in different ESPON programmes. ESPON projects 1.1.1 and 1.4.3 have determined the major outlines and definitions of methodology; the latest research through FUAs is carried out within the POLYCE project.

#### 2.4. Research of urban policentricity with spatial analysis method

Research of urban policentricity with spatial analysis method or methodology of European Development Bank is developed by researchers of European Development Bank Dani Arribas-Bel and Fernando Sanz Graciab (2011). Methodology analysis is based on a assumption that employment centres is the key places where all economic activities of a city is performed and it is the main reason of spatial difference in incomes among cities and regions. The model of monocentric city is the main theoretical instrument for city research economists, who assume that cities become polycentric, decentralizing employed individuals. The identification of employment centre is being set on the bases of the following principles:

- 1. Its territory is with considerably higher employment density than in neighbouring territories (McMillen&Smith, 2003)
- 2. The area is big enough to provide significant impact on total spatial structure in urban area, as a result of which the population density, land prices and apartment prices are increasing (McMillen&Smith, 2003)
- 3. All subcentres must be close to each other (Giuliano&Small1991).

For the method the available data can be used – city area, inner scale of the city, employment data, geographical data, spatial value. In calculation the formula of Luc Anselin (Arizona State University) is being used (1995). For the calculations the statistical data of local territory is used, which identifies a significant spatial auto correlation in each place. The abovementioned method is being used in different fields in order to define heterogeneity of spatial "gap"; the conclusions are based on permutational approach of the consumptions. In the result the identified HH spots combined with the scatter-plots are HL. RANDOM marking is used in the research (Rey&Sastre-Gutierrez, 2010), which is empirical method for determining differences for intergroup characteristics. The research is performed on differential traits for each group. The result of applied methodology research provides characteristics of polycentric cities (bigger, with greater density, richer, with smaller number of the poor inhabitants).

# 2.5. Spatial Aggregation of Cities and Rural Areas. The General Regional Polycentric Index

Establishing the spatial aggregation level of the cities within the regions was based on generally agreed indices used by the specialized literature (T. Villaverde Castro, 2004) like the size, location and connectivity. The starting point for calculating the indices concerning the towns size and location was the dispersion calculation. Based on the dispersion (o) the mean square deviation (o<sup>2</sup>) had been calculated, and based on it and on the average level (X med), determined the coefficient of variation. This one is expressing in a comparative way the spread related to the average value. From all synthetic indices of spread the variation

coefficient is by far the most used and useful for comparative analyses. (Dalgraad C.J., Vastrup J., 2001).

The general regional polycentric index was defined by Borbély László (2011). The Connectivity was defined by the present paper as the request according to which in a polycentric system, cities and towns have a relatively good accessibility, feature defined within the present work by 8 types of statistical indices: total public roads; modernised public roads; public roads density on an area of 100 km<sup>2</sup>; territory causeway accessibility; in-use rail ways; electrified rail ways; rail ways density on a territory with the area of 100 km<sup>2</sup>; telephone subscribers number, etc.

The adopted aggregation technique corresponds to the multi-criteria method. For each of the connectivity indicators was calculated at the region level a rank established by prioritization according to the other regions ranks in an ascending order, assigning to it a grade/score/ rank (R i). The ranking is designed from 1 to 9 (8 ranks for each of the 8 Romania development regions and a rank for the average at national level, or regional average). Afterwards, an importance coefficient (k<sub>i</sub>) is assigned to each of the 8 connectivity indicators chosen. The importance coefficients scale was prioritized according to (i) the importance rank of the Connectivity Index - very important, major, secondary; (ii) the possible consequences of not fulfilling the agreed criterion, which may be: extremely sever at region economy level; severe, but only at level of some activities carried on within the region; effects with a low influence within the region, sometimes just isolated effects. In this context, the values assigned to the importance coefficients ranked for connectivity featuring indices are the following:

- For "consequences with lower impact effects within the region, sometimes just isolated effects" the importance coefficient scale is designed between 4 and 1;
- (ii) For "severe consequences but only at the level of some activities in the region" the importance coefficients scale is designed between 10 and 5;
- (iii) For "extremely severe consequences at region economy level" the importance coefficients scale is designed between 13 and 10.

Based on the 8 considered connectivity indices prioritizations, and also on the prioritization of the values of the coefficient of importance assigned to each indicator it had been calculated the complex indicator "Aggregate Score of Connectivity" (Asc<sub>i</sub>).

(1)

## $Asc_i = (\Sigma R_i * k_i) / \Sigma k_i$ ,

Where:	Asci	-	The Aggregate Regional Score for Connectiv	vity for
the Devel	lopment F	Region "i", r	espectively for the	national average level;
	i	-	1,, 8 region, 9-regional average level;	
	$\mathbf{R}_{i}$	-	Rank of each connectivity indicator ascend	ing
			prioritized;	

where:

ki

- Importance coefficient assigned to each indicator.

So, the "size" is quantified by the variation coefficient for the cities population, the "location" is expressed by the dispersal in territory of cities with a certain population ( $x_i$  <10.000 inhabitants, 10.000-20.000 inhabitants, ...>250.000 inhabitants), and the "connectivity" is expressed by the aggregate Rank of the Regional Connectivity. Based on these weights, was calculated the aggregate indicator of Regional Polycentric Index for the Urban Areas (IPRURB<sub>i</sub>).

The calculation formula for the Regional Polycentric Index for the Urban Areas (IPRURBi) is the following:

# $IPR_URB_i = CV_i * \sigma_i^2 * Asc_i$

Using similar principles it is possible to define *Regional Polycentric Index for the Urban Areas* and *General Regional Polycentric Index*, which is syntethic expression in the development of cities and rural territories.

#### 2.6. The determination method for morphological development level

The base of the method is developed by Veneri and Burgalassi (2010). The first one is to consider the ratio of people living in the main city over total population in region, as shown in equation 1, where n=1 indicates the main city:

(3)

(2)

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

This simple indicator can be applied to describe the role of the prime city in respect of the region: the higher the weight, the higher the monocentricity of the region. However, it poorly describes to what extent other centers of comparable hierarchic level characterize the region.

A more complete indicator is given by taking into account the size distribution of cities belonging to a region. Cities are ranked according to their population and then the equation (4) is estimated:

#### $\ln pop = \alpha + \beta \ln rank$

The latter is the so-called rank-size equation in the Lotka form (Parr, 1985): if the estimated relation holds, the size distribution of cities follows a statistical log-linear distribution. The slope of equation (4), given by the estimated //, indicates the level of hierarchy, and thus the level of polycentricity within a region: the higher the value of estimated //, the higher the level of polycentricity. Rank-size estimations are widely used in the literature about spatial distribution of economic activity. In particular, they have been used to estimate the Zipf's Law, the well-known empirical evidence which holds if / equals -1: in this case, the size-distribution of cities follows a statistical power distribution (Gabaix and Ioannides, 2004).

As compared to the weight of the prime city, the rank-size coefficient appears to be a more complete and reliable measure of the degree of polycentricity within a region. In fact it synthesizes the hierarchies in terms of population and, hence, economic activity across space. However, some problems arise from rank-size estimation. The first issue is the role of the threshold used (i.e. 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. There are several ways to consider a threshold (Meijers, 2008). The first one is to take into account cities over a certain amount of population, such as, for instance, 20.000 inhabitants. The second method consists in considering the *biggest n* cities of the region, for instance the biggest 30 cities. Another method is to take into account the number of cities according to which population reaches a certain amount of total regional population, for instance by taking the median as a threshold. A second issue is related to the units of analysis. In fact, the cities might refer to several definitions, namely an institutional definition of city or a functional definition of city, intended as urban area.

#### 2.7. The determination method for functional development level

The base of the method is developed by Veneri and Burgalassi (2010). In order to measure the degree of functional polycentric development, literature suggests various interaction indicators based on flow data that usually regard commuting. The starting point of these interaction methodologies consists in conceptualizing the spatial aggregate under analysis - here the NUTS 2 region - as a system composed of nodes or territorial units (municipalities, cities, etc.) and relations among these nodes (Boix, 2002; Calafati, 2007).

(4)

Polycentric regions should be characterized by highly interconnected urban nodes, following the idea that the more the interconnected the centers, the more the polycentric the system. However, a more important aspect is that connections should be balanced among nodes, without a full centralization of flows towards a single node. This latter condition refers to the fact that polycentric regions are characterized by more than one centrality, so that there should exist several nodes that are in a similar hierarchic position.

One simple indicator based on commuting flows is the Entropy index proposed by Limtanakool et al. (2007). Such an indicator is aimed at measuring the structure of a given spatial system, where the 'structure' is one of the three S-dimensions - the other two being the Strength and the Symmetry - that authors consider to characterize regional spatial development. The entropy index is calculated as follows:

(5)

$$EI = -\sum_{i=1}^{L} \frac{(Z_i) \ln(Z_i)}{\ln(L)}$$

where *L* are the links in the network, *Z*i is the proportion of journeys in link *l* in relation to the total number of journeys in the network. The *EI* indicator ranges from 0 to 1 and it measures how the total interaction is distributed among nodes. Values close to 0 means that almost all the trips are toward a single node; hence the region should be strongly monocentric. Conversely, values close to 1 indicate strong entropy of flows, hence a strong interaction among nodes, which is compatible with a polycentric regional structure. However, this very general indicator may not strictly describe the degree of *polycentricity*, but the dispersion of activities over the territory, which would even describe features of *urban sprawl*.

Another indicator to measure the degree of functional polycentricity is the Ordinary Polycentricity (OP) index recently proposed by Green (2007). This index is built by using network analysis' tools in order to quantify the relations among urban nodes. In particular, using commuting flows, the *OP* index considers the in-degree as a measure of centrality of each node, looking at the distribution of these centralities within the region. More specifically, the index can be calculated as follows:

$$(6) \qquad \qquad OP=1-S_F/S_F \max$$

where  $\sigma_F$  is the standard deviation of the nodal in-degree being measured;  $\sigma_F$  max is the standard deviation of a 2-node network where in-degree ni=0 and in-degree n2=in-degree of the node with the highest in-degree value in the network. This indicator also ranges from 0 to 1, where 1 indicates perfect polycentricity and 0 indicates perfect monocentricity. Compared with the entropy index, this indicator has been expressly constructed to measure regional polycentric development; hence it should do it more accurately than the former.

#### 3. Assessment of Latvia in aspect of polycentricity

The concept of polycentricity is being used as the main driver for Lisabon/Goteburg strategy, which is directed towards competitiveness, cohesion and mutual interaction of sustainable development, thus identifying its complete conformity with ESDP principles. Basically ESDP is adopted on May, 1999 in conference of the Ministers for Spatial Planning at the Potsdam; it is a political framework for a better cooperation among Community industry policies, member countries, regions, and cities. Application of ESDP is a tool for integrated spatial planning of sustainable development policy; these principles are taken as a base in Latvia's development planning. System of polycentric cities is more sustainable and balanced than system of monocentric cities and dispersed small populated areas. Polycentricity is a political concept. Though policentricity is the main research object for many EU studies, it is difficult to consider, whether it can decrease economic and social differences and promote balanced competitiveness and sustainable development in each and all European regions while there are no comparative researches, which would be provided after the same methodology in certain, comparative periods of time. Although the new member countries have more polycentric city systems than in old member countries, since national independence they have become more polarized, and this trend is reinforced by the rapid economic development of the capital cities and rural-urban migration. Modernization of transport infrastructure, which mainly is oriented on the capital of the country, can promote development of countries.

Revising the situation of Latvia in the field of spatial planning, it can be considered that currently the process of spatial planning as for European consideration cannot be seen in Latvia, since the Spatial Planning Policy in national level, which could integrate various individual industry policies and strategies, is still not defined; also there are no National Spatial Plan and the spatial development strategy. Hierarchically the highest long-term development planning document in Latvia is Latvia's Sustainable Development Strategy (LSDS) to 2030 (adopted in Saeima on 10 June, 2010) and Spatial Development Perspective, which is a part of LSDS. Spatial Development Perspective underlines three main issues, which conforms to direction of polycentric development:

- 1) Approachability and mobility;
- Distribution of population as place for economic development, human social life and work;
- 3) Areas of national interests unique, specific territories, which are important for the development of the whole country.

Latvia is a member state of the EU, which finds all the Community adopted policies as compulsory; therefore all territorial processes and tendencies in the Europe also affects Latvia both in direct and indirect way. Based on the European Parliament and Council Regulation (EC) No.1059/2003 (26 May, 2003) on common classification of territorial units for statistics (NUTS), it is defined that Latvia is in the NUTS 2 position, while Kurzeme,

Vidzeme, Latgale, Vidzeme, Riga suburb and Riga regions lay in NUTS 3 (LR CSP, 2011). Saeima adopted the Development Planning System Law (APSL), which aims to determine planning documents and their hierarchy in the country, as well as to provide coherence and cross-linking of decisions, made in national and municipality-level; the law became effective on 1 May, 2009. The law states that development planning is performed in three levels: national, regional, and local level; development in each of these levels is planned in long-term (to 25 years), middle-term (to 7 years), and short-term (to three years) (LR Saeima, APSL, 2008). The long-term development planning in Latvia is provided with an aim to reach balanced development of country territory, though there is no unified methodology for the unbiased its assessment. Since 2000 Latvia use territory development index for the assessment of territory development. The methodology of index calculation initially was worked out by Latvian Statistical Institute, and Ministry of Economics of the Republic of Latvia corroborates it for determination of specially supported territories. Approved method of index calculation shows higher or lower development of territories if compared with average socioeconomic development level in country in the corresponding year; territory assessment is being performed periodically, thus representing processes, which occur in state economics (LR MK, 2010). In most significant EU planning documents of structural funds for 2007-2013 planning period (National Strategic Framework on activities and programs) balanced development of territories is defined as horizontal priority, which is mandatory in planning and implementing the EU investments and includes diverse general aim – increase in quality of life, which is complex social, economic and political concept and covers wide range of the population living circumstances. It is stated that for the promotion of balanced development in Latvia it is useful to apply the following political solutions / tools: polycentric development, which is based on stimulation of growth of development centers of different levels; application of territorially differential supportive tools (for cities, rural areas, borderlands) according to potential and needs of particular territory development. Despite the putting forward the priority "Balanced Territorial Development" for the quality of life, one of the major horizontal priority monitoring indicators in assessment of balanced territory development is currently defined territory development index. It is connected with the situation that it must be able to compare the EU's contribution in the comparison; however, with this method it is not possible to objectively evaluate the polycentric development. It is necessary to work out the research methodology of polycentric development assessment, which is based on morphological and functional approach.

Latvia is characterized by comparatively weak urban structure and city residents are concentrated in only few centers. There are five regions in Latvia (Riga, Vidzeme, Kurzeme, Latgale, and Zemgale); almost half of the residents live in Riga region, the second greatest region is Latgale region (16% residents), the smallest is Vidzeme region (LR CSP, 2012). Latgale region is the weakest in terms of territory development. Latvia is characterized by linear concentric, centripetal to the capital-oriented structure of populated areas and traffic infrastructure and concentration of activities in urban area of Riga, which determines its specific role in spatial development of the country. The concentrated critical resource mass in Riga exceeds the critical mass of other regions and cities for several times. Because of its location, size and economically dominant role, it forms agglomeration around it, in the central part of which live around 700 thousand and in the whole agglomeration – 1.15 million residents (LR CSP, 2012). The agglomeration consists of such cities and towns as Jurmala, Jelgava, Ogre, Salaspils, Sigulda, Olaine. The author can mention also different major public development centers, such as Liepaja, Ventspils, Jelgava, Daugavpils, Valmiera, Rezekne, and Jekabpils, as well as other cities with greater economic activities and human resource levels, which are evenly dispersed throughout Latvian territory. The network of populated areas can be characterized with high inequality in terms of development and growth. Moreover, populated areas are poorly connected to each other, limiting the cooperation network and establishment of urban and rural partnership relations. Current model of transportation network gives the advantages for territories, which lay at the main transportation passages and does not provide good accessibility of the rest territory. There are no fast, safe and comfortable inter-linkages among different development centers in the country; as well there is a limited link to the cities in the Baltic Sea region and Europe. Latvia has defined distribution of city size and their characteristics:

City concept	Population	City characteristics
Big city (town)	exceeds 25 000	City with high population concentration and construction density. Developed diverse technical, social and economic infrastructure, as well as diversity of economic, social, and cultural life, as well as other functions.
Medium city (town)	from 10 000 to 25 000	Populated area with medium-high population concentration and construction density. Characterized by developed diverse technical, social and economic infrastructure, as well as diversity of economic, social, and cultural life, as well as other functions. They service wide area within a radius of 30-70 km. In neighborhood of Riga – also satellite towns.
Small city (town)	does not exceed 10 000	Concentration of population and construction density. Characterized by wide technical, social and economic infrastructure, and it partially provides economic, social, and cultural life, as well as other functions. Great part of small cities (towns) functionally is care centers for the residents in the area within a radius of 10-30km

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Polycentric spatial structure can be applied to morphology of settlement system. It assumes that in hierarchical levels of different settlements there are several similar-sized urban agglomerations, as opposed to situations, when there is only one central city, which dominates in each of the level, sometimes even eliminating the existence of some intermediate spatial levels. The principle of polycentric spatial structure and development can be applied to several levels, starting from all Europe to a particular region. On the basis of current city net and their development potential Latvia has defined the following perspective of polycentric development for the period to 2030:





The model of polycentric Latvia can be characterized with capital Riga and centers of national and regional significance, the main part of which lay in infrastructure subways. Planning the direction of polycentric development, in 2008 Latvia adopted 1.1.1. methodology of ESPON Project un stated that cities according to FUA (Functional Urban Areas) ranking have the significant role in development of balanced state territory (ESPON, 2004):

- MEGA (Metropolitan Growth Area) center Riga. Riga is defined as a city, which has the highest population, transportation, production, knowledge and decision-making indicators;
- 2) trans-regional development centers Liepaja and Daugavpils. These cities are both trans-regional and regional development centers at the same time. Defining a crossdevelopment centers were taken into account such factors as population, gross domestic product, cross-networking among universities and cities, etc.

3) regional development centers, which are formed by Jelgava, Ventspils, Valmiera, Rezekne, Jekabpils, and Jurmala.

Defining city ranking according to FUA methodology, basically the population number indicator of the defined territory was used. Around 70% of the population live in different urban areas of Latvia and only one third of the population have chosen rural areas as their living place.



Figure 3.2. Distribution of Latvian residents after their place of living in 2012, %. *The summary of the author.* 

At the beginning of 2012 Latvia has 2 042 371 permanent residents, 32% or 650 thousand of which live in Riga (MEGA), 8% or 167 thousand live in trans-regional development centers (Daugavpils - 91 511, Liepaja - 75 397), 11% or 227 thousand live in regional development centers (Jelgava – 58300, Jekabpils – 24025, Jurmala -50634, Rezekne – 31570, Valmiera – 24731, Ventspils – 38082). In other 67 cities (in small and medium development centers) live 18% residents (the total number of residents – 362 thousand) and 31% or 667 thousand residents live in rural areas (CSP, 2012). Differences among cities in Latvia become more explicit; cities represent rapid social polarization, increase in poverty, and environment degradation. There are serious regional differences in unemployment and income level among Riga and other regions of the country:



Figure 3.3. Indicators of regional difference in Latvia, 2008, % (LR CSB, NVA, 2008)

A gap among cities and rural area is widened due to lack of working places in urban environment and agrarian sector. The perspectives of future development are based on polycentric urban system, delaying further polarization. Except national and regional development centers only few centers with sufficient critical mass can be classified as cities. The spatial distribution of these centers show it will not be an easy task to develop such urban structure, which would be able to direct spatial development of Latvian regions. The polycentric development of Latvia cannot be formed at Riga's expense, fragmenting it and distribute within the region of Riga. It is necessary to continue increasing the development potential of Riga as a metropolis and strengthen it as MEGA center of the Baltic region, at the same time developing polycentric urban system of Latvia, which is performed on the basis of regional development centers and county structure. For the successful development of regional development centers in future it is necessary to validly use their advantages of competitiveness, promote their individual profile and development of unique competencies, and contribute formation of mutually complementary networks, at the same time increasing human resources, institutional and infrastructure capacity to strengthen their competitiveness and supportive role of region development. Additional to it the development must be directed towards creation of attractive and qualitative living environment, increase in critical mass of creative people and economic activities, sustaining of international cooperation. Cities of regional development centre networks functionally supplement trans-regional city network, where complementary functions are related to both economic issues and services and to such city functions as culture, education and knowledge, social infrastructure, international networks etc. Following this approach Latvia has adopted concrete tools of territorial development - targeted investment program of EU structural funds. For the planning period of 2007-2013 Latvia has established implementation scheme for investment policy, which is available with support of EU finance resources. The usage of allocated resources are planned very carefully to reach the maximum efficiency. The investment tools are oriented on investments in infrastructure of regional and trans-regional development centers. The polycentric approach for territory development in Latvia is one of the ways how to divert EU financial resources to infrastructural investments, create attractive environment both for residents and investors, and it is the only way how to stop decrease of human resources in peripheral areas.

#### Conclusion

- Although polycentricity is the main subject of many EU researches, it is hard to say if it can decrease economic and social differences, and foster balanced competitiveness and sustainable development in each and every European region while there are no comparative researches based on one methodology in comparative period of time.
- 2) The author looks at polycentricity from two perspectives: morphological and functional. There are no recognized standards in European countries to evaluate city's territory units in the context of polycentricity. This fact prevents carrying out comparative research among European countries which uses analysis of city's territory units. The author in this article identifies initiated research methodology of polycentric development evaluation city's polycentricity research with the help of dimensional analysis, General Regional Polycentric Index, FUR, DMAs, FUAs, methods for determination the morphological and functional polycentricity level.
- 3) Long-term development planning with aim to establish balanced development of state's territory now is performed in Latvia, but there is no common methodology for its objective evaluation. In planning development direction of polycentricity, the methodology of ESPON Project 1.1.1. is used and it is set out that essential role in the balanced development of state's territory is anticipated according to FUA ranking. In Latvia polycentricity approach to the development of region territory is one of the ways how to divert EU finances to infrastructure investments, to create attractive environment in regions.
- 4) The aim of integration of Latvia in EU primarily is the increase of prosperity in all state's regions. Although different EU funds are implemented since 2004, Latvia has not reached balanced regional development yet. It is monocentric country with powerful position of state's capital Riga. The concentrate critical mass in Riga for largely exceeds the critical mass in other regions and cities. The difference between other state's cities and regions becomes more distinguished, fast social polarization, increase of poverty and degradation of environment shows up.
- 5) Since 2000 Latvia for evaluation of development of territories uses the territory development index. This index is one of the main criteria for EU horizontal priority supervision for evaluation of balanced development of territories. By using territory development index method it is impossible to evaluate objectively the tendency of polycentric development. In order to carry out objective assessment it is necessary to set research methodology of polycentric development evaluation, basing on morphological and functional approach.

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