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METROPOLIZATION OF LARGE URBAN CENTERS IN ROMANIA: ANALYSES AND SOLUTIONS

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Abstract:
Metropolization is one of the most dynamic processes of the contemporary world, due to changing existing economic patterns and creating new relationships between major cities. Therefore, specific tools and techniques for periodic evaluation of medium- and long-term territorial development policies are needed in order to assess the dynamics of territorial development of metropolitan areas. In this context, the article aims to introduce an innovative methodology based on an IT-mathematical model for the evaluation of the main indicators for characterizing the metropolitan territories in Romania in terms of dynamics and existing territorial disparities. The implementation of GIS technology and statistical support in assessing the Romanian metropolitan areas contributes substantially to carrying out in-depth, open and innovative analyses, used to phrase development scenarios at the territorial level. From the analysis of the aggregate indicators in a composite indicator (performance index), interesting conclusions are drawn regarding the definition of functional urban areas (ZUF), the improvement of integrated development strategies in functional urban areas and the metropolitan governance system.

Key words: polycentricity, territorial statistics, disparities, GIS, spatial planning, Romania

Introduction:

The way how people and economic activities evolved over time and space has led to many structural transformations. In particular, the improvement of communication technologies and the implementation of IT technologies, has led in many economic sectors to increased mobility of people and goods and the transformation of economic development processes, which has generated processes of suburbanization and integration with their surrounding hinterland (Brezzi and Veneri, 2014). A metropolis, according to specialty studies, is a city with a population of at least 500,000 inhabitants, characterized by the following features: excellent quality of services, institutions and facilities, potential for innovation in technology, economy, politics and culture, characterized by specificity and attractiveness (Bassand, 1997). In contrast to the cities of the industrial age, today's

metropolis does not produce goods, but it provides quality services and generates knowledge in the field of knowledge. Within the metropolises, the headquarters of global corporations are established, which here sends orders for the reallocation of production centers. In metropolitan areas, locations for banks serving large corporations, law firm offices, firms and companies specialized in advertising, marketing and consulting are established.

Integrated metropolises develop not only with metropolitan areas, but also within a global network of metropolitan areas operating in the network. Space mobility is one of the main features of the metropolitan process. According to M. Privelli (2003), the expansion of the metropolitan area into the contemporary world depends on the type and quality of the services offered in the core of the metropolis; the level of scientific and technological development, the ability of service providers and consumers to access the latest achievements of science, economic, technical and legal access, the type of legal and administrative system, and the political situation. In general, the integrated approach to the development of metropolitan areas must take into account those responsibilities that are considered crucial to the development of the metropolis and its direct surroundings, namely the public transport, territorial marketing and spatial planning system (Bartosiewicz and Pielesiak, 2014). In relation to Europe, spatial planning undergoes substantial transformations, where the so-called "Europeanization" of planning has led to a reorientation of planning policies, systems and approaches, as a result of national responses to European initiatives. Thus, spatial planning spans from the traditional dimension of national politics to a "meta-governmental" model that adapts to current political trends and socio-economic dynamics: globalization / Europeanization, economic competitiveness, development of territorial development agendas, adaptation to new scales of social and economic life (Cremer-Schulte, 2015).

The metropolitan process is closely linked to the concept of polycentric development advocating the creation of dynamic economic integration areas, distributed in a balanced way throughout the European Union and comprising the internationally accessible network of metropolitan regions and their hinterland (towns, municipalities and rural areas various sizes) (Tache and Petrișor, 2017). The polycentric urban system can be defined as a functionally integrated socio-spatial entity, made up of several urban nodes, which can be different in size, but all play an important role in the system and are linked by intensive reciprocal and multidirectional relationships (Tache *et al.*, 2016; Petrișor, 2017). Meijers and Burger (2010), for instance, have shown how different spatial structures – and in particular the monocentricity/ polycentricity dimension – affect the economic performance of metropolitan areas. From functional perspectives and governance, functional urban areas are internationally considered essential basic polycentric development. Functional urban areas are often identified with metropolitan areas. Policentricity is currently considered a useful spatial planning tool to enhance the competitiveness, social cohesion and environmental sustainability of cities (Davoudi, 2003). Urban areas regarded as polycentric development nodes have been the subject of numerous studies at European and national level. Numerous European studies delineate Functional Urban Areas (Functional Metropolitan Areas) based on

commuting data at the workplace reflecting the 15% threshold of commuter traffic to the core city of the economically active population (IGEAT *et al*., 2007).

The challenges of competitive metropolitan development have become the subject of extensive academic discussion about governance (Dieleman and Faludi, 1998). At the same time, the challenges of intra-urban development have already been addressed in the URBAN policy debate in the first and second programming periods at European level (Davoudi, 2003). Metropolization is one of the most dynamic processes of the contemporary world, changing existing settlement patterns and creating new relations between large cities (Jałowiecki, 2006). In the context of affirmation of metropolitan areas and intelligent metropolitan areas, the precise definition of functional urban areas represents a process to maximize integrated territorial development policies. Metropolization is a process of attracting new specific activities, jobs and inhabitants, relying heavily on competitiveness. This means that the attractiveness of specific metropolitan functions and activities is based on certain strengths of cities, usually the most powerful of them, and their potential, which offers area-specific advantages. In this context, the metropolitan governance modalities are crucial to territorial development by strengthening competitiveness and attracting new functionalities.

Metropolitan areas now have a new meaning, since their local government is cooperating and working with civic and private sectors to address regional policy issues in a network type (Hamilton, 2014). The great challenge for these areas is to determine the appropriate coordination between the formulation of strategic planning perspectives for the whole metropolitan area and the arrangements for governance that enable decisions to be made. New spatial development perspective is a dynamic concept in which cities are not only regarded as centers of supply but also as engines of development (Castells, 1996; Sassen, 2001; Schindegger and Tatzberger, 2002). The new vision for spatial planning at European and global level is the development of cities as intelligent metropolises. The term "intelligent" implies, in particular, an implied or explicit ambition of a city to improve economic, social and environmental standards and therefore its competitiveness in the urban competition (Giffinger and Gudrun, 2010). Intelligent approaches to functional specialization are multiplied by the private investments to be trained in these areas of specialization according to the principle "*limited resources directed to limited areas*".

Problematic:

In Romania, the definition of the metropolitan area is made by Law no. 351/2001 regarding the approval of the National Territory Planning Plan - Section IV - The Network of Localities, Annex I, which defines it as "*the area created by association, based on a voluntary partnership between the major urban centers (the capital of Romania and the municipalities of the 1st rank) and the urban and rural localities located in the immediate area, up to 30 km away, between which several collaborative relations have developed*" (Parliament of Romania, 2001). According to Urban Planning Law no. 350/2001, Annex II, the metropolitan territory is "*the area situated around the large urban agglomerations,*

bounded by specialized studies, in which reciprocal relations of influence are created in the field of communication, economic, social, cultural and urban infrastructure" (Parliament of Romania, 2001). Amended Law 215/2001 defines the formation of metropolitan realities as intercommunity development associations. Art. 11 states that "*two or more administrative-territorial units have the right, within the limits of the powers of their deliberative and executive authorities, to cooperate and to associate, under the law, by forming inter-community development associations with legal personality, by law private and public utility*" (Parliament of Romania, 2001). The metropolization process of the major cities in Romania has been relatively new, and has led to differences in the trend of their development and hinterland. An important role in transforming metropolitan areas in Romania into engines of economic development is played by the efficiency of the spatial planning process and their good governance.

Thus, the metropolization of the territory should be analyzed in the context of the specialization of knowledge-based economic activities at the level of large urban centers (Krätke, 2007) and their attractiveness. For this reason, most metropolitan areas in Romania have to become functional urban areas that can provide more efficient territorial organization and better access to services of general interest, thus enabling progress in terms of cohesion and competitiveness objectives. An Integrated Metropolitan Strategy (SMI) in the medium and long term is one of the ways to ensure the balance to be achieved for this purpose. The strategy consists of a long-term vision that sets the context and the broad directions, and a package of medium- and long-term strategic policies, programs and projects.

The metropolization process being a dynamic phenomenon, a key element for a proper policy at the level of major urban areas is policy monitoring at the territorial level. The data obtained in the system are periodically updated, aggregated and presented in synthetic form in maps, tables and statistical indicators to highlight the dynamics and territorial disparities at metropolitan areas (Dobrin *et al*., 2010a, b; Manole *et al*., 2011, 2012). Different statistical techniques including regression analysis, factor analysis, multicriteria analysis and cluster analysis can be used to produce a composite index of selected indicators (Coombes and Wong, 1994). Statistical evaluation techniques should be designed to match the indicators for all areas studied and take into account both quantitative and qualitative aspects. The most important step in the process of analyzing territorial indicators is to clarify the basic concept to be represented by the analysis. The proposed methodology for the assessment of metropolitan areas in Romania is based on a system of minimal but representative indicators for the characterization of metropolitan territories, an innovative solution based on the standard breakdown scheme (Jenks) (Tache and Tache, 2016) and on GIS support to produce hierarchies of territorial indicators at metropolitan area levels and socio-economic discrepancies at each metropolitan area, displayed as charts and maps.

Methodology for evaluating the metropolitan areas of Romania:

Starting from the studied concept, namely the development of metropolitan areas in Romania, the representative indicators that highlight the dynamics of these territories are represented by the phenomenon of population mobility. Thus, the indicators collected in time series are represented by statistical indicators on the population, the number of employees, the number of new dwellings and the incomes of the population and the turnover of localities, obtained from the Tempo database (National Institute of Statistics Bucharest, 2018).

The spatial database made in the GIS system was structured as follows:

- Population of metropolitan areas in evolution (2008, 2011, 2014, 2017);
- Number of evolving employees (2008, 2011, 2014, 2016);
- Number of new homes in the last 5 years measured statistically (2012, 2013, 2014, 2015, 2016);
- Total number of dwellings (2016);
- Population revenue over the past 5 years measured statistically (2012,2013,2014, 2015, 2016);
- The turnover of the localities in the last 5 years measured statistically (2012, 2013, 2014, 2015, 2016).

Starting from these basic statistical indicators, combined indicators were developed reflecting the evolution of the metropolitan areas, both in quantitative and qualitative terms.

For the population field, the following combined indicators were calculated:

- Population evolution 2011-2008;
- Population evolution 2014/2011;
- Population evolution 2017/2014.

For the housing domain, the indicators analyzed were the following:

- Number of new homes in the last 5 years;
- Evolution of the number of new dwellings in the last 5 years in relation to the total number of dwellings in 2016.

For the assessment of the number of evolving employees, the following combined indicators were considered:

- Evolution of the number of employees 2011/2008;
- Evolution of the number of employees 2014/2011;
- Evolution of the number of employees 2016/2014;
- The ratio between the number of 2016 employees and the population volume 2016.

For the indicators of the population incomes and the turnover of the metropolitan areas, the following indicators were calculated:

- Average increase or decrease in population incomes for 2012-2016;
- Average slope of growth or decrease in the turnover of metropolitan areas.

The next step for these combined indicators was to group the values recorded at the level of the metropolitan areas at 10 intervals according to the Standard Breaks (Jencks) - standard breakdown scheme, thus obtaining 10 groups, which, in the rising order of values, scores

ranging from 1 to 10 were attributed. Jencks' classification based on the natural grouping of values is done by identifying breakpoints by looking at those default data pooling patterns. Values are divided into classes where the boundaries are marked by large jumps from one value to another. If an indicator has recorded a value of 0 at a studied location, the score attributed to that UAT at this indicator will be 0. Therefore all the values of the selected indicators have been converted into scores of the groups they belong to (1,2, ..., 10, possibly 0), and this was done with ArcGIS 10.4's statistical support.

For each grouping of indicators (population, dwelling, number of employees, income, turnover) using iterative techniques (Delphi method), NIRD URBAN-INCERC's spatial planning specialists have determined weights to achieve a single indicator for each group of indicators. Finally, using the same iterative method at the level of the unique indicators on each indicator group a composite performance index of the studied metropolitan areas was determined.

Results and discussions:

The evaluation of the territorial indicators proposed in this study resulted in a GIS-based thematic map showing the evolution of the constituent localities of the legally constituted metropolitan areas and also the identification of the potential functional urban areas.

The weights established by NIRD URBAN-INCERC Bucharest for each single indicator of the indicator groups used were the following:

- Single population ratio - 22%
- Unique housing index - 11%
- Unique number of employees - 30%
- Single Income Index and Turnover of Localities - 37%

The question of the interpretability of the analysis is the most important part of the evaluation of the statistical indicators, because the objective of aggregating the indicators is to adequately provide information on the problems of the metropolization of the territory of Romania.

The use of GIS technology in conducting territorial analyzes on metropolitan areas provides a substantial contribution to carrying out in-depth, open and innovative analyzes, with the possibility of formulating development scenarios at territorial level (Petrișor, 2016).

The map of the performance index at the level of the metropolitan areas of Romania is displayed in Fig. 1.

From the analysis of thematic map on the performance index of the metropolitan areas, we can draw the following conclusions:

- Metropolitan areas that can be assimilated to functional urban areas are located around Bucharest, Timisoara (Timis County) and partly around the cities of Constanta, Arad, Cluj-Napoca, Iasi, Brasov, Ploiesti (Prahova county), Sibiu, Oradea (Bihor County), Baia Mare (Maramures County), Pitesti (Arges County) and Bacau;
- Corridor of high potential territorial development: Timisoara-Arad, Bucuresti-Ploiesti;

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- Corridor of development with medium potential: Baia-Mare - Satu-Mare, Suceava-Botosani, Braila-Galati;
- Metropolitan areas too large territorial in relation to the competitive potential: Craiova metropolitan area, Satu-Mare metropolitan area, Ramnicu-Valcea metropolitan area, Zalau metropolitan area (Salaj county);
- Metropolitan areas with low potential for competitiveness: Vaslui metropolitan area, Corvina metropolitan area (Hunedoara county), Zalau metropolitan area (Salaj county), Roman metropolitan area (Neamt County), Piatra Neamt metropolitan area (Neamt County).

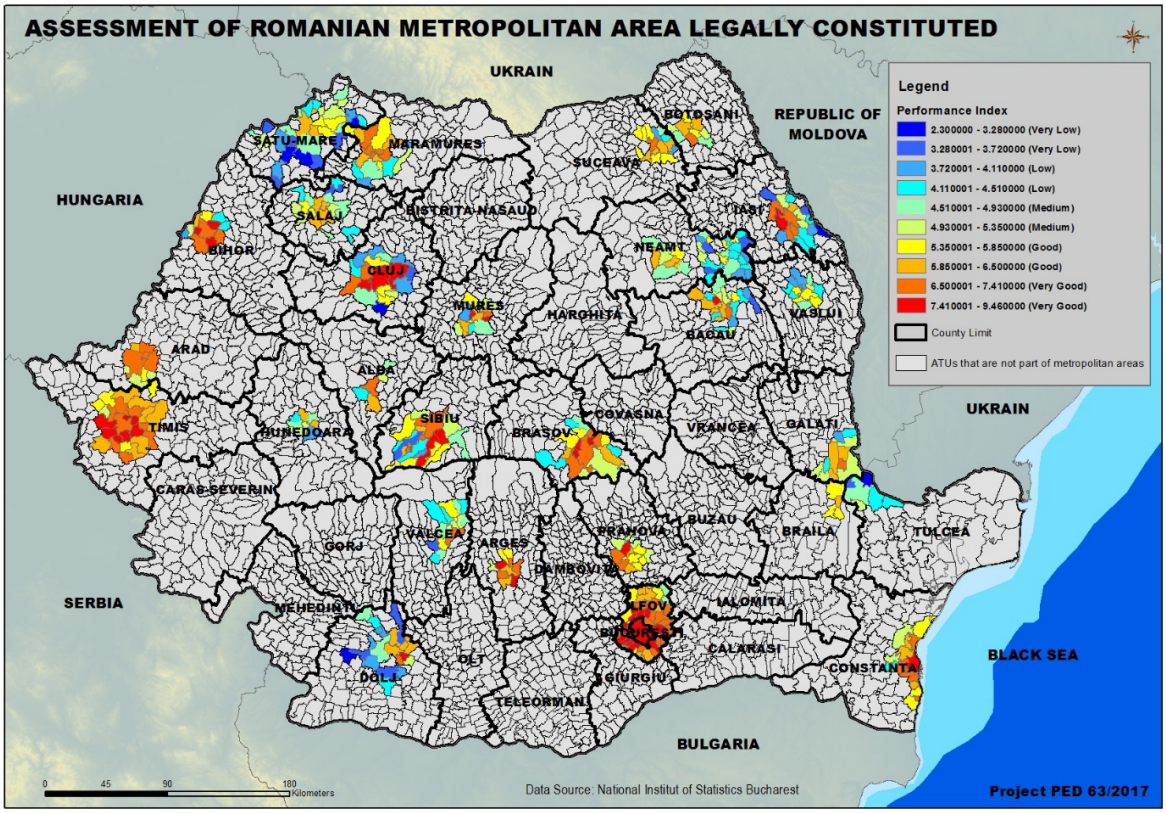

Fig 1. Evaluation of metropolitan areas in Romania

Also, from the analyzes carried out by groups of indicators, there is a very large increase in turnover for the Cluj-Napoca municipalities (2 times increase of the turnover in 2016 compared to 2009 (becoming the second city as turnover after Bucharest – the capital of Romania), Timisoara, Brasov, Arad (2.5 times increase in turnover in 2016 compared to 2009), Oradea and Targu Mures. Municipalities with high turnover but with slower growth rates are the cities: Constanta, Ploiesti, Pitesti, Sibiu, Iasi, Galati, Craiova and Bacau. Of the municipalities with moderate turnover but with significant increases in the period 2009-2016 we mention the municipalities of Baia Mare, Satu Mare, Alba-Iulia, Suceava, Braila. Municipalities with insignificant increases in turnover are also municipalities whose metropolitan areas have a low potential to become functional areas. These include the cities of Ramnicu Valcea, Deva, Piatra Neamt, Vaslui.

In the chapter on the number of employees, the municipalities of Cluj-Napoca and Sibiu registered a significant increase. Also, average increases were registered in the municipalities of Brasov, Oradea and Alba Iulia, while decreases in the number of employees were registered in the municipalities of Ramnicu-Valcea and Vaslui. Municipalities with constant population growth are the municipalities of Cluj-Napoca and Iasi.

In terms of population incomes, the highest wages are in the municipalities of Bucharest, Cluj-Napoca, Timisoara, Sibiu and Pitesti, while at the opposite pole there are Braila, Ramnicu Valcea, Vaslui munitions.

Conclusion:

The assessment of metropolitan areas in Romania highlights the country's development. Thus, the analysis demonstrated an economic and social development of Romania at different speeds. There are territories where growth poles have an upward trend, and here we mention the capital of Romania - Bucharest with the metropolitan area, Timis-Arad conurbation, metropolitan area of Cluj-Napoca, Oradea, Constanta, Brasov, Ploiesti, Pitesti. But there are also many municipalities with low turnover compared to the big cities and which have an insignificant economic growth to support a network of polycentric localities. Space planning plays a significant role in attracting investment and increasing urban prosperity. Increasing the number of sustainable cities is absolutely necessary for the economic development of Romania and for the European desires for territorial cohesion.

The formulation of a clear long-term vision of the development of the city and the neighboring areas by developing integrated metropolitan development strategies, strengthening the public-private partnership, implementing urban and territorial marketing as strategic components of territorial planning, and last but not least a managerial structure to manage the proposed resources and projects contributes significantly to maximizing the socio-economic development potential.

Clusters, as elements of increasing competitiveness, must be supported to develop in those sectors where large cities have functional and intelligent functional specializations. The development of industrial parks is an important asset for the economy due to the large investments that are attracted to these areas. The business pulse here is also very good with the profits or losses declared by the companies that administer these perimeters. Technological, industrial, innovation and science parks (PTIS) are increasingly seen as means of creating dynamic clusters that accelerate economic growth and increase international competitiveness.

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