

Methodology to Establish the Borders and Structure of Metropolitan Areas

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ABSTRACT

The paper is focused on CURS' research experience developed in the DEMOS Project in order to identify and to describe profiles of the metropolitan areas in Romania.

A metropolitan area is defined as an integrated unit in which the core city and the surrounding localities have direct, diverse and continuous interrelations as it is developing as a functional and systemic area.

In the paper there are showed both some international significant experiences in the field (from USA, Canada, Europe – METREX) and from Romania.

The proposal methodology we elaborated and pre-tested on Bucharest area is seen on a kind of standard methodology to be used as a framework in order to identify the metropolitan area borders and to describe the profile of this area.

Thus the methodology should take into account four stages or steps.

The first step is to survey the local authorities from the surrounding localities (as a survey frame or sample universe, including all localities within an established distance). The data for interrelation indicators such as population migration, community, space building under the influence of the core city, tourism potential etc. were collected from the local authorities.

The second step is to analyze these data and to establish which localities should be included in the metropolitan area. An integration index was also built covering the values of the main indicators. The data were normalized to be compared and shared so the final indexes or score showed the hierarchy of the integration of the surveyed localities. The most integrated localities are suggested to be incorporated in the metropolitan area.

The third step is to assess the population support for the establishment of a metropolitan area. A representative survey at the level of the surrounding localities reported to be included in the metropolitan area is conducted. Here we are talking about the relations this population has with the core city, the perception of the advantages and disadvantages of the metropolitan area and their attitude, *pros* and *cons* the settling of a metropolitan area.

The fourth step is about the establishment of an interdisciplinary team (with localities representatives, architects, economists, lawyers and sociologists) that will analyze the data and will design the new metropolitan area with borders, structure, objectives and own management.

KEYWORDS

methodology, survey, indicators, interdisciplinary team

JEL Classification

C18, L83, R11

The metropolitan area is defined as an integrated unit in which the core city and the surrounding localities have direct, diverse and continuous interrelations as it is developing as a functional and systemic area.

If accepted the idea and the obvious fact that metropolitan areas are made up of a polarizing city (or several cities, if they are united from a spatial point of view) and the settlements from the surrounding territory, strongly connected with them, then the essential issue brought forward is that of setting the borders, the settlements that are part of the same area.

We emphasize the interrelation between the city and the surrounding localities because many people wrongly consider the metropolitan area as being a peri-urban area, outside the city, thus excluding its very central, polarizing nucleus out of this assembly of social and economic concentration.

There are numberless methodologies to determine the settlements included in the metropolitan area, starting with the simplest one, that of setting the maximum distance to the core city, and ending with the thorougher methods, that establish the borders by applying a methodology for the assessment of the

interrelations between the core city and the external area (in scholarly literature this area has various denominations as attributes: peri-urban, pre-urban, extra-urban, commuting, suburban, pre-metropolitan etc.).

Moreover, there are numerous studies of various geographers, economists, statisticians, sociologists, urbanists etc., that aim at determining the borders of metropolitan areas. In some metropolitan areas there are included only the settlements declared suburbs or suburban localities. Other such areas include all the settlements in the surrounding territory situated within a certain “x” distance from the core city (usually less than 50 km), but there are also studies in which this area is extended to over 60 km. Even in the case of Bucharest there are studies that include Oltenița, for example, in the Metropolitan Area of Bucharest.

Without excluding the normativist and associative kind of experiences through which there has been decided the building of metropolitan areas by administrative or associative ways (partnerships), it can be asserted that the majority of the metropolitan areas was formed on the basis of some clear studies and scientific criteria, through which there were avoided the negative effects of some interests or arbitrary decisions.

In the United States of America, for example, ever since 1940 the Bureau of Statistics has introduced the concept of Standard Metropolitan Statistical Area – SMSA, which became later the Metropolitan Statistical Area. Having in view that the social and spatial integration of cities is done at a larger scale, including various metropolitan statistical areas, the concept advanced to that of Consolidated Metropolitan Statistical Area.

What is essential is the fact that these metropolitan areas were determined on the basis of some rigorous criteria. In the case of the USA the status of metropolitan area implies:

- The existence of a core city having at least 50000 inhabitants;
- The inclusion in the SMSA of all the communities out of which at least 15% of the workforce was commuting in order to work in the core city or at least 25% of the workforce in the core city was commuting to the surrounding territory (district) ;
- In addition, at least 75% of the workforce from the surrounding territory included to the SMSA had to be involved in non-agricultural activities or have other such jobs;
- The metropolitan area may also include, due to spatial contiguity, other rural settlements that do not accomplish the criteria previously mentioned but their rate cannot represent more than 10% of the whole area.

In 1990, there were 254 such metropolitan statistical areas in the USA. Note that we are not talking about great metropolitan areas only, but rather about functional urban areas.

In Canada there is the concept of Census Metropolitan Area (CMA). This area is shaped and demarcated on the basis of some censi of population and of some indicators regarding the interdependence of the population in the surrounding localities with the work market of the core city. Usually, the surrounding localities may be included in the Census Metropolitan Area when:

- out of a minimum of 100 commuters, at least 50% (of the active/working population of these surrounding localities) are working in the core city
- out of a minimum of 100 commuters, at least 25% (of the active/working population working in the surrounding localities), are living in the core city.

Thus, these data provided by the census made it possible for the authorities to identify the surrounding localities that have a strong connection with the work market in Ottawa – Gatineau, leading to the creation of metropolitan areas.¹

In Europe there are numberless studies for determining the borders and structure of metropolitan areas. The scientific substantiation of the metropolitan area of Vienna on the basis of the mobility of the workforce is of great importance regarding this issue.

The European center of coordination and research in the field of social sciences in Vienna, elaborated in 1972-1973, the model to determine the Functional Urban Region under two forms: Standard Metropolitan Labour Area (SMLA) and Metropolitan Economic Labour Area (MELA). SMLA comprises the territory where over 15% of the economically active residents in the surrounding localities are commuting daily to the metropolis, and MELA comprises the territory where most of the population is commuting daily to work in the core city.

The calculation formula is:

$$I_i = \frac{C_{ij}}{REA_i} * 100$$

where: I_i = the value of commuting in the “i” area

C_{ij} = the level of commuting between the “i” and “j” areas

REA_i = economically active residents (working population) in the “i” area

In Romania there are some notable studies regarding the determination of peri-urban areas, of the regional function of the city of Bucharest or even of the metropolitan areas.

Among the most well known studies for determining the borders of the metropolitan area is that of the geographer Ion Iordan who, in his volume “The Peri-urban Area of Bucharest”, published in 1973, determined the localities in this area using the formula:

$$X_i = \frac{\frac{1}{n} \sum_{i=1}^n R_i S_i}{\sqrt{D}}$$

where:

R = each of the indicators enumerated for the “i” locality, respectively, the index regarding non-agricultural activities, commuting, urbanistic innovation, forest areas, perishable products intended for the city consumption, production of goods of vegetal and animal origin intended for the city consumption and tourism potential

S = the degree of importance of these factors

D = the distance within which the city is situated

In Romania there are also known the studies published by Dorel Abraham in 1979 and 1991 (Introduction in Urban Sociology) on the basis of the researches made in collaboration with sociologists, geographers and economists, in order to determine the peri-urban area of Bucharest or the regional function of the city of Bucharest. There have been taken into account indicators regarding the following dimensions: workforce, supplying the city with perishable products, tourism potential, the distance and spatial contiguity in connection with the polarizing city.

¹ See: www.ottawa.ca/residents/statistics/new_growth/background_report/population_projections/ottawa_area_en.html

$$ZP = \frac{P_1 A_1 + P_2 A_2 + P_3 \sqrt{A_3}}{\sqrt{D}}$$

where:

P_1, P_2, P_3 = share ing for the three indicators

A_1, A_2, A_3 = standard values for the three indicators (workforce, agriculture for the benefit of the city and tourism potential)

D = the distance to Bucharest

After 1990, the experience with studies regarding the determination of the metropolitan area was diversified. Thus, the process of urbanization led to the formation, just like in other countries, of some poles of urban development having a regional impact. The administration authorities of some polarizing cities such as Iași, Oradea, Constanța, Cluj, Baia Mare, Brașov, Arad etc., have already entered upon well known studies regarding the development of metropolitan areas on associative basis. These studies have positive results but they practically refer to the formation of some metropolitan settlements having in view the legislation in force without, on the one side, the area being constituted according to scientific studies that were validated and widely accepted after assessing the population support and, on the other side, without the new reality having enough financial, managerial and interinstitutional power for a sustainable development. A special case is the city of Bucharest.

After 1989, together with the expansion of the city in the surrounding areas, determined by the horizontal urbanization process (suburbanization) by means of exurbation, there appeared the systematic interest towards defining, planning and organizing the metropolitan area of Bucharest.

One of the first studies, coordinated by the Bucharest Town Hall Sector 1, initiated in 2003, was based on the two dimensions: scientific determination of the Metropolitan Area of Bucharest and the juridical and political organization of such a reality.

At present, only in the case of the city of Bucharest, there are 4 studies regarding the realization of the Metropolitan Area of Bucharest, each of them putting forward proposals that are more or less consistent with respect to the organization and enactment of this area.

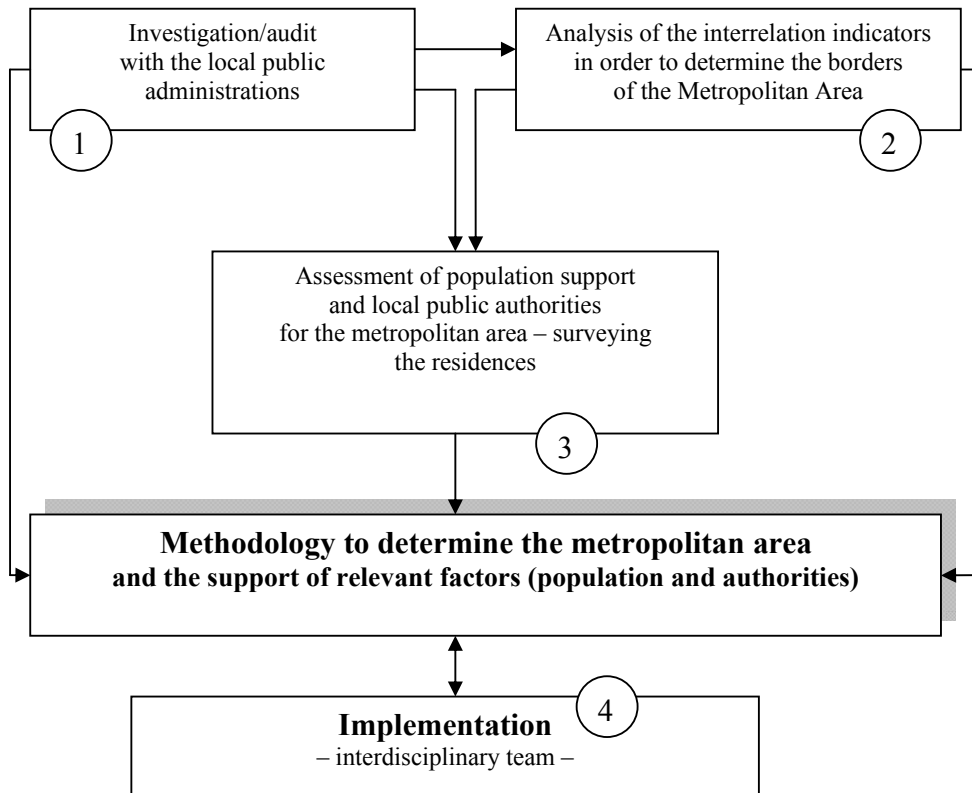
The previously mentioned projects are the following: the study in 2003-2004, based on CURS research, coordinated by former mayor Vasile Gherasim, regarding the scientific and legislative substantiation for the building of the metropolitan area of Bucharest; the study in 2005 coordinated by the Alma-Ro Association, regarding the new structure of the Metropolitan Area of Bucharest, starting from the administrative evolution of the city of Bucharest in the districts in the surrounding area during 1950-1981. The study in 2005 coordinated by The Agency for Regional Development Bucharest-Ilfov, regarding the Strategic Regional Frame, 2007-2013, specifically regarding the economic, social, infrastructural, environmental, administrative and political aspects, for the formation of metropolitan areas, within a Regional Development Plan.

The project-study coordinated (ordered) by Urban and Metropolitan Planning Center in Bucharest of CGMB, with the help of Integraph Computer Services, regarding the borders, planning and functioning of the Metropolitan Area of Bucharest (MAB).

Unfortunately, these approaches lacked coordination, an activity that was absolutely necessary in order to avoid the politization of such a step, in order to share a common and scientific methodology, to determine the borders and structure of the MAB and to elaborate an optimum juridical frame of organization and functioning of such a new structure like the Metropolitan Area of Bucharest.

Having as support previous examples and our own research in the area of Bucharest, **within the DEMOS project there has been elaborated and validated a frame methodology, relatively standardized, in order to determine the borders of the metropolitan area**; this methodology could be easily applied, having as aims both the approval and improvement, if necessary, of the the already declared metropolitan areas and the scientific substantiation and constitution of new metropolitan areas and a Law Project for the Metropolitan Area.

The relatively standardized frame methodology that we proposed, basically comprises **4 steps or stages**:

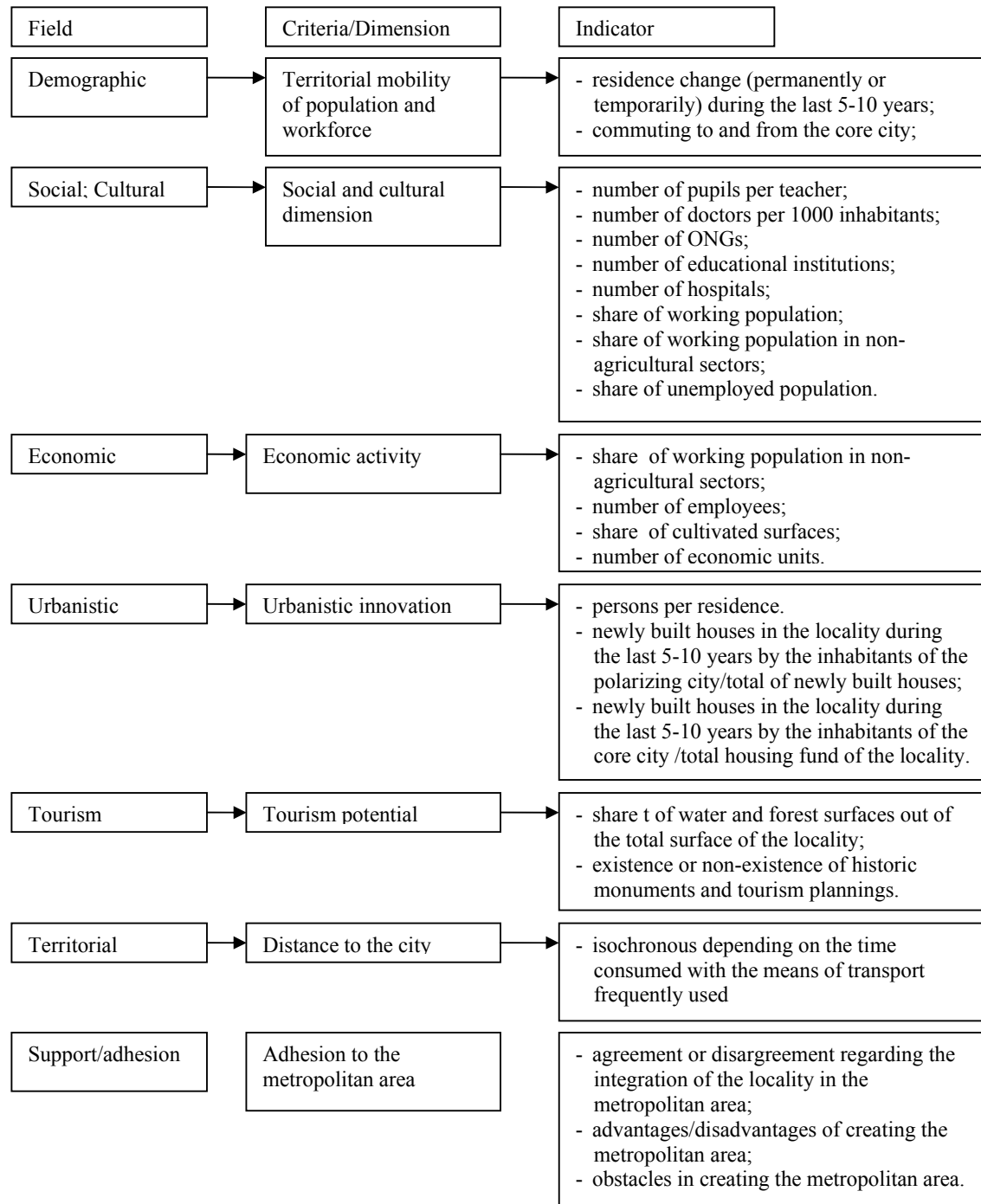


1. Collecting data

Survey on the basis of a questionnaire applied to local authorities around the polarizing city that will become the center of the metropolitan area, implying an area wider than that where the metropolitan area proper will be formed, at least in a first stage. In the case of the city of Bucharest the distance was of 50 Km.

In this stage there were established the interrelation indicators (that measure the intensity of the interrelations) and there were collected the necessary data to determine the borders, respectively the localities that were going to be included in the metropolitan area. The data were collected from all the localities situated within the previously set radius, respectively of 50 Km to Bucharest.

Essentially, the questionnaire applied to the local public administrations, that provided the collected data, was structured in the following fields – dimensions – indicators:



2. Analysis of data and methodology to determine the MA

This stage includes:

- Determining the indices for each of the indicators selected for the measurement of the connection intensity of the core city with each locality.
- Standardizing the indicators (of interrelation) so that they become comparable, respectively bringing them to the same scale.

Standardization is realized with the formula of maximum avail, where the standardized value is the result of the ratio between (real value – minimum value/maximum value-minimum value) * 100 thus obtaining all the numbers between 0 and 100 or between 0 and 1.

The formula is: $I_s = (Val_{real} - Val_{minimum}) / (Val_{maximum} - Val_{minimum}) * 100$

- share of the indicators
- Setting the global index (index) or the total score of each locality as integration index.

The selected indicators are calculated as follows:

- the percentage of commuters, out of the total working population of the locality, commuting to the polarizing city;
- the percentage of commuters in the polarizing city commuting to the locality in the influence area/ total working population in this locality;
- the percentage of population that changed the residence from the respective locality to the polarizing city/total settlements in the locality;
- the percentage of population that changed the residence from the polarizing city to the respective locality/ total settlements in the locality;
- the percentage of newly built houses in the locality during the period of reference (the last 5, 10, 29 years) by the inhabitants of the polarizing city/total houses in the locality;
- the index of tourism potential determined by the share of water and forest surfaces out of the total surface of the locality the number of historic monuments and tourism plans per total houses in the locality;
- the distance to the city, in minutes, using the means of transport in common most frequently used.

The calculation formula:

$$Z_M = \frac{(I_n + I_m) * 2 + I_e + \sqrt{I_t}}{D}$$

where:

I_n = totaled commuting index (to the polarizing city and to the locality in the influence area);

I_m = totaled migration index (to the polarizing city and to the locality in the influence area);

I_e = urbanistic innovation index ;

I_t = tourism potential index;

D = the distance to the polarizing city.

The multiplication of $I_n + I_m$ by 2 is due to the fact that commuting and migration represent the most important relationship, having a double impact, both for the city and for the locality in the influence area. The rationalization of I_t shows the fact that this represents a relation which is rather potential than real.

The distance to the polarizing city is considered a direct factor of influence or opportunity.

In order to select the localities that will be part of the future Metropolitan Area there will be established a minimum threshold (a minimum value of the integration score) of the integration index but it will be also taken into account the principle of spatial contiguity (in this way, a locality will be included in the metropolitan area if it is surrounded by other localities proposed to be part of this area, even if it has an integration index below the preestablished value).

After setting the exterior borders of the Metropolitan Area, there can be started the procedure of characterizing the structure/profile of the area. As analysis indicators there will be used both those in the questionnaire applied to local authorities for which the data have been calculated, as well as the indicators in the data resulting from the survey applied to the population in the future metropolitan area.

The indicators used, the modality of analysing the data, inclusively the calculation formula, constitutes the essence of the relatively standardized methodology proposed in order to determine the Metropolitan Area.

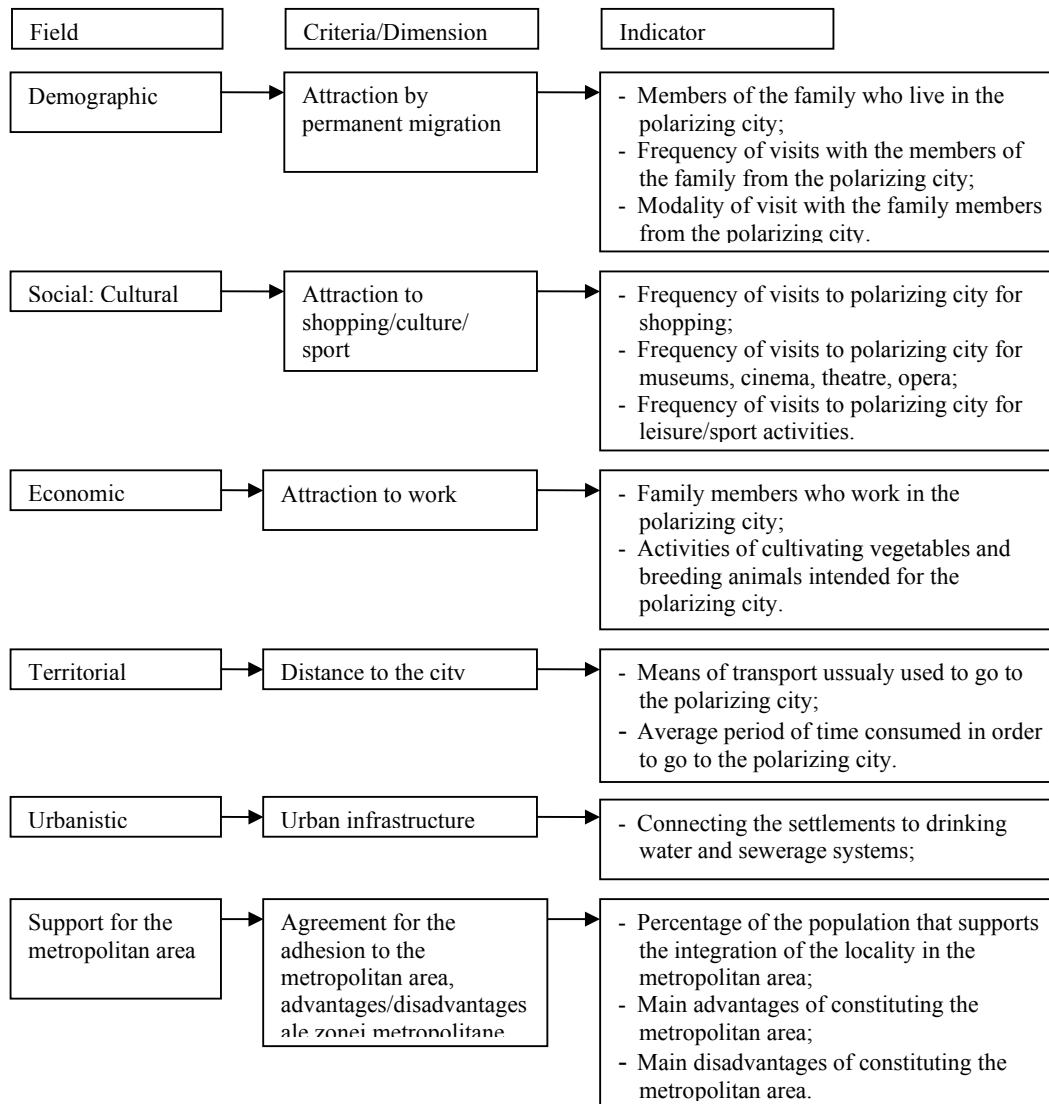
3. Assessing the support or adhesion for MA

Basically, in this stage there is realised the representative survey at the level of the population, in the localities proposed to be included in the future metropolitan area, in **step 2**, in order to assess its relationships with the city, the attitude and support of the population towards the constitution of such an area.

The questionnaire for the study regarding the population essentially comprises indicators referring to the support of the population for the Metropolitan Area, the relationships between the population in the surrounding territory of the core city and this city, determining what is called the phenomena of urban attraction; but it also comprises questions regarding the equipment of the settlement, their level of urbanization etc.

The questions and data that regard the support for the Metropolitan Area and the perception of their advantages complements the proposed methodology. To the assessment of the support of the population there is added the assessment of the local authorities support realised through the survey with the town halls.

Basically, the questionnaire applied to the settlements in the localities selected to be part of the MAB, where the data was collected from, was structured in the following fields – dimensions – indicators:



4. Implementation

Constituting an interdisciplinary team consisting of representatives of the local authorities, mainly part of the polarizing center and specialists in the juridical, economic, urbanistic, sociological field etc., who should analyze the results of the research and propose the model of metropolitan area that will be created, in a first stage, but also predictions for the evolution of the Metropolitan Area during the following stages.

The result of their work will be materialized under the form of a Report of substantiation of the final model of metropolitan area proposed, including the borders, structure, aims, management methods of the Metropolitan Area. Moreover, the team will give suggestions for the substantiation of a Law of the Metropolitan Area.

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