

DOI: 10.5817/CZ.MUNI.P210-9896-2021-58

POLYCENTRIC URBAN FORMS: THE RELEVANCE OF SCALE FOR METROPOLITAN AND CITY PLANNING

Polycentrické městské formy: význam měřítka v metropolitním a městském plánování

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Annotation

The paper deals with the importance of scale in metropolitan and urban planning, in connection with the promoted and often applied concept of polycentric development. Although the normative conceptualization of polycentricity to some extent reflects the multi-scalar dimension, the operationalization of the concept encounters a number of limitations and fuzzy meanings that result from different scales of analysis and interpretation. Using the Czech context of planning practice, the negligence of the importance of overlapping geographical scales and limits of binding spatial planning materials is documented. The dependence of polycentricity on the scale has consequences both for the analytical evaluation of the spatial situation of the settlement system and for the subsequent interpretation of the results and the setting of further development strategies.

Key words

polycentricity, scale, metropolitan planning, urban planning

Anotace

Příspěvek se zabývá významem měřítka v metropolitním a městském plánování, a to v souvislosti s prosazovaným a často aplikovaným konceptem polycentrického rozvoje. Ačkoliv normativní konceptualizace polycentricity do jisté míry reflektuje vícenásobnou měřítkovou dimenzi, operacionalizace konceptu naráží na řadu omezení a nejasných významů, které vyplývají právě z rozdílných měřítek analýz a interpretací. S využitím českého kontextu plánovací praxe je dokumentováno opomíjení významu překrývání měřítek a limity závazné územně plánovací dokumentace. Závislost polycentricity na měřítku má důsledky jak pro analytické vyhodnocení prostorové situace sídelního systému, tak pro následnou interpretaci výsledků a nastavení budoucích strategií rozvoje.

Klíčová slova

polycentricita, měřítko, metropolitní plánování, městské plánování

JEL classification: R11, R12, R14, O18, O21

1. Introduction

In last twenty years, a polycentric and balanced development of the whole European territory has become one of the main goals of the European Union (EU) territorial cohesion policy agenda (EC, 1999; Territorial Agenda, 2011; ESPON, 2014). Since the implementation of the European Spatial Development Perspective (ESDP), polycentric spatial arrangements together with fair access to infrastructure, public amenities, and knowledge have turned out to be the cornerstones of the long-term EU cohesion strategy (Malý, 2019).

The normatively defined concept of polycentricity from the position of cohesion strategy has its roots in the spatial planning traditions of selected European countries (France, the Netherlands), however, the issue of polycentric (or multinucleated) urban system has also been researched within urban system theories that seeks to explain growing

complexity of multifaceted urban settings which are facing simultaneously changing social and economic environment (Camagni, 1993; Capello, 2000, Parr, 2004).

The main aim of the paper is to shed light on the operationalization of the polycentricity concept from the perspective of overlapping metropolitan and urban scales. Based on the Czech spatial planning contexts, the paper summarizes the key thoughts on the relevance of the scale in spatial planning practice with regard to polycentric development. It concludes with main thematic fields that should be further elaborated in order to build relevant arguments that urban planners may use in debates about the meaningfulness of polycentric development in different spatial and scale contexts.

2. Polycentricity: a brief theoretical framework

According to EU regional policy, supporting local towns and regional centres in order to overcome the adverse socioeconomic situation in disadvantaged areas is a crucial issue in reaching territorial cohesion (EC, 2008). In general, territorial cohesion is a situation characterized by less territorial disparities regarding fair access to services and jobs for all citizens and firms while maintaining sustainable development (Territorial Agenda, 2011). To ensure such development it is necessary to apply territorial analysis respecting functional dynamics of territories that very often goes beyond the administrative borders. Thus, spatial dimension of territorial cohesion is closely linked to the structure of settlement systems and relations between urban, semi-urban and rural areas. Regarding settlement system functioning, territorial cohesion discourse accentuates especially three aspects requiring attention: polycentricity, avoiding polarisation, the key role of local towns. Besides the role of local towns the concept of polycentricity has been labelled within EU spatial planning doctrine as a tool contributing to less polarized development (Zonneveld et al., 2005).

Polarisation between given territories or places is perceived as undesired element of territorial development and is very often seen as a stimulus for an increase of spatial disparities (EC, 2008) and social exclusion (Šoltés et al., 2020). Even before the accession of new member states in 2004 the EU authorities realized that “the mobility of people, goods and information in the EU is characterised by concentration and polarisation tendencies” (EC, 1999: 26). All regions should have adequate access to infrastructure, jobs and services. However, predominantly peripheral regions (islands, mountainous regions, border regions) are in a number of cases excluded from proper access (EC, 2008).

Geographical dimension of polarisation is documented by the notion about importance of avoiding polarisation between capitals, metropolitan areas and medium sized towns on the national scale and about crucial role of small and medium sized towns at regional level (Territorial Agenda, 2011). According to Molle (2007: 90), polarisation “implies not only the aspect of geographical concentration but also the accentuation of the differences in endowments, equipment and hence disparities in wealth between the core and the periphery.” Strong territorial polarisation of economic performance should be therefore reduced by policy efforts in order to diminish large regional disparities in the European territory (Territorial Agenda, 2011). From the perspective of urban system functioning, more hierarchical settlement structure may contribute to greater polarisation while more balanced configurations, i.e. existence of similarly large settlements in a close proximity, indicate less polarized territory. According to Van Nuffel et al. (2010: 335), polarisation “refers to the extent to which a node’s connections are (un)evenly distributed.” In this context, supporting regional and local centres is key to overcome direction of flows and concentration of economic activities into one dominant centre.

The conceptualization of polycentricity is based on territories where human activities are organized non-hierarchically. It includes morphological aspect of urban configurations, for example the form and spatial structure of centres, and also functional dimension of the spaces of flows and growing complexity of human interactions (Green, 2007). Functional polycentricity is then defined by multidirectional flows, mutual and criss-cross relations of work-/school-commuting, functional complementarity and specialization of urban centres (Van der Laan, 1998; De Goei et al., 2010). Polycentric development is highly normative concept that represents ideal situation within urban system’s functioning. In this matter, polycentric pattern of traditionally mentioned archetypal region *Randstad* has been questioned for its spatial planning nature that not always corresponds to reality (Lambooy, 1998; Van Oort et al., 2010) and problematized from the perspective of the “multiplexity” of urban networks (Burger et al., 2014). Moreover, positive impact of polycentric urban systems on balanced spatial development has not yet been proved (Veneri and Burgalassi, 2012; Malý, 2016). Despite several limitations of polycentric development, the concept is closely linked to more specific goals of the EU territorial development that include avoiding polarisation and supporting local towns.

2.1 Polycentric urban regions (PURs)

With regard to polycentricity at regional level, Randstad, Flemish Diamond, or the RheinRuhr Area are considered as typical examples of polycentric urban regions (PURs) (Davoudi, 2003; Meijers, 2007). On the other hand, more concentric pattern can be observed in large number of regions, especially those with one dominant centre (e.g. nations with dominant capital in Eastern Europe – Hungary, Estonia). In case of PURs, the assumption of benefits in such spatial configuration is based on perceived advantages including avoidance of agglomeration diseconomies, high land prices, widespread territorial competition, infrastructure deprivation, leap-frog and scattered development leading to urban sprawl and extensive traffic producing side effects – pollution or noise (Bailey and Turok, 2001). On the other hand, it is assumed that clustering of economic actors, knowledge spillovers and strong labour market are factors contributing to generation of PURs' benefits (Meijers, 2008).

Analysing PURs requires several aspects to be taken into account, it puts emphasis on changes of spatial distribution of jobs, polycentric pattern of particular region, time distance and multidirectionality of commuting flows. Attention is paid especially to the situation of regional and local centres that are supposed to play a key role in balanced spatial development at regional level. The analyses made so far have shown that real spatial development may be in contrast to normative concepts applied from planning perspective and have raised a question, if it is even possible to reverse the current spatial development tendencies by applying polycentric tool into different spatial contexts (Malý, 2016; Sun et al., 2019). What is more striking, however, is an ambiguous territorial application of polycentric analysis in terms of different spatial levels and geographical scales. Without a doubt, the operationalization of the polycentricity concept is a spatial issue par excellence and thus requires a scale-sensitive approach when evaluating PURs, especially in the context of setting spatial planning strategies and visions of development.

2.2 Scale-dependency of polycentricity: regional and urban context

While the multi-scalar nature of the territorial cohesion discourse is reflected by the normative imaginary of the polycentricity concept, the operationalization of polycentricity is different when various geographical scales are taken into account and thus the concept of polycentricity is scale-dependent (Hall, 2002; Malý, 2019). As several authors argue (e.g. Taylor et al., 2008; Vasanen, 2013), rational consideration of scale is a key assumption for application of policy polycentric agenda. In this context, an easy-to-understand guide is a principle of mutual interaction which means that reaching polycentricity at one spatial level may cause strengthening monocentric arrangements at lower geographical scale. This is evident especially in the case of supporting national polycentricity which can lead to monocentric forms at regional level (Hall and Pain, 2006). A surprisingly less researched area is the relationship of regional settlement systems with the scale of the individual cities (a recent exception is, for example, the study of Zévl and Ouředníček, 2021).

Integration of metropolitan areas, cities and towns into the world economy affects dynamics and functionality of urban system networks at all geographical scales. Such places, which concentrate economic activities, political power and human capital, are backbones of national and regional development and creates territories with metropolitan character. A metropolitan area (or region) may have a spatial arrangement close to the PUR structure or may have a rather dominant core with smaller settlements in the hinterland where the proximity to largest agglomerations may contribute to better performance of small towns that are able to use benefits and functions which are offered by a nearby metropolis (Meijers and Burger, 2017).

The concept of PUR is predominantly employed at the scale where the most of the everyday human interactions occur, that is the scale of daily urban systems. The phenomena of territorial proximity, weak hierarchy, shared identity and common historical development trajectory, which, however, clearly may not coexist in practice, form complex initial conditions for creation of complex varieties of regional polycentricity. The territorial potential, which is given by the specific polycentric configuration of settlements, must then be used in the strategic management and decision-making process in the field of territorial development. In relation to governance, it is necessary to coordinate the decision-making processes and activities of various actors in order to achieve effective development of the wider region. In this context, the need for “multi-level polycentric governance” (Finka and Kluvánková, 2015) has been recently extensively discussed as a mechanism allowing to better connect the needs of local communities with the central power structures (Jordan, 2008). However, incidence of the anticipated benefits of the specific spatio-functional organization of PURs in the political and institutional aspects of the operation of regions has not been so far fully established by the performed research works.

Metropolitan areas (or regions) consist of individual centres (polycentric arrangement) or one centre (monocentric arrangement). However, these centres have their internal urban and functional structure, which fundamentally determines life in the city - transport links, mobility, availability of socio-economic functions and overall quality

of life. Thus, there may be situations where the settlement system of the metropolitan area takes a prominently monocentric form, but the core city is characterized by a dispersion of human activities and tends towards a polycentric arrangement. From analytical perspective, this is the issue of spatial delimitation which faces modifiable areal unit problem (Openshaw, 1984). There is a large number of possibilities how to determine the shape and size of the regions when using the functional approach of delimitation. Each delimitation into different spatial objects influences the results. Because of that, all results should be interpreted with regard to the spatial aggregation process. From the perspective of spatial planning practice, however, there is a fundamental problem with the “administrative” approach to planning, in which different scale levels overlap and where the traditional spatial planning territories stand next to a non-binding planning approach using functional urban units as basic building blocks for formulating strategic development goals, at least in countries in Central Europe.

3. Methodology and data

Given the theoretical nature of the article, the description of the methodology is linked mainly to the underlying materials and data, which serve as an illustrative framework for the ideas emerged. A review of spatial planning documents within the legislative framework of the Czech Republic was carried out in order to evaluate the importance of the metropolitan scale in the practice of spatial (or strategic) planning. The relevant documents are the Spatial Development Policy of the Czech Republic, the Spatial Development Principles (of particular region), the Integrated Development Strategy (of particular metropolitan area or agglomeration) and municipal land-use plans. Next, selected socioeconomic-related data has been used in order to illustrate some of the pitfalls associated with the operationalization of polycentricity at mutually affected spatial scales and to point to the limitations of administrative boundaries in spatial analysis made at metropolitan scale. The data used relate to work-commuting matrices obtained from the census 2001 (CSO, 2011) and information about jobs that are available from the Planning Analytical Materials of Brno (2020) and the database of the Brno City Chief Architect’s Office (KAM, 2018).

4. Relevance of scale for spatial and strategic planning: Czech metropolitan context

4.1 Metropolitan “gap” in spatial planning practice

In addition to the Spatial Development Policy of the Czech Republic as a nationwide instrument of spatial planning, which serves mainly for the coordination of spatial development at the national level and for the coordination of regional spatial planning activities, there are regional and municipal spatial planning tools. While the Spatial Development Principles is a tool of spatial planning at the regional level and is based on the Spatial Development Policy of the Czech Republic, traditional land-use (or zoning) plans are used at municipal level. There is not, however, institutionalized spatial planning apparatus focusing on the metropolitan scale. Metropolitan areas (or agglomerations) in the Czech Republic may constitute the Integrated Development Strategy that relates to the EU Operational Programmes and takes the form of an integrated strategy for urban development and for inter-municipal cooperation at metropolitan level (Šašínska et al., 2019).

On the one hand, there are spatial plans of individual municipalities and a “zoom-out” perspective of regional plans, and on the other hand, there can be a strategic document of a metropolitan area, which is mostly scaled between the municipal and regional level. While regional plans perceive the territory of metropolises or agglomerations as development areas with specific territorial conditions and do not address the relevant metropolitan issues in more detail, land-use plans of core cities of metropolitan areas focus only on the territory of the given municipality and reflect the broader context marginally. Metropolitan issues are thus dealt with only in the integrated strategy, which, however, has no power to set territorial conditions for further development. As a result, the spatial development vision of metropolitan areas shows multiple interpretations, which are the result of insufficient reflection of this area in binding spatial planning documentation and of inadequate linkage of the integrated strategy of metropolitan areas with spatial planning practice. The described limits of the institutional anchoring of the metropolitan level into planning practice bring significantly limited possibilities to build the development of metropolitan areas on the potential of a daily urban system with its specific settlement and functional structure.

4.2 Implications for analytical treatment

While the institutionalization of the metropolitan level is probably crucial for the definition of metropolitan strategies and governance, regarding the spatial planning tools, an analytical approach to assessing the functioning of settlement systems is a key issue. Ideally, the analytical apparatus should use the scope of the defined metropolitan area and a single database of data as detailed as possible. This approach is possible only in the case of selected thematic analyses taking into account especially elements of higher-ranked importance (e.g. the

evaluation of distribution of key public infrastructure – schools, health care facilities, etc.) or full-scale datasets, which are filled by using “bottom-up” approach (e.g. national registers). The real analytical practice shows, however, a significantly different level of detail of spatial data and thus limited possibilities of spatial analysis using only one territory of the metropolitan area, rich in information and with great granularity. On the other side, specific differences in population densities, time-space behaviour (Osman et al., 2020), mobility patterns of specific social groups (Kraft et al., 2020), work-commuting motivations (Vontroba et al., 2020) and a way of life in general between large cities and small towns in the hinterland emphasize the different interpretation of some phenomena. In this sense, it is necessary to distinguish between processes (albeit of the same meaning) taking place in a compact city and in suburbs.

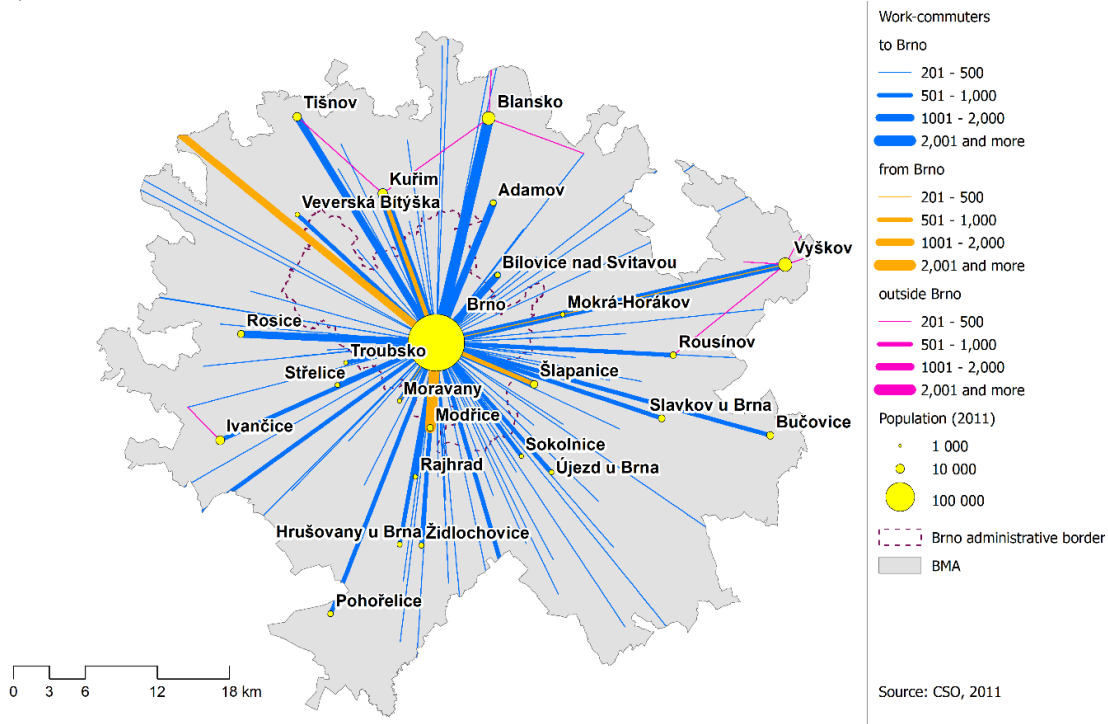
With respect to practical limits of metropolitan spatial analyses and specific interpretation of some phenomena, different datasets and analytical methods need to be applied at both spatial contexts (metropolitan and urban) in order to evaluate the degree of polycentricity. The basic factors of different analytical approaches to both spatial contexts are:

- Different nature of built-up and socioeconomic environment (population densities, concentration of economic activities, development structures (high-rise, compact (city) versus extensive, open (suburbs)), mobility behaviour, lifestyles)
- Different sets of data and their availability/existence
- Different methods in evaluating polycentricity
- Metropolitan scale: rank-size distribution, primacy index, multidirectionality of commuting flows, etc.
- Urban scale: grid statistics, hot spot analyses, densities, etc.

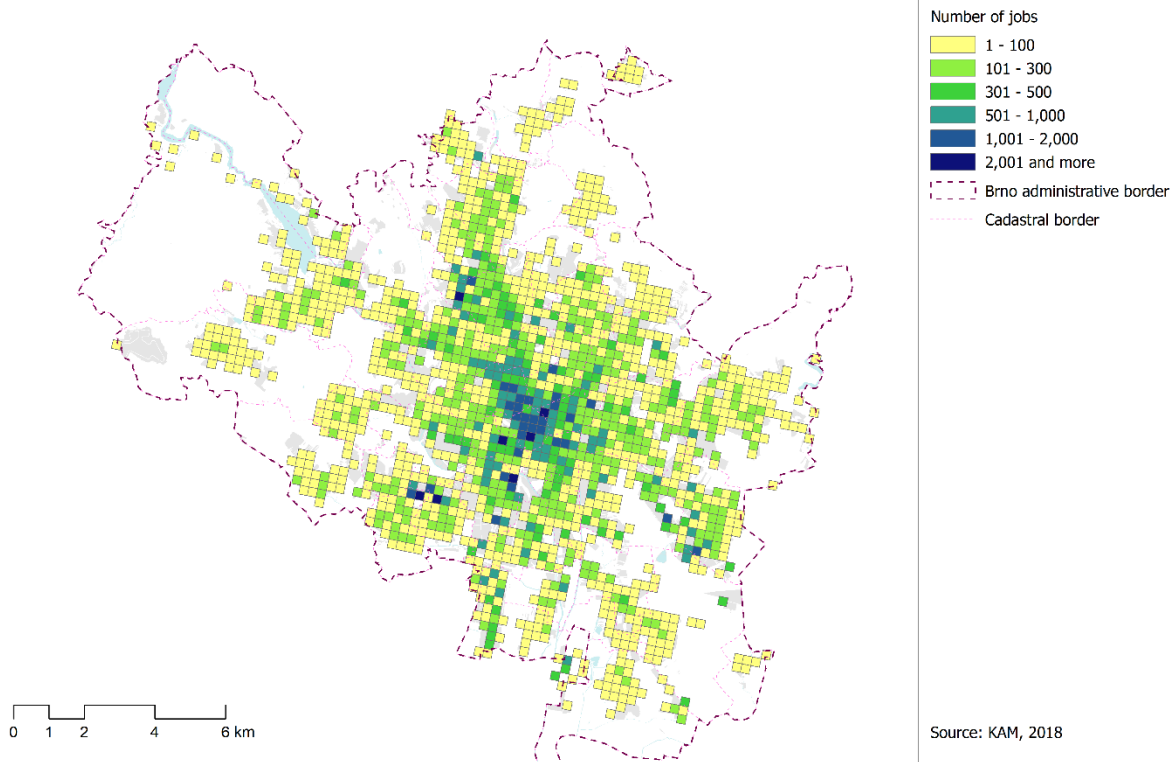
As the degree of polycentricity at regional/metropolitan level has been commonly evaluated using the jobs distribution (Cowell, 2010; Wolday et al., 2019), we can demonstrate different approach to assessment of spatial patterns of economic activity that are affected by above stated principles. Using Brno metropolitan area (BMA, defined by Ouředníček et al., 2020) as an example (Figure 1), the metropolitan context uses work-commuting data as an indicator of multidirectionality of flows as this kind of mobility shapes the relationships between settlements. With regard to the method used for polycentricity evaluation, multidirectionality of flows can be evaluated via identification of reciprocal component within relation of each pair of municipalities. The urban context, on the other hand, uses data on spatial distribution of jobs due clearer interpretation of density data for subsequent evaluation of urban structures and also due to the limited possibilities of evaluating inner-city commuting because of the lack of quality data.

Fig. 1: Illustration of different spatial configurations (pointing to the degree of polycentricity using jobs as an indicator) at (a) metropolitan and (b) urban scale, the case of Brno, Czech Republic

a)



b)



Source: CSO, 2011; KAM, 2018; Planning Analytical Materials of Brno (2020), authors' processing

4.3 Interpretations and strategic decisions

Limitations of analytical treatment places high demands on interpretations of the results. Careful consideration and thinking about the nature of data and their limits is crucial when proposing steps for further development. For

example, returning to the previous Brno illustration, metropolitan context of work-commuting tells us the prevailing interactions, directions and size of the flows. This points to observation, how the main mobility patterns should be perceived, which centres create catchment areas or what are the dominant directions of flows. Urban context gives us a picture of local concentrations of jobs. It defines main sub-centres of economic activity and places where greater demands on transportation or quality of public spaces take place. The disadvantage of such a depiction lies in the blind space that occur just outside the city borders. Unlike a functionally integrated and internally closed metropolitan system, the boundaries of a core city are completely unsuitable for delimiting the space of analysis. And although we are aware of the circumstances that make it impossible to cross the city boundary with the chosen type of analysis (see above), this aspect cannot be overlooked when interpreting the analytical results. Moreover, presented illustrations should not be overinterpreted since the underlying data has its limitations.

Although these recommendation seems relatively trivial, in the context of overlapping scale levels of spatial analysis, it is all the more necessary to emphasize it. If there is agreement on empirical-based and data-based decision-making (the opposite of the “feeling-based” approach), the influence of the scale on the interpretation of results and on the formulation of strategic goals is enormous. In light of polycentric discourse, essential for setting up future territorial development is an awareness of how the development of a particular place will affect the immediate surroundings, the wider area or the entire functional spatial unit. The vision of the metropolitan development should be structured into several fundamental scales, while the parameters of development within one scale should not prevent or negatively influence the parameters of the development of another scale.

5. Conclusions

The paper presented key reflections on the development of metropolitan areas, which should be taken into account in the adaptation of polycentric development into the practice of spatial planning. Metropolitan areas show a strong clustering of economic activities, either into one (monocentric) or more (polycentric) centres (these cases are rather extreme positions on a scale with a less clear arrangement). As the centres are characterized by a specific internal built-up environment and functioning, spatial planning must take both scale levels (metropolitan and urban) into account. Based on the Czech spatial planning context, key elements related to the issue of scale-dependency of polycentricity are identified: metropolitan “gap” in spatial planning practice, implications for analytical treatment, interpretations and strategic decisions.

As part of planning practice, it is necessary to reflect more on the scale of daily urban systems, which corresponds to the metropolitan level in terms of the intensity of daily interactions and which serves as a spatial framework for the planning of integrated territorial units. The subject of further discussions should be the form - institutionalization of metropolitan planning. From the analytical point of view, it is essential to approach the evaluation of (poly)centralities with regard to the specifics of urban compact forms in core cities on one side and fragmented built-up areas in the hinterland on the other side. This is inevitably related to the various data and evaluation methods which are context-dependent. Not only interpretation, but above all strategic decisions should be based on the awareness of the interconnectedness of metropolitan areas, its complexity and the insignificance of administrative boundaries in the case of the dynamics of everyday human interactions. The presented reflections are part of the initial thoughts and ideas emerged during the first phase of a broader research project that deals with the relationship between polycentric and compact urban forms and should be further developed into rigorous studies and scientific outputs.

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The article was supported by the project „Compact and polycentric urban forms: Conflicting spatial imaginations?“ (20-13713S), funded by the Czech Science Foundation. The authors are thankful for the support.