BABEȘ-BOLYAI UNIVERSITY CLUJ-NAPOCA
FACULTY OF GEOGRAPHY
DOCTORAL SCHOOL OF GEOGRAPHY

DOCTORAL THESIS – SUMMARY

COMPARATIVE ANALYSIS OF THE SOCIO-ECONOMIC DEVELOPMENT OF METROPOLITAN AREAS IN ROMANIA

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INTRODUCTION

Currently, more than half of the world's population lives in cities, which are considered the "engines" of economic development (Florida, 2002; Ambruosi et al., 2010; Glaeser, 2012; Cristea et al., 2017; Andersson & Ghesquiere, 2020; Danielewicz, 2020; Rauhut & Humer, 2020). There is a direct correlation between economic growth and urbanization, which is influenced by several factors such as population size, level of economic development, and quality of life (Ionescu-Heroiu et al., 2019). A country cannot have a strong economy without a system of metropolitan areas and urban agglomerations, which contribute to reducing regional inequalities (Cristea et al., 2017; Nagy & Benedek, 2018; Ionescu-Heroiu et al., 2019).

Cities have developed over time and tend to transcend administrative boundaries, providing the foundation for strong suburbanization. Given the functions and services provided by the city (i.e. specialized services, economic opportunities, market access, higher education institutions, advanced medical care, cultural activities, innovation, and technology), population from surrounding areas (mostly rural) commute daily to the urban centre. Thus, functional relationships occur between the core (major urban centre) and the periphery (the surrounding localities).

However, the residential function is more associated with the suburban localities, especially for young families (Ouředníček, 2007; Kährik & Tammaru, 2008; Cocheci & Mitrea, 2018). People prefer the suburbs due to the lower prices of land and construction, larger living space, lower levels of pollution, and extensive green areas. In this context, the suburban expansion should be guided by policies to avoid the negative consequences associated with the urban sprawl and social segregation. In the absence of a strong legal framework and an integrative approach to spatial planning, the very factors that encouraged migration to suburban areas may be reversed, leading to issues such as a fragmented urban fabric, high construction density that does not comply with urban planning regulations, a lack of green spaces, degraded rural landscapes, traffic congestion, pollution, and low-quality public services.

The spatial planning level that encompasses both the urban core and its functional periphery is represented by the **Metropolitan Area (MA)**. The concept was defined in the early 20th century by the U.S. Census Bureau as a statistical unit (Berry, Goheen, & Goldstein, 1969). It was only after 1960 that the term gained significant importance in Europe. France was the first to adopt it, using **"aires métropolitaines"** and **"métropoles"**. Later, the concept was

applied to other Western European countries, including the United Kingdom, Germany, and Spain.

In Romania, the term was officially introduced into law in 2001, although it had been previously described in the literature during the communist period (Cucu, Vlăsceanu & Urucu, 1982). After the political regime changed, spatial planning required a new direction. The prospect of European integration was the main triggering factor that led to the alignment with the territorial planning paradigm. Benedek and Cristea (2014) argue that the term "metropolitan area" was forcefully introduced into national legislation, as the only region that could meet the criteria stated in the international literature was Bucharest-Ilfov. A similar view is expressed in a study conducted by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR, 2011), which analysed the metropolitan functions (politics, economy, science, transport, and culture) of each European metropolitan area. According to the results, only Bucharest could be included in the category of metropolitan areas with a limited variety of functions (BBSR, 2011).

Nevertheless, the criteria for defining metropolitan areas vary across countries based on population. Of course, Romanian metropolitan areas (including Bucharest-Ilfov) could never be compared with London or Paris, but there are other European metropolitan areas with comparable populations in the Central and Eastern Europe countries (see the study areas in the project of the EC & WBG, 2025). Moreover, not only the population size is considered in the delineation of metropolitan areas, but also the 'functional ties' between the core and its hinterland, as Rodríguez-Pose (2008) argued.

When looking at spatial planning in any country, it is clear that cities are linked to surrounding administrative units, mostly by commuter flows. This implies that the city has specific functions that cannot be found in other locations. However, this does not entail that every city has a metropolitan area, but rather a functional area. The distinction between the two concepts is subtle, especially in the absence of a legal framework that defines the existence of a metropolitan area. The evolution of the MAs and related theories will be discussed further in the theoretical chapter.

Metropolitan development becomes unavoidable in the context of economic transformations and globalisation (Lang & Török, 2017; Fricke, 2017). Looking at the definition provided at the beginning of the section (Kübler & Heinelt, 2008), several aspects can be noted. Firstly, at least for Romania, this century may be "metropolitan". Western European states began the metropolisation process earlier and have gained significant experience. The CEE countries were delayed by the political regime but have started to catch

up. Furthermore, Metropolitan Areas (MAs) are seen as “nodal points” in the context of globalisation. Thus, a transition from cities as growth engines in the global network to MAs can be recognised. Of course, cities maintain their position as urban cores within MAs, but they now have the potential to expand their specialisation beyond territorial boundaries, and empower peripheral areas to develop positively. The ultimate aim for MAs is to enter the global competition (Kübler & Heinelt, 2008).

The discourse surrounding metropolitan areas and their significance has recently gained momentum and captured public attention. Since the onset of the COVID-19 pandemic, when movement restrictions in Romania limited people's mobility to their metropolitan areas, discussions around this concept began to emerge in media. Although the term had been legally introduced in 2001, it had never been a major topic of public debate.

In May 2020, national authorities permitted free movement within metropolitan areas without requiring a self-declaration form. This led many people to question whether their locality belonged to such an area. Officials stated that a metropolitan area was defined as extending up to 30 km from the main municipality. Subsequently, online media began publishing further details regarding the delineation of these areas. Authorities clarified that only the 103 municipalities could establish metropolitan areas, while other media sources—citing a World Bank Group study (Kriss et al., 2021)—claimed that only 22 metropolitan areas actually existed. Fortunately, the requirement for self-declarations was soon lifted, and with it, public discourse on metropolitan areas faded into the background once again.

At the end of the pandemic, the National Recovery and Resilience Plan mandated a dedicated law for metropolitan areas, which was swiftly adopted in 2022. This law formalised the delineation of metropolitan areas for all municipalities, while allowing pre-existing MAs to retain their status. Furthermore, the new Urbanism Code, currently under debate, is expected to introduce additional provisions regarding metropolitan areas.

In this context, studying metropolitan areas is a crucial step towards their practical implementation. Given the growing significance of these entities in national legislation, academic research, and the socio-economic landscape over the past two decades, an empirical analysis based on data and indicators is both necessary and timely.

RESEARCH AIM AND SCOPE

The present research primarily aims to analyse the socio-economic evolution of metropolitan areas in Romania. The secondary objectives of the thesis are as follows:

1. To examine the evolution of the concept, starting from the Europeanisation process and growth pole theory, which initiated metropolitan development.
2. To assess the provisions regarding metropolitan areas in national legislation.
3. To present an overview of metropolitan area associations (both existing and planned).
4. To conduct an empirical analysis of the 12 metropolitan areas with over 200,000 inhabitants (based on the 2021 Census). To achieve this objective, demographic, economic, housing, and land use indicators will be used for statistical analysis covering the period 2000–2023, depending on data availability.
5. To compare the MAs at the general, urban core, and periphery levels using the previously analysed indicators. Additionally, a local-level analysis will be conducted to highlight the territorial administrative units that have experienced significant increases or decreases.
6. To compare income inequalities at the national, regional, and metropolitan levels using Cluster and Outlier Analysis.
7. To assess the evolution of built-up areas at both metropolitan and local levels.

The comparative approach is useful for assessing the evolution of the 12 metropolitan areas using common criteria for comparison (demographic, economic, housing, and built-up area indicators). To analyse the dynamics of these indicators, the period 2000–2023 is considered. Furthermore, different levels of analysis are compared for each Metropolitan Area. Thus, the thesis focuses on four levels of analysis: the MA as a whole, the urban core, the periphery (which includes all other MA members), and the local level. Distinguishing between these levels is valuable, as the indicators are expected to behave differently across them.

Among the key contributions of this thesis, the methodological design stands out. The statistical analysis of indicators, compared across different periods and levels, is combined with spatial analysis using ArcGIS. Grouping Analysis is employed to assess the performance of each MA in terms of indicator evolution. This analysis will demonstrate how MAs, urban cores, and peripheries can be grouped based on similar indicator results.

Furthermore, the comparison of average local income is conducted using Cluster and Outlier Analysis in ArcGIS. Although this type of analysis has been performed before (Török & Benedek, 2018), the present study updates the data and also introduces the global autocorrelation measure (Global Moran's I) to identify the evolutionary trend of income spatial

distribution. Moreover, the results are scaled for metropolitan areas to illustrate how each MA performs in terms of spatial clustering of average incomes.

Another key contribution of this study is the analysis of built-area evolution, based on datasets selected after an overall accuracy assessment. While previous studies (Grigorescu et al., 2012; Cocheci, 2014; Kriss et al., 2021; Cocheci, 2023) used Corine Land Cover (CLC) to assess built area expansion, this research employs a finer resolution (up to 10 metres) to detect changes in built areas more accurately. Furthermore, the newest release of CLC Backbone is utilised to map built areas in 2021.

It is expected that this study will serve as a starting point for further empirical research on metropolitan areas, particularly in the context of legislative changes that highlight the importance of these territorial levels. The findings will identify the most dynamic metropolitan areas, reveal the interdependence between the core and periphery, and highlight the indicators that require attention to mitigate potential negative effects of certain processes. Moreover, the empirical findings should draw the attention of public authorities to the need for better planning strategies to effectively manage the potential of metropolitan areas and recognise them as key drivers of national development.

THESIS STRUCTURE

The thesis consists of five chapters (Figure 1), each highlighting specific objectives of the study. The first chapter serves as an introduction, presenting the research aim and the structure of the study. The second chapter explores the theoretical context of metropolitan areas at both international and national levels. The third chapter discusses the state of research on metropolitan areas. The fourth chapter provides a detailed explanation of the data and methods used. The fifth chapter presents the results and discussions. Finally, the thesis concludes with a summary of findings, suggestions for further research, followed by references and annexes. Each chapter will be further detailed.

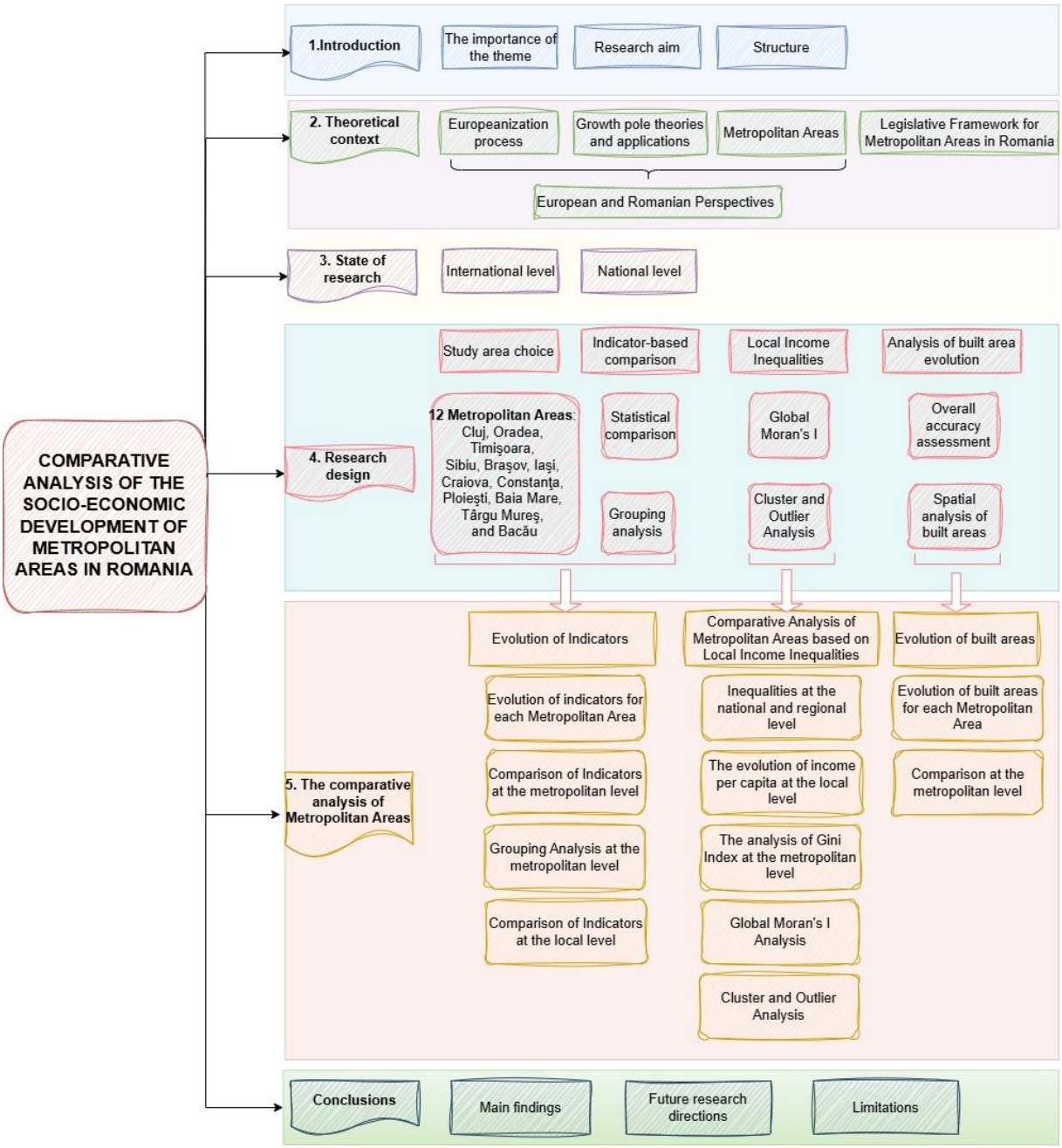

Figure 1. The structure of the thesis

Chapter 1 presents the introduction, highlighting the importance of metropolitan areas in both the international and national contexts. In addition, the functions and advantages of establishing metropolitan areas are discussed. The objectives of the thesis, along with its contributions and implications for future studies, are outlined, as well as the structure of the thesis.

Chapter 2 introduces the *theoretical context of metropolitan areas*. The paradigm shift in territorial planning is analysed in studies, beginning with the Europeanisation process, which

had significant implications for national policies. The Central and Eastern European states required a new policy framework following the change in the political regime. In this context, stimulated by the prospects of EU accession, Romania adopted new spatial policies, incorporating the concept of "metropolitan areas".

Furthermore, the growth pole theory is described, as it serves as the catalyst for the formation of metropolitan areas. Examples from the implementation of this theory in European states are presented, starting with France, which initiated this concept. Germany, Italy, Spain, and Poland also have experience with policies regarding growth poles.

Next, the concept of "metropolitan area" is defined, along with associated terms in relevant documentation. Additionally, the processes connected to metropolitan areas are briefly described, including metropolisation, peripheralisation, and shrinking cities.

The final subchapter is dedicated to theories in the national context. The establishment of growth poles and their importance in shaping planning documents is emphasised. Following this, the concept of metropolitan areas is defined using both studies and legislative documents, along with aspects of governance.

A qualitative content analysis of legislative documents is carried out, beginning with Law 350/2001 and continuing with Law No. 246 from 20 July 2022 and the new Code of Urbanism, all of which are intended to establish an official framework for metropolitan areas. In addition, connections with other laws are discussed, as well as how they influence the discourse on metropolitan areas.

The chapter concludes with a description of metropolitan areas as mentioned in various documents. The availability of planning documents, official websites, legal documents, and innovations introduced by each metropolitan area are outlined. Their location and population are depicted on maps.

Chapter 3 analyses the studies on metropolitan areas both at international and national level. We must mention that the list of studies is not exhaustive, as conducting a literature review is not the scope of this thesis. Moreover, given the long history of the concept in European literature, dating back to the 1960s (excluding the broader American literature), we consider an extensive review unnecessary, as the term is well-established. Instead, we have included descriptions of relevant studies that are more closely aligned with our approach.

The findings suggest that the international literature has more experience in studying the metropolitan areas, as the concept was introduced in France in the middle of the previous century. The European literature has defined the specification of metropolitan areas, which were

adopted later in the national context. Also, as the analysis shows, metropolitan areas are studied in a broad range of contexts, related to governance, urbanization, urban sprawl, and sustainable development. The methods vary from statistical analysis using indicators, content analysis of legislative documents to the analysis of urban sprawl using remote sensing data.

Chapter 4 presents the *research design* used in this thesis. After selecting the 12 metropolitan areas for analysis, three different approaches were adopted.

First, an indicator analysis is conducted for each metropolitan area to examine its evolution between 2000 and 2023. The period analysed varies according to data availability. For average income, data from 2005 to 2023 was used; for the number of companies, data was available from 2008 to 2023; and for the number of building permits, the period covered is 2002–2023. The analysis is carried out at three levels: metropolitan area, urban core, and periphery. In this study, the periphery is defined as the rural or urban members of a metropolitan area, excluding the urban core, which refers to the main city. A comparative analysis is then performed for all metropolitan areas while maintaining these three levels. Moreover, to assess the performance of each metropolitan area, Grouping Analysis in ArcGIS is used to identify clusters with similar indicator values.

Second, metropolitan areas are compared in terms of local income inequalities. Global Moran's I is applied to explore whether income values at the local level have become more dispersed or more clustered over time. Then, Cluster and Outlier Analysis is used to identify income clusters across the country and assess their performance within metropolitan areas. A comparative analysis is conducted to evaluate temporal changes in each metropolitan area.

The third approach involves, first, an overall accuracy assessment of four land cover/land use datasets. This step was necessary due to the existence of multiple datasets on built areas. The analysis helped in selecting the most up-to-date dataset for examining the evolution of built areas between 2018 and 2021, namely Corine Land Cover Backbone. This dataset was released in mid-2024 and exhibited the highest overall accuracy among all the datasets analysed.

For the earlier period, the High Resolution Layers – Imperviousness dataset was used, based on previous studies that employed the same dataset (Holobâcă et al., 2022; Ursu & Benedek, 2022). Subsequently, the analysis was conducted at both local and metropolitan levels, identifying the metropolitan areas experiencing dynamic expansion in built areas.

Chapter 5 is entirely dedicated to *results and discussions*. First, the evolution of indicators for each metropolitan area is presented using diagrams, following the three levels of analysis outlined in the methodology. This analysis highlights the impact of various socio-economic events on each metropolitan area.

Next, a comparative analysis across all metropolitan areas is conducted, alongside Grouping Analysis in ArcGIS. This approach allows for the identification of metropolitan areas with similar performances across all indicators.

The following subchapter focuses on local income inequalities. It begins by presenting the context of national and regional inequalities, followed by a spatial representation of the evolution of average income, discussed in relation to regional trends. This analysis also includes the computation of the Gini Index at the metropolitan level for the period 2005–2023, illustrating how inequalities among metropolitan areas have evolved. Additionally, Global Moran's I analysis was performed to assess the spatial distribution of average income for selected years (2007, 2014, and 2021). Clusters and outliers were then identified and compared to the spatial extent of each metropolitan area.

In the final subchapter, the analysis of built areas is carried out for each metropolitan area across five periods: 2006–2009, 2009–2012, 2012–2015, 2015–2018, and 2018–2021. Three types of built areas were considered—residential, industrial, and transport infrastructure—by comparing the results with ground truth satellite imagery from Google Earth Pro. The analysis emphasizes the periods of significant expansion, the types of built areas that expanded, and the evolution of urban patterns. Finally, a comparison at the metropolitan level was conducted, linking the findings to previous studies on the subject. However, as existing studies are limited and typically focus on only one metropolitan area, this research provides a broader perspective.

RESULTS

Main findings of the statistical indicator analysis

The indicator analysis shows different trends according to each level of analysis. For the period 2000–2023, most urban cores, except for Cluj-Napoca and Iași, experienced population loss, while the peripheries exhibited the opposite trend, gaining population. This phenomenon is known as "exploded urbanism" (Petrovici & Poenaru, 2025). The peripheries of Timișoara, Cluj, Iași, and Oradea saw population increases of over 50%, while Craiova and

Ploieşti recorded increases of less than 7%. As expected, Iaşi experienced an 18% increase in its urban core, while Târgu Mureş, Ploieşti, Baia Mare, and Constanţa recorded decreases of up to 15%. At the metropolitan level, only Iaşi, Cluj, and Timişoara MAs recorded population increases.

The net migration rate indicates that intense suburbanization is affecting the peripheries of Iaşi, Baia Mare, Sibiu, Cluj, Oradea, Braşov, and Constanţa. These MAs recorded the highest values in 2023. Most urban cores experienced negative migration rates, indicating that fewer people are choosing to settle in urban areas. This phenomenon also reflects the population dynamics, with growth being concentrated in the peripheries. At the metropolitan level, only Sibiu, Oradea, Iaşi, Cluj, Timişoara, and Braşov recorded positive migration rates.

For all three level of analysis, the infant mortality rate has decreased between 2000 and 2023 in all metropolitan areas, signaling improved medical services and better infrastructure.

Regarding economic indicators, the share of employees declined in the peripheries of Constanţa and Craiova, suggesting a shrinking workforce and rising unemployment. In contrast, Iaşi recorded a positive trend at the periphery level but a decline at both the metropolitan and urban core levels. As expected, the urban cores display a higher share of employees and number of companies than the peripheries. Increases over 30% in the share of employees were recorded in Cluj, Sibiu, Constanţa, and Târgu Mureş.

The 2009 economic crisis negatively impacted the share of employees and the number of companies per 1000 inhabitants, as demonstrated in the analysis of each metropolitan area. However, the number of companies increased significantly by over 15% in the urban cores of Cluj, Craiova, and Braşov. Insignificant changes were recorded in Baia Mare and Bacău between 2008 and 2023. Compared to the urban cores, peripheries exhibited higher growth rates in the number of companies across all metropolitan areas. This indicates that economic development is expanding beyond the city's boundaries.

The average local incomes have shown positive trends across all metropolitan areas. Except for Constanţa MA, the cores received more funds then the peripheries, which is expected due to the number of inhabitants and the concentration of economic activities. The greatest increases between 2005 and 2023 were recorded in Cluj-Napoca, Timişoara, Braşov, and Sibiu, which had added over 2900 RON/inhabitant. At the opposite, Baia Mare and Bacău had less than 1700 RON per inhabitant. In the peripheries, Constanţa, Braşov, Timişoara, and Cluj had the greatest increase, as opposed to Bacău and Iaşi, which have a weak performance mostly influenced by the regional trend.

Housing indicators such as construction density, housing stock renewal rate, and living space per inhabitant all exhibited positive trends across all metropolitan areas. The construction density is higher in the cores than the peripheries, as many constructions are concentrated on a small area. Significant increases over 40% were noticed in Sibiu, Iaşi, and Cluj. The peripheries had greater increases in the construction density, surpassing the growth rates from the urban cores. Iaşi, Cluj, Timişoara, and Constanţa managed to double their construction density in 2023.

The housing stock renewal rate had a positive evolution for all MAs, except for Bacău periphery, where a decrease of 0.2% was recorded. As expected, the number of new buildings is higher in the peripheries than in the urban cores, due to the availability of land and accessible prices. Sibiu, Cluj, Timişoara, and Constanţa MAs had the greatest increases in the peripheries.

The living space per inhabitant show increases in 2023for all three levels. In the case of the cores, the values doubled in Sibiu, Cluj, Timişoara, Craiova, Braşov and Constanţa, while in Bacău the lowest increase was recorded (53%). The peripheries also doubled their living space in Iaşi, Cluj, Timişoara, Braşov and Constanţa. This indicator is a further proof of the built areas expansion towards peripheries.

The number of building permits per 1000 inhabitants fluctuated throughout the period, showing a decreasing trend at the metropolitan level in Constanţa, Bacău, and Târgu Mureş. In urban cores, only Oradea, Braşov, and Baia Mare recorded positive values, suggesting the availability of land for new construction. The pandemic period proved favorable for construction, as construction density increased in most metropolitan areas after 2020. Additionally, the number of building permits was higher in the peripheries than in the urban cores, reflecting the availability of space for new constructions.

Overall, in terms of metropolitan areas performance, Cluj, Sibiu, Oradea, Braşov, Timişoara, and Constanţa demonstrated positive evolution, with only one indicator showing a negative trend. Iaşi, Bacău, and Târgu Mureş had two indicators with negative trends. Meanwhile, Craiova, Ploieşti, and Baia Mare recorded negative trends in more than three indicators, indicating weaker overall performance.

The results of the grouping analysis show that the metropolitan areas (MAs) with the best performance at all three levels are Cluj, Timişoara, and Oradea. The second group includes MAs with high performance at the metropolitan and core levels, such as Braşov, Sibiu, and Constanţa. Iaşi MA has the lowest performance at the core level but a moderate performance at the other two levels. Craiova MA performs poorly at the metropolitan and periphery levels but

shows high performance at the core level. The last group, consisting of Baia Mare, Târgu Mureş, and Bacău MAs, exhibits moderate performance at the core level and low performance at the other two levels.

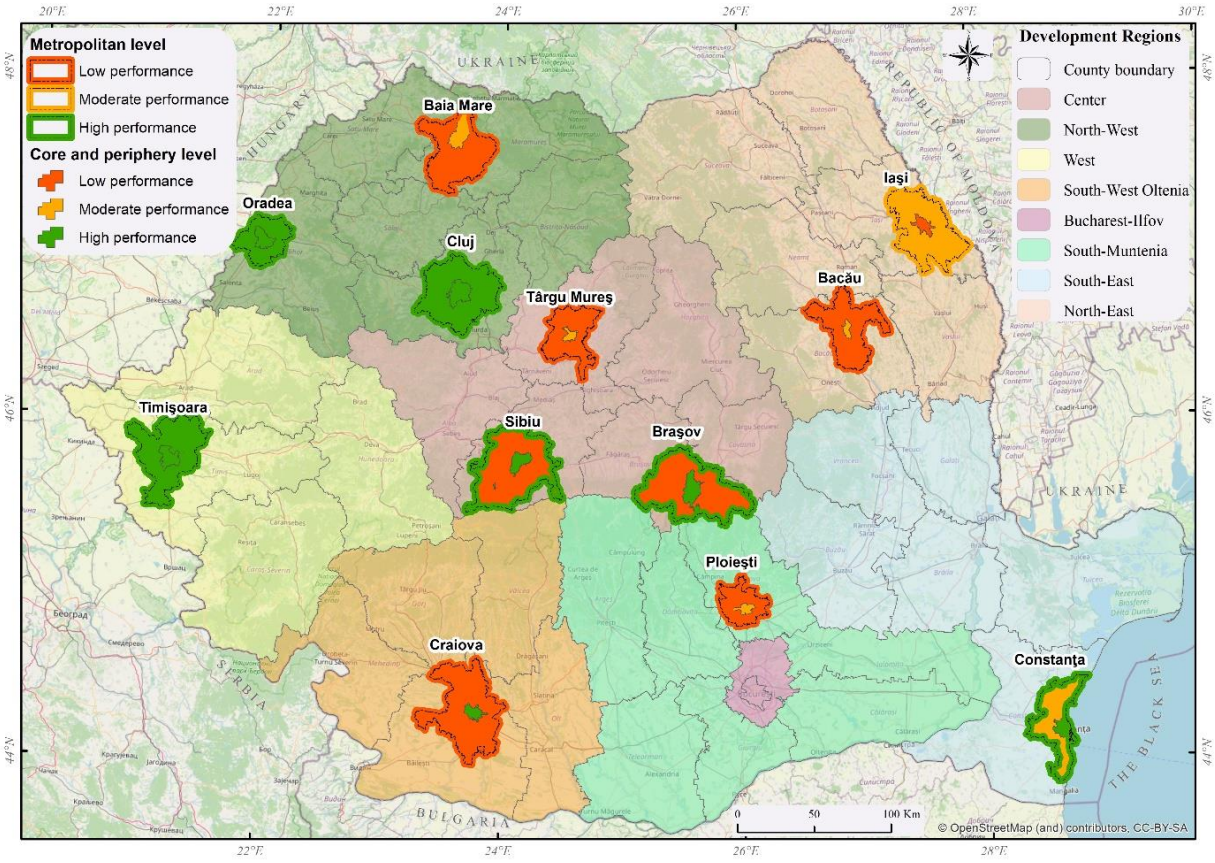

Figure 2. Spatial Distribution of Indicators Performance at MA, core, and periphery levels

Main findings of the income inequalities analysis

At the national level, even if the evolution of income inequalities has presented fluctuations starting from 2010 to present, after 2021, the values seem to be on a descending trend. This is a sign that the income inequalities started to be more evenly distributed.

The GDP growth rate between 2011 and 2022 at regional level presents significant growth in the case of the North-West, North-East, Centre and South-West Oltenia, which doubled their GDP in 2022. Bucharest-Ilfov, West and South-East regions have increases over 90%, while for South-Muntenia, only 76% growth is recorded. However, two of the poorest regions (North-East and South-West Oltenia) managed to double their GDP in 2022, which is a first step towards achieving a more balanced economic development across the country.

The analysis of per capita income at the national level shows an increasing trend, supporting the results observed at the metropolitan level. The Gini Index has also decreased at the national level, indicating a reduction in income inequalities. However, at the metropolitan level, an analysis of the Gini Index between 2005 and 2023 reveals that two of the best-performing MAs, Cluj and Sibiu, registered an increasing trend. This result may suggest widening intra-regional disparities.

The Cluster and Outlier Analysis revealed that, at the regional level, the North-West, West, Centre, and South-East Regions contain a significant number of territorial administrative units (TAUs) classified as High-High clusters. This indicates that high-income localities are surrounded by other localities with similarly high-income levels. Conversely, the North-East, South-Oltenia, and South-Muntenia Regions are predominantly characterized by Low-Low clusters, meaning that low-income TAUs are surrounded by other low-income localities. Intra-regional differences are also observed in the North-West and South-East Regions, where a high number of Low-Low clusters are concentrated in the northern areas.

The number of outliers is relatively low in each region, with High-Low outliers (high-income localities surrounded by low-income ones) primarily found in regions dominated by Low-Low clusters, while Low-High outliers (low-income TAUs surrounded by higher-income ones) are present in regions with High-High clusters. These High-Low outliers are usually represented by cities, which exhibit higher income values than the surrounding localities. Across the analysed years (2007, 2014, and 2021), these patterns of clusters and outliers expand.

At the metropolitan level, the trend follows that of the regional level. Thus, in the Cluj, Timişoara, Sibiu, Braşov, Oradea, and Constanţa MAs, High-High clusters dominate. In Ploieşti, a mix of High-High clusters and Low-High outliers is observed. Iaşi and Bacău follow the regional pattern, with most TAUs classified as Low-Low clusters. Baia Mare was mostly classified as Low-Low clusters in 2007, while in 2014 and 2021 “Not Significant” values were assigned. Târgu Mureş and Craiova MAs maintained their positions over time, with only a small number of TAUs classified as High-High or Low-High. Not Significant values are predominant in Târgu Mureş, Craiova, and Baia Mare, indicating that income diversity made it difficult to classify the TAUs.

Overall, the MAs with the best performance in every year are Cluj, Timişoara, Sibiu, Braşov, Constanţa. Oradea and Ploieşti recorded variation across the time between High-High clusters and not significant values. Iaşi and Bacău MAs are constantly dominated by Low-Low clusters, while Craiova, Târgu Mureş, and Baia Mare are predominated by Not significant values.

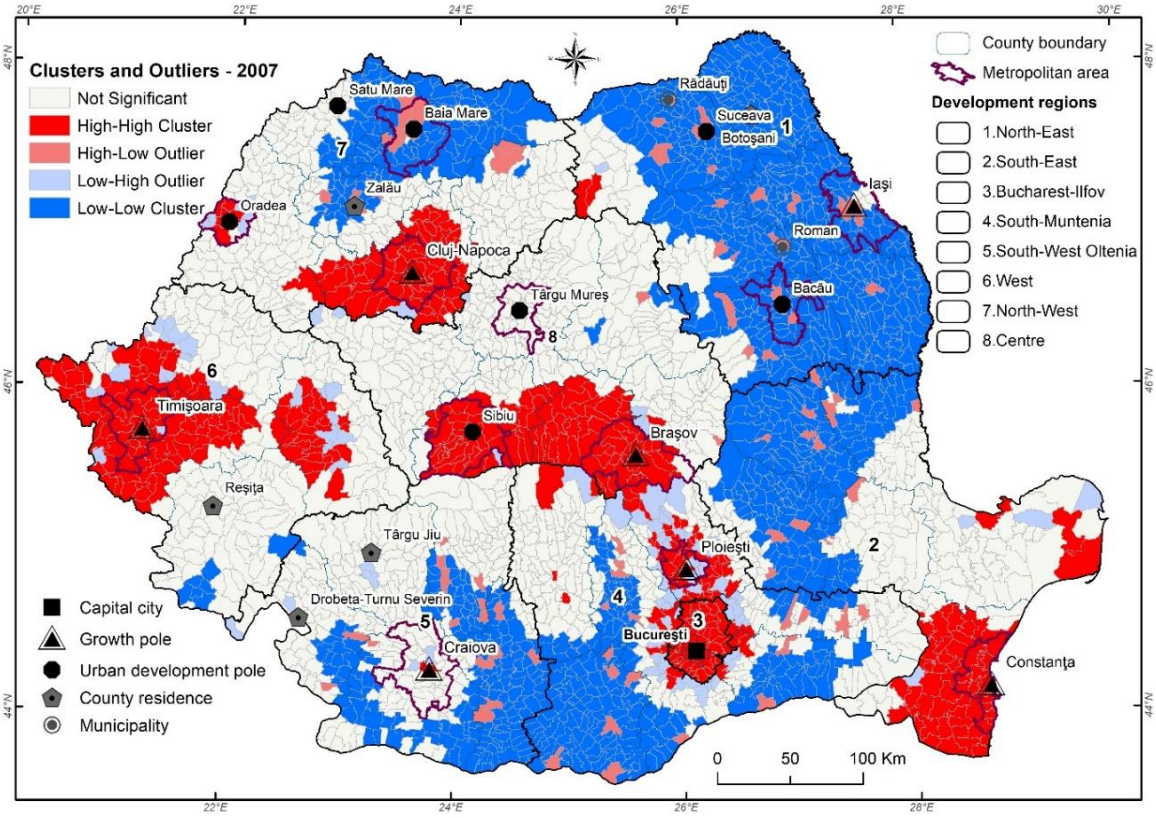

Figure 3. Cluster and Outliers – 2007
Source: modified after Ursu & Benedek (2024)

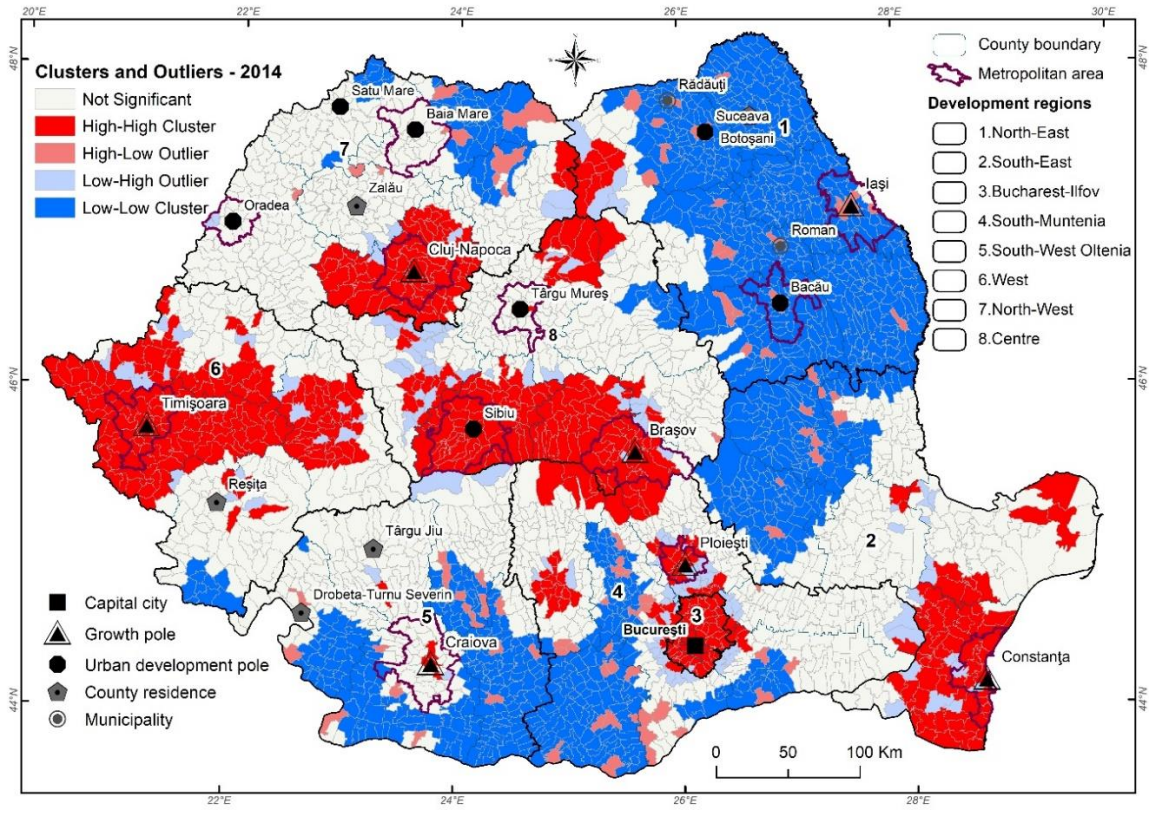

Figure 4. Cluster and Outliers – 2014
Source: modified after Ursu & Benedek (2024)

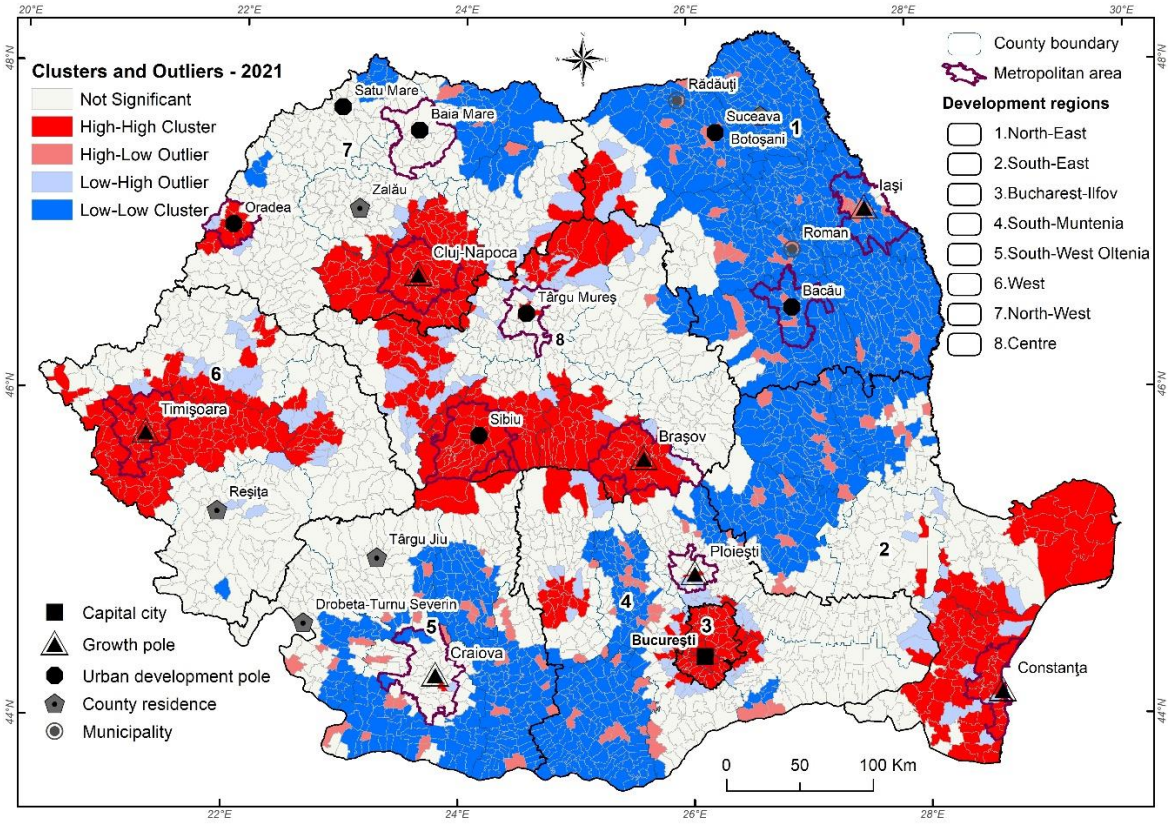

Figure 5. Cluster and Outliers – 2021
Source: modified after Ursu & Benedek (2024)

Main findings of the evolution of built areas

For each metropolitan area, differences in the type of the built areas can be noticed. Three types of land uses for analysed: residential, industrial, and transportation infrastructure.

In Cluj MA, the greatest increase in built areas was recorded between 2006 and 2009, when a section of A3 highway was recorded. The residential development reached its peak in Floreşti, Apahida, and the south of Cluj-Napoca. In Jucu, the industrial platforms were developed. Between 2012 and 2015, the airport runway was extended, while for the next period, another A3 sector was constructed.

For Braşov MA, the period 2009–2012 had the greatest impact on the expansion of built areas. The northern part of Braşov municipality, also Ghimbav, Cristian, Râşnov, Sânpetru, Hărman, Tărlungeni, and Codlea recorded expansions of residential and industrial areas. Between 2012 and 2015, major infrastructure projects (Braşov bypass road and Ghimbav airport runway) increased the share of built areas. For the last period, infrastructure and residential development were noticed in Braşov, Râşnov, Cristian, and Ghimbav.

Constanţa MA had significant residential development between 2009 and 2012, mostly located in the western part of the urban core. The period 2012–2015 was dominated by infrastructure projects, while from 2015, extensive residential areas were developed in Năvodari.

In Iaşi MA, extensive residential areas were constructed between 2012 and 2015 in the communes surrounding the urban centre: Valea Lupului, Rediu, Miroslava, Bârnova, Ciurea, Tomeşti, and Holboca.These areas were also expanded in the next periods. Iaşi municipality had a mixed development pattern, including both residential and industrial areas.

The built areas had the greatest expansion in Oradea MA between 2009 and 2012, when the urban core developed in the north and southern part, mainly due to industrial areas. Also, the communes Sântandrei, Borş, Sânmartin and Oşorhei had increases in the built areas during the period 2015–2018. Between 2018 and 2021, a sector of A3 highway was constructed, leading to increases in built areas of Biharia.

Timişoara MA based it built areas expansion on the residential development in the communes Giroc, Moşniţa Nouă, Ghiroda, and Dumbrăviţa. Sections of A1 highway were constructed between 2009 and 2015.

In Sibiu MA, the residential development had increases in Cisnădie and Şelimbăr, while the western side of the urban core was planned for industrial expansion. Most of built areas expanded between 2009 and 2018. Infrastructure was also developed in the northwestern area of Sibiu and Cristian commune.

In Craiova MA, most of the built areas expansion was recorded between 2012–2015. Residential areas were developed in the south and western part of Craiova municipality, as well as in Şimnicu de Sus, Ghercești, and Malu Mare. In Cârcea, a section of south bypass road was constructed. During the last period (2018–2021), a large commercial centre was developed in the north-western part of Craiova. Also, the communes with previous residential development continued to expand their built areas.

In Ploieşti MA, the period 2006–2009 had increases of built areas due to the construction of A3 highway sector in Bărcăneşti and Berceni. In the next period (2009–2012), the industrial platforms in Ariceştii-Rahtivani commune were expanded. In the urban cores or other TAUs (Blejoi, Păuleşti, Târgşoru Vechi, and Bucov), built areas had an insignificant expansion.

In the case of Bacău MA, the mixed pattern of built areas made by residential and industrial areas was developed between 2006 and 2012 at the periphery of the municipality and a little in the surrounding communes Letea Veche, Măgura, and Nicolae Bălcescu. For the last

period (2018–2021), the construction of Bacău bypass road had increased the built areas in the eastern side of Bacău municipality.

In Baia Mare, most of the expansion of built areas was realised between 2006 and 2009, when industrial platforms were constructed at the periphery of Baia Mare municipality. The built areas also expand towards the western side of the MA, while the mountain areas limited the expansion in the east. The other TAUs that recorded significant increases are Tăuţii-Măgherăuş, Recea, and Groşi.

In Târgu Mureş, most of built areas expansion was due to the infrastructure projects in Ungheni, Sânpaul, Gheorghe Doja, and Cristeşti. The residential areas had an insignificant expansion mainly in the surrounding communes of the urban centre.

The growth rates of built areas for each period at metropolitan level show that Cluj had the greatest increases of 18% between 2006 and 2009, mainly dedicated to the construction of A3 highway sector. For the second period (2009–2012), Braşov, Timişoara, Baia Mare, and Sibiu had developed their built areas by more than 6%. Between 2012 and 2015, only Constanţa, Craiova, and Iaşi managed to expand the most their built areas. Ploieşti, on the other side, was the only one with great expansion for the period 2015–2018, while Oradea and Bacău developed mostly in the last period (2018–2021), when major infrastructure was built. Except for Baia Mare and Iaşi, all the other MAs had expansions of major transport network connecting them with other urban centres or even states (in the case of Oradea).

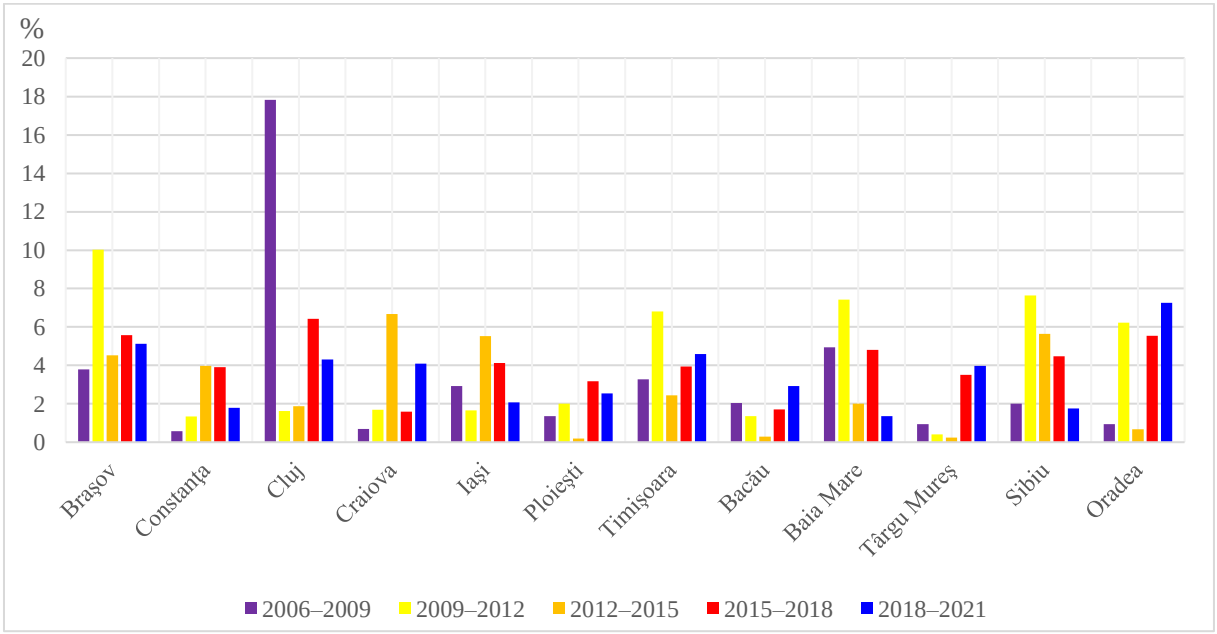

Figure 6. The built area dynamics at metropolitan level

CONCLUSIONS

The thesis focuses on the comparative analysis of metropolitan areas in Romania, using an empirical approach. We assume that, in the context of legislative changes regarding metropolitan areas, any analysis should begin with statistical evidence to assess the evolution of these territorial entities and design appropriate development strategies. Moreover, the performance of each metropolitan area should be evaluated periodically to identify dysfunctions and determine ways to mitigate them.

In this context, the thesis aimed to examine the evolution of 12 of the largest metropolitan areas through an empirical analysis. Three approaches were employed to achieve this objective. First, statistical indicators related to demographic, economic, and housing domains were analysed at the metropolitan, urban core, and periphery levels. Second, local income inequalities were assessed at regional and metropolitan levels using the Gini index, Global Moran's I, and Cluster and Outlier Analysis. The third approach focused on analysing built areas at both local and metropolitan levels. All these approaches followed a comparative perspective to identify the most dynamic metropolitan areas.

The aim of the metropolitan areas is to promote the cooperation between the urban centre and the surrounding localities for ensuring better public services (especially for the services that require major investments, which cannot be supported by a single TAU – like the public transport outside the city and waste collection) and improved living conditions for the citizens. In addition, it is desirable to aim towards a planned spatial development, which should design the investment projects not only for the local level, but also for the metropolitan level. Another purpose of the metropolitan governance is to promote the efficient use of the local resources and a sustainable development at metropolitan level.

Going back to the quote from the introduction (Kübler & Heinelt, 2008, p. 1), we are optimistic that this century will be indeed "metropolitan" for Romania. In the context of adopting new planning documents that establish the legislative framework for metropolitan areas, it remains to be seen how quickly the legislation will be implemented in practice. Moreover, the resilience of metropolitan areas will be intensely tested if major changes occur in the administrative-territorial organization (such as the reduction in the number of counties or the merging of certain communes with the adjacent urban centre). Therefore, the future development of Metropolitan Areas remains a promising topic for research.

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