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Metropolitan delimitation in spatial perspective: selected Asian and European case studies

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Abstract

Aim: The study aims to analyse and compare the various approaches to defining and delimiting metropolitan areas, with a specific focus on cases from the European Union and selected Asian countries (China and Japan).

Methodology: The study applies a qualitative comparative analysis based on a comprehensive review of legal documents, statistical frameworks, and academic literature, supported by illustrative case studies from the European Union, China, and Japan.

Results: The research identified key delimitation criteria, including administrative boundaries, commuting patterns, population thresholds, urban density, socio-economic interactions, urban sprawl, governance models, and levels of economic integration. It revealed that the European Union tends to apply more standardised frameworks, whereas Asian countries favour more flexible, context-specific practices.

Implications and recommendations: The findings emphasise the complexity of achieving consistency in metropolitan delimitation, especially for cross-national comparisons and policy design. The study recommends adopting flexible and context-sensitive delimitation methods that reconcile governance needs with functional urban realities.

Originality/value: The study contributes to the ongoing debate on metropolitan governance by highlighting how differences in delimitation approaches influence urban planning and socio-economic cohesion. It offers a nuanced perspective on the tensions between standardisation and contextual adaptation in urban policy frameworks.

Keywords: metropolis, metropolitan delimitation

1. Introduction

The delimitation of metropolitan areas has been the subject of extensive debate, both in applied policy frameworks and academic research. While the significance of metropolitan regions for urban development, governance, and socio-economic interactions is widely acknowledged, there is no universal consensus on how they should be defined. The divergence in legal, statistical, and functional approaches has resulted in a substantial variation in how metropolitan areas are conceptualised and classified across different regions.

This study examined these differences, particularly emphasising applied frameworks and scientific perspectives. The author considered formal policy-driven approaches such as the legal and statistical criteria used in governance and planning, along with academic perspectives that indicate metropolitan areas' functional, socio-economic, and spatial dimensions. The aim was to assess how these varying methodologies influence the understanding of metropolitan regions, and shape their role in governance and policy-making.

The comparative analysis focused on Europe and Asia, contrasting the structured and standardised methodologies employed in the European Union with the more 'flexible', country-specific approaches observed in China and Japan. The study identified the key challenges in establishing coherent and comparable metropolitan delimitation frameworks through a review of functional urban classifications, administrative definitions, and theoretical models.

By integrating applied policy frameworks with scientific discourse, this paper contributed to the ongoing debate on metropolitan governance. The selected case studies – the European Union's Functional Urban Areas (FUAs), Shanghai, and Osaka – illustrate the implications of different approaches for urban planning and regional development. The findings stress the tensions between standardisation and flexibility, demonstrating how governance models must balance administrative coherence with the complex realities of metropolitan dynamics.

2. Defining metropolis: diversity of frameworks and criteria

The concept of a metropolis was defined and analysed through two primary perspectives: the academic perspective and the applied frameworks, which include both the legal and practical dimensions. These perspectives reflect the multifaceted nature of metropolitan units and their roles in socio-economic and spatial systems.

The academic perspective, rooted in literature, approaches metropolitan units as dynamic socio--economic and spatial entities. This view underlines their evolving structures, functional relationships, and interconnectedness within global and regional networks, and often prioritises theoretical exploration and descriptive analysis over formalised criteria.

In contrast, applied frameworks focus on formal definitions and their implementation. The legal dimension provides standardised definitions and criteria (such as population thresholds and jurisdictional boundaries), which serve as a foundation for governance and policy-making. The practical dimension addresses the real-world applications of these definitions, such as urban planning, statistical reporting etc.

Nowadays, a metropolis constitutes a significant socio-economic formation, however the literature review revealed a lack of consensus regarding its precise definition and clear qualification criteria. The term 'metropolis' entered widespread academic use in Europe and the United States in the 20th century, employed by scholars such as Park, Burgess, Simmel, and Mumford (cf. Jasiński, 2010, p. 226; Mumford, 1963).

The review of both Polish and English-language literature revealed common references as to what defines a metropolis. First, an urban centre classified as a metropolis exerts an influence within the broadly defined sphere of civilisational development. Second, it fulfills managerial functions across various types of flows (knowledge, labour, investment, etc.), both regionally and internationally (including globally), and third, it participates in the global network of urban linkages. Thus, it can be concluded that a metropolis is generally viewed through the lens of its economic significance on a global scale.

To comprehensively grasp the essence of the concept of a metropolis, it is imperative to situate it within the socio-economic framework in which it operates. The character of a metropolis appears as a synthesis of the conditions inherent in the contemporary economy[1], shaped primarily by rapid developmental dynamics, the synergy derived from the aggregation of diverse forms of capital (including knowledge, financial resources, and production factors), and a robust capacity for innovation and networked development. Prusek (2011, p. 416) posited that metropolitan functioning was rooted in endogenous resources, whilst simultaneously serving exogenous functions that contribute to the global economy.

Another significant, albeit contentious, aspect concerns the population size of a metropolis. Firstly, it is necessary to distinguish between official (administrative) and academic perspectives. The former pertains to legal and regulatory frameworks applicable in a given country or region where the definition of a metropolis is explicitly outlined in statutory laws, official documents, etc. Even at this initial stage, discrepancies arise regarding the very essence of what constitutes a metropolis – whether it is a city, an area, a region, or another entity.

For instance, US law employs the term Metropolitan Statistical Area, setting a minimum population threshold of 50,000, with the condition that this applies specifically to the core urban area (Census.gov, 2023). In contrast, Indian legislation introduces the concept of a metropolitan city, defined as having a population of 1 million or more (74th Amendment to the Constitution, 1992, art. 243ZE). In Europe, approaches to defining a metropolis also exhibit significant variation, often reflecting the diverse legal, administrative, and spatial contexts of individual countries. Frequently, there are no explicit legal provisions specifying defined population thresholds for metropolitan areas, but generally accepted benchmarks are often used for statistical or planning purposes. For example, in France, the National Institute of Statistics and Economic Studies (INSEE) classifies urban areas based on population and employment criteria. Urban areas with more than 500,000 inhabitants and at least 20,000 'metropolitan-type' jobs are designated as metropolitan areas (Fr. *aires métropolitaines*). Those with more than 200,000 inhabitants are termed large urban areas (Fr. *grandes aires*, INSEE, 2021). The European Union classifies metropolitan regions as urban agglomerations in which at least 50% of the population lives within Functional Urban Areas (FUAs) with a minimum of 250,000 inhabitants (European Union, 2021)[2]. This criterion offers a unified framework for statistical analysis and cross--country comparisons, focusing on urbanisation through a functional lens that highlights socio--economic interconnections rather than adhering to administrative divisions. The differences between examples in terms population thresholds required for defining a metropolis, as well as the conceptual distinctions regarding Asia and Europe are presented in Table 1.

[1] Network development in the economic context pertains to the creation and maintenance of interconnected relationships among various entities, including enterprises, institutions, and cities. They collaborate to achieve shared objectives, adopting different forms depending on their nature and the tasks they undertake – examples include supplier networks, distribution networks, and innovation networks (Skrzypek, 2017), with particular relevance regarding the network of cities. As Szymańska (2008) observed, cities are the most interconnected entities, facilitating the most intensive exchange of information, capital flows, technology, goods, services, and human mobility. Consequently, they emerge as central nodes in the global economy. The networked nature of metropolises also assumes a spatial dimension, extending their influence beyond the administrative boundaries of the metropolitan city.

[2] This issue is further elaborated in other sections of this study.

Table 1. Terminology and population criteria for metropolitan units in Asia and Europe – examples

No.	Country/Region	Applied Term	Official Population Requirement
Asia			
1.	China, Taiwan	Metropolitan Area	None. Metropolitan areas are primarily defined for administrative purposes (National Bureau of Statistics of China, 2024).
2.	India	Metropolitan City	Minimum population of 1 million (Constitution of India, 1992).
3.	Japan	Metropolis	None. Legally, only Tokyo holds metropolitan status (Tokyo Metropolis, Statistics Bureau of Japan, n.d.).
4.	Malaysia	Metropolitan Area	None. Metropolitan areas are recognized based on urban agglomerations and economic activity (Department of Statistics Malaysia, 2024).
5.	Philippines	Metropolitan Region	None. Metropolitan regions are recognized based on functional and economic integration (Philippine Statistics Authority, 2024).
6.	South Korea	Metropolitan City	None. Metropolitan cities are identified based on administrative criteria and urban functionality (Statistics Korea, 2024).
7.	Thailand	Metropolis, Metropolitan Region	None – however, Bangkok holds metropolitan status as a designated central urban area, along with the Bangkok Metropolitan Region (BMR), (Office of the National Economic and Social Development Council (NESDC), Thailand, 2024).
Europe			
8.	European Union (Eurostat Framework)	Metropolitan Region	At least 50% of the population resides in FUAs of at least 250,000 inhabitants (Eurostat, 2024).
9.	Belgium	Metropolitan Area	None. Functional zones are based on commuting patterns (Statbel, 2024).
10.	Finland	Metropolitan Area	None. Metropolitan areas are recognized based on commuting zones and functional relationships (Statistics Finland, 2024).
11.	France	Metropolitan Area	Urban cores with a minimum population of 200,000 in statistical classifications (INSEE, 2024).
12.	Germany	Metropolitan Region	None. Metropolitan regions are identified by demographic and economic significance (BBSR, 2024).
13.	Italy	Metropolitan City	None; designation based on administrative criteria (ISTAT, 2024).
14.	Netherlands	Randstad	A polycentric urban region with approximately 7 million inhabitants, though not officially defined as a single metropolis (CBS, 2024).
15.	Norway	Metropolitan Area	None. Defined by urban agglomeration and commuting flows (Statistics Norway, 2024).
16.	Poland	Metropolitan Area	None (GUS, 2024).
17.	Spain	Metropolitan Area	None. Metropolitan areas are identified based on population and commuting flows (INE, 2024).
18.	Sweden	Metropolitan Area	None. Metropolitan areas are identified based on commuting and economic activity (Statistics Sweden, 2024).
19.	United Kingdom	Metropolitan County	Typically encompasses populations exceeding 1 million inhabitants, administrative designation (Office for National Statistics, 2024).

Source: author's own elaboration.

The analysis of the literature on the essence of metropolitan units also indicated conceptual diversification (Table 2). Similarly to governmental/statistical frameworks, the following terms are widely used:

1. Metropolis, metropolitan city – used interchangeably (Chatterjee & Chattopadhyay, 2020; Duché, 2010; Korenik, 2011; Radło & Szczech-Pietkiewicz, 2022; Smętkowski et al., 2019).
2. Metropolitan region (da Cruz et al., 2020; Hajrasouliha & Hamidi, 2016; Khanam et al., 2023).
3. Metropolitan area (Adobati & Debernardi, 2022; Giuliano et al., 2019; Heblich et al., 2018; Sali et al., 2014; Viganò et al., 2018).

Table 2. Comparison of common characteristics of metropolis, metropolitan region and metropolitan area

Aspect	Metropolis	Metropolitan region	Metropolitan area
Core concept	Single influential urban centre	Integrated urban and regional unit	Urban core and its commuting zones
Scope	Focused on the central city	Broader regional perspective	Functional urban region
Defining criteria	Economic, cultural, and political influence	Functional and spatial integration	Commuting flows and socio--economic ties

Source: author's own elaboration.

The term metropolis/metropolitan city typically refers to a single, dominant urban centre characterised by its significant socio-economic influence, cultural importance, and administrative functions. It often denotes the core city that acts as the anchor of larger urban systems. The emphasis is usually placed on the city's ability to drive economic growth and innovation. In contrast, a metropolitan region extends beyond the boundaries of the core city to include the surrounding urbanised and rural areas that maintain strong economic and social ties to the central city. It emphasises functional and spatial integration, often requiring coordinated governance across multiple administrative units. Finally, the term 'metropolitan area' refers to the functional urban region comprising a densely populated urban core and its commuting zones, focusing on socio-economic interactions rather than administrative boundaries. This term is frequently used in spatial planning and statistical analyses to identify interconnected urban and suburban zones.

However, the application of these terms often reveals considerable conceptual voluntarism. For instance, Graizbord et al. (2012, p. 17) proposed that a metropolis, in a geographical context, can be interpreted as a metropolitan area comprising a single central city and a network of political administrative units (municipalities) when their territories fall within the urbanised area. Additionally, from a functional perspective, they introduce the concept of metropolitan zones, characterised by the extension of local jurisdiction to areas that develop significant interactions with the city centre or with regions already recognised as part of the metropolis. This perspective is in line with the notion presented by Mikuła (2010, p. 49), who argued that a metropolis should not be understood solely as a single city confined within strictly defined administrative boundaries, whereas it should be viewed as a broader functional area, encompassing agglomerations or metropolitan regions. According to Mikuła, a metropolis represents a networked spatial entity that transcends administrative divisions, emphasising its functional role in facilitating socio-economic processes.

The analysis of population-related criteria regarding metropolitan units revealed two distinct approaches applied in the literature. The first, referred to by the author as quantitative, is based on specifying a minimum population threshold that a city must reach to qualify as a metropolis (this approach is reflected for example in Indian legal regulations, as previously outlined). Jałowiecki (2007) suggested a threshold of 50,000 inhabitants as the minimum for a city to be considered a metropolis, arguing that the city's role in the settlement hierarchy and its economic functions are of primary importance. In contrast, Mydel (2021) proposed a significantly higher threshold of 1 million inhabitants, stressing that demographic size is often correlated with a city's functional level and its sphere of influence.

This quantitative approach is in contrast with the second, functional perspective, which focuses on the city's role in urban networks and its relationships with other settlement units, regardless of specific

population numbers (Szymańska, 2008). Thus, while quantitative criteria offer precision, they do not always reflect the actual significance and functions of a city on a regional or global scale.

The functional approach identifies two groups of definitions:

1. Those that reference urban population without specifying a threshold (Arban, 2018; Duché, 2010; Graizbord et al., 2012; Okraszewska et al., 2019; Orellana & Fuentes, 2019; Orum, 2014; Xiangzhan, 2011).
2. Those that do not reference urban population at all (e.g. Chatterjee & Chattopadhyay, 2020; da Cruz et al., 2020; Heblich et al., 2018; Smętkowski et al., 2019).

The functional approach to defining metropolitan areas highlights two distinct categories of definitions based on their treatment of urban population. The first category includes definitions that reference urban population but do not specify a precise threshold. For example, Okraszewska et al. (2019) focused on the role of densely populated urban cores and their integration with the surrounding areas, while Orellana and Fuentes (2019) discussed metropolitan areas as functional units shaped by socio--economic interactions without rigid population criteria. This category also frequently refers to the characteristic high population density of metropolitan areas (Arban, 2018; Graizbord et al., 2012; Orellana & Fuentes, 2019; Orum, 2014; Xiangzhan, 2011) and the significance of large populations. Duché (2010) specified that such large populations typically pertain to the 'main city', whereas Graizbord et al. (2012) argued that even small cities with fewer than 50,000 inhabitants can be considered part of a metropolitan zone or area if they exhibit strong functional integration with the metropolitan core.

The second category comprises definitions that omit explicit references to urban population size, focusing instead on other characteristics of metropolitan areas. These definitions highlight aspects such as governance structures, regional hierarchies, and socio-economic functions, whilst also considering the spatial and functional integration of metropolitan regions, including commuting patterns and economic interdependence.

The lack of consensus on defining criteria, both in application and in research, particularly regarding population size, stresses the importance of viewing metropolises not merely as administrative entities, but also as functional regions shaped by dynamic socio-economic interactions. This diversity in terminology and criteria necessitated posing the fundamental question: why is metropolitan delimitation needed in the first place? From an application-oriented perspective, delimitation is essential for spatial planning and governance, enabling the effective management of specific areas. It also facilitates statistical reporting, often tied to administrative considerations, whereas from a research-oriented perspective, delimitation serves as a tool to study existing structures and predict their development. These dual dimensions – practical and analytical – underline the necessity of establishing coherent delimitation frameworks that balance administrative functionality with a nuanced understanding of the socio-economic and spatial dynamics shaping metropolitan areas.

This sets the stage for a deeper exploration of metropolitan delimitation in the European Union and Asian contexts.

3. Applied framework of metropolitan delimitation – the EU context

In EU law, the term 'metropolis' is not formally defined or utilised. Instead, the EU employs the concept of 'metropolitan region', which serves as a cornerstone in spatial planning and governance frameworks. The metropolitan typology was created collaboratively by the Directorate-General for Regional and Urban Policy (DG REGIO) of the European Commission and Eurostat. Initially introduced in 2009, this framework later underwent a comparative analysis with OECD-defined metropolitan regions, resulting in a unified and harmonised definition of metropolitan regions adopted by both organizations (Statistics Poland, n.d.). This method stresses the EU's emphasis on the functional and socio-economic realities,

prioritising connectivity, population density, and regional cohesion over rigid administrative boundaries (e.g. The Territorial Agenda 2030 promotes balanced spatial development by addressing urban-rural dynamics and ensuring connectivity within metropolitan regions (European Commission, 2021).

The EU approaches the delimitation of metropolitan regions through a structured, three-stage process (Figure 1). This methodology, grounded in established frameworks, ensures that the functional and socio-economic characteristics of metropolitan regions are accurately captured while maintaining statistical consistency across the member states.

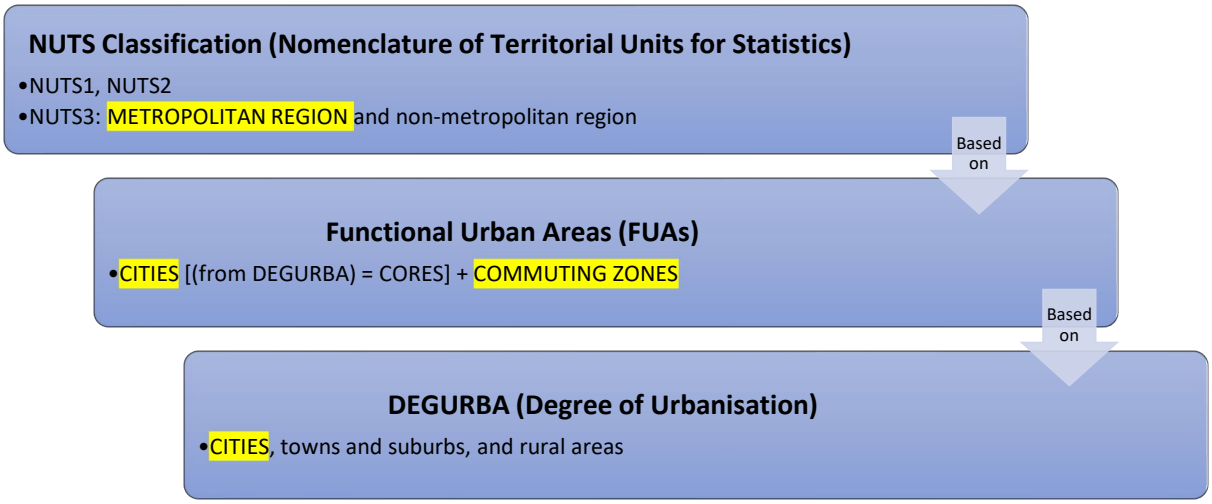

Fig. 1. Three-stage framework for metropolitan region delimitation in the European Union

Source: author's own elaboration.

The Degree of Urbanisation (DEGURBA) classification, introduced by the EU in 1991, categorises areas based on population size, density, and contiguity. To address comparability issues across member states, a revised methodology was adopted in 2011, incorporating population grids for greater accuracy (Dijkstra & Poelman, 2014). The framework was further refined in 2021 to address evolving urbanization patterns and enhance its applicability[3] (European Commission, 2021). DEGURBA is now mandatory across all EU countries, ensuring harmonised statistical reporting and supporting cohesive regional and urban strategies (Statistics Poland, n.d.).

The DEGURBA framework divides territories into three distinct groups: cities, towns and suburbs, and rural areas. This classification is based on population density and geographical continuity measured using a 1 km² resolution grid. The grid cells are grouped into urban centres, urban clusters, and rural grid cells, which form the basis for defining local administrative units (LAUs). In Poland, for example, this typology is applied to communes (Pl. *gminas*) (Statistics Poland, n.d.).

Cities, referred to as densely populated areas, are LAUs where at least 50% of the population resides in urban centres (European Commission, 2021), which are the foundation for metropolitan regions, serving as cores around which socio-economic and spatial interactions are structured. They act as hubs of economic, social, and infrastructural activity, characterised by their high population density and critical role in regional dynamics. The second group – towns and suburbs – is classified as intermediate--density areas. These LAUs support functional connectivity with cities and are defined as areas where less than 50% of the population reside in urban centres and less than 50% live in rural grid units; together with cities, they form a broader category of urban areas (ibidem). It must be stated that towns

[3] The typology utilising a 1 km² resolution grid is applied, categorising grid cells into urban centres, urban clusters, and rural grid cells (European Commission, 2021).

and suburbs rely heavily on cities as their functional anchors, particularly for employment opportunities and access to essential services, highlighting their dependence on urban cores. Finally, rural areas, referred to as thinly populated areas, are LAUs where more than 50% of the population reside in rural grid units. These areas, while less directly connected to urban cores, still play a role in regional dynamics, particularly in mixed-use zones or as transitional areas between urban and strictly rural settings.

Building on this classification, Functional Urban Areas (FUAs) expand the concept of urban areas by incorporating both cities – which serve as cores – and their surrounding commuting zones. These commuting zones comprise areas where at least 15% of the employed population commute to the core for work (ibidem). In Poland's FUAs encompass groups of gminas (Statistics Poland, n.d.). A unique case in Germany is the Ruhr area, an urban region with a dense network of interconnected cities and municipalities. Unlike other regions where FUAs are typically centred around a single urban core, the Ruhr area encompasses multiple cities that are functionally integrated through extensive commuter flows and shared economic activities (European Commission, 2021).

At the top layer of the framework, the NUTS3 classification, part of the Nomenclature of Territorial Units for Statistics (NUTS) system[4], focuses on administrative-statistical units: metropolitan regions and non-metropolitan regions. The primary purpose of the NUTS system is to provide a harmonised statistical framework for analysing socio-economic patterns and regional development across the EU. The delimitation of metropolitan regions is guided by two key criteria. First, at least 50% of the population in a NUTS3 unit must reside within a Functional Urban Area. Second, the FUA itself must have a population of at least 250,000 inhabitants. In the case where a single FUA, with a population of at least 250,000, encompasses more than one NUTS 3 unit, where at least 50% of the population lives within the FUA, these NUTS 3 units are collectively treated as a single metropolitan region (ibidem). It can be assumed that by applying population thresholds and assessing urban functionality, the classification aims to capture regions where urban cores and their surrounding areas exhibit measurable socio-economic interactions. Consequently, metropolitan regions are distinguished from non-metropolitan areas which lack the specified levels of urban connectivity. This approach appears to emphasise functional integration over purely administrative consideration, reflecting the intent to align territorial definitions with observable patterns of interaction.

The implementation of standardised statistical frameworks encountered considerable obstacles stemming from the diverse legal and administrative frameworks of EU member states. While these are required to follow the statistical tendency outlined earlier in this study, individual countries maintain their own internal legal regulations, which often differ significantly. The standardisation of statistical frameworks in the EU faces significant challenges due to the diversity of definitions and administrative structures across member states. Although the definitions of Functional Urban Areas developed by the EU and OECD provide a unified approach, their implementation requires adaptation to local administrative units, complicating international comparisons. For instance, FUA definitions rely on data about population density and commuting flows, but differences in the size and structure of administrative units in each country can lead to over or underrepresentation of urban centres (Dijkstra et al., 2019). Importantly, the need to adhere to both EU standards and national regulations can result in fragmented policymaking. In cases where national laws prioritise administrative boundaries over functional realities, the effective targeting of EU funds and development programmes is hindered, and such misalignment obstructs the realisation of cohesive and effective development strategies (ESPON, 2020).

The challenges extend to disparities in data collection and integration. Whilst some member states possess well-developed spatial and socio-economic data collection systems, others lack the infrastructure necessary to meet the detailed criteria of frameworks such as DEGURBA and FUAs.

[4] Higher levels of the system include NUTS2, used for regional policy implementation, and NUTS1, encompassing broader socio-economic regions.

These gaps undermine the consistency and quality of statistical applications, thereby reducing the overall reliability of analyses across the EU Furthermore, governance and coordination issues emerge when EU-defined metropolitan regions do not correspond to nationally recognised legal entities. This incongruence results in inefficiencies in planning, resource allocation, and the implementation of cross-regional projects, particularly in metropolitan governance contexts (European Union, 2012; Gonçalves et al., 2022). Flexibility within EU frameworks is crucial for accommodating national contexts while pursuing harmonisation, e.g. flexibility mechanisms such as derogations or transitional arrangements tailored for individual EU countries, help overcome barriers to integration (Carnegie Endowment for International Peace, 2018). Encouraging Member States to align their internal regulations with EU methodologies is another essential strategy, often facilitated through targeted incentives or technical assistance. Eurostat, the EU's statistical authority, exemplifies this by collaborating with national statistical offices to harmonise data and ensure quality standards (Eurostat, 2024). Moreover, fostering collaboration between national and EU institutions enhances the integration of statistical and legal definitions, making policies both functional and contextually appropriate. Although the coexistence of EU and national frameworks introduces complexity, it simultaneously creates opportunities for innovation in territorial governance[5].

4. Metropolitan delimitation – the Asian context

The rapid urbanisation in Asia has redefined the structure and dynamics of metropolitan areas, necessitating the development of context-specific delimitation frameworks. Unlike Europe, where urbanization is typically slower and more regulated, in Asia it is characterised by high population density, informal settlements, and economic transformations driven by export-oriented industries (Zhang et al., 2019). One critical aspect distinguishing Asian urbanisation is the proliferation of informal settlements and slums, arising from the inability of cities to accommodate the influx of rural migrants (World Bank, 2017). Moreover, the high density of Asian metropolitan areas is not confined to horizontal expansion but extends vertically, with mixed-use high-rise developments becoming a hallmark of urban landscapes in cities such as Shanghai and Hong Kong. These forms of urbanisation are often monocentric, focusing on historical city centres, although polycentric and peri-urban expansions are increasingly observed in response to housing and economic demands (Christiawan & Nguyen, 2024). It should be underlined that metropolitan delimitation remains among the significant differences in governance and policy frameworks, with the European Union benefiting from cohesive policies – as outlined earlier – while Asia lacks a unified policy framework for metropolitan governance, leading to diverse and often fragmented approaches to metropolitan delimitation across the continent.

4.1. China

In contrast to Western approaches to metropolitan delimitation which often prioritise functional integration and economic networks, China's system is deeply rooted in rigid administrative structures that frequently fail to reflect the actual spatial dynamics of urbanisation. Urban areas are classified hierarchically – ranging from provincial-level municipalities to districts, towns, and villages – with a primary focus on governance efficiency and political control rather than the socio-economic and spatial realities of metropolitan regions. What is more, this system is undermined by frequent policy--driven adjustments, such as the "city management of counties" and the conversion of counties into districts, which repeatedly redraw administrative boundaries without adequately addressing

[5] Balancing unification with adaptability enables the development of strategies effective at both regional and European levels, as observed in policy areas such as the single market, Eurozone integration, and migration cooperation (Carnegie Endowment for International Peace, 2018).

functional urban integration. These ongoing changes, compounded by inconsistent population data, make defining and managing metropolitan boundaries increasingly challenging (Cang et al., 2024).

Shanghai provides a compelling example of the divergence between administrative and research--based approaches to metropolitan delimitation in China. These differences, as described above, stem from the administrative approach's focus on rigid governance structures, which fail to adapt to the dynamic nature of urban growth. This is evident in Shanghai's official designation as a direct--administered municipality which encompasses 16 districts, but does not account for the city's broader metropolitan influence extending to neighbouring areas such as Suzhou, Wuxi, and Jiaxing (Figure 2).

A review of the literature revealed that researchers typically divide metropolitan units into two main components: the core metropolitan area (the equivalents of urban centres in the EU nomenclature) and areas constituting the broader metropolis beyond the core. Researchers consistently identify the core of Shanghai's metropolitan region as including the districts of Huangpu, Jing'an, Xuhui, Changning, Zhabei, Putuo, Hongkou, and Yangpu (Figure 2, point A). For these core districts, delimitation criteria are based on land use and land cover characteristics, including the proportion of built-up areas and the degree of urbanisation. These factors reflect the functional and spatial dynamics that define the core metropolitan zone. The delimitation of areas beyond the metropolitan core (in the metropolitan area) varies in the literature, but no clear criteria for defining these areas have been identified. Whilst some studies (Cui & Shi, 2012; Gu et al., 2019; Zhao et al., 2006), highlighted functional integration (Figure 2, point B), others (e.g. Wang et al., 2017) (Figure 2, point C), focused on urbanisation and economic ties, where the lack of consistent criteria highlights the ambiguity surrounding the boundaries of these peripheral regions.

Fig. 2. Spatial delineation of Shanghai's metropolitan unit and its broader surroundings – research-based approach

Source: author's own elaboration based on (iReloChina, n.d.).

When compared to Shanghai's administrative framework, the core area featured in literature largely aligns with the city's central urban districts. However, the administrative approach encompasses a broader range of districts within its governance boundaries, some of which, like Qingpu and Chongming, do not meet the functional criteria typically associated with a metropolitan core[6]. This comparison highlights the limitations of rigid administrative structures, whereas the research-based

6 Such districts are included within Shanghai's administrative boundaries but do not meet the functional criteria typically associated with a metropolitan core. These districts are characterised by lower levels of urbanisation, less dense development, and a predominantly rural or peri-urban character (Cui & Shi, 2012; Li et al., 2016).

approach facilitates a more precise and contextually nuanced delineation of the metropolitan core, demonstrating greater alignment with empirical realities and urban dynamics.

4.2. Japan

Japan's administrative division system is structured into three hierarchical levels: national, prefectural, and municipal governments, among which the concept of a metropolis refers to the administrative unit called in Japanese *to*, a designation unique to Tokyo-to, or the Tokyo Metropolis. This distinctive framework merges the characteristics of both a prefecture and a city, setting it apart from other administrative divisions in Japan such as prefectures cities, towns, and villages (Japan's administrative division system…, World Bank Group, 2017).

In 1943 Tokyo Prefecture and Tokyo City were merged to form the Tokyo Metropolis, creating a unique administrative entity that combined city and prefectural functions (Japan's centralised governance historically concentrated power in Tokyo). The structure included 23 special wards, each functioning similarly to independent cities, as well as other municipalities such as cities, towns, and villages. The establishment of the Tokyo Metropolis was further solidified through the enactment of the 1947 Local Autonomy Law, which provided a framework for local governance in Japan. This distinction was further reinforced by Tokyo's role as the political, economic, and cultural centre of Japan, housing the national government, the Imperial Palace, and major global institutions. Its population density [7] and its significant share of Japan's GDP[8] required its unique administrative framework (ibidem). Other cities, such as Osaka and Kyoto, hold the designation of urban prefectures but lack Tokyo's combined governance model, economic scale, and global influence.

In Japan there exists a concept known as a metropolitan area used for statistical purposes to facilitate planning in areas such as demographics, urban development, transportation, and the economy. Osaka is a key city within one such metropolitan area and serves as an important centre in the Kansai region. Administratively it is classified as a Level 3 city, operating with its own municipal government responsible for local services. The broader administrative region, which includes 42 surrounding municipalities, constitutes Osaka Prefecture, a Level 2 urban prefecture. Finally – on a larger scale – Osaka is part of the Keihanshin Metropolitan Area, a major conurbation that also includes Kyoto and Kobe.

From a scientific perspective, researchers employ diverse approaches to delimit the core of the metropolis and the broader metropolitan area in the context of Osaka. Buhnik (2011) identified the City of Osaka as the core of the metropolitan region, stressing its administrative and demographic importance as the central node within its prefectural boundaries. Conversely, Perez et al. (2019) and Aoki (2022) adopted a broader perspective, suggesting that the core extended beyond the city of Osaka to encompass the entire Keihanshin Conurbation (which includes Osaka, Kyoto, and Kobe – Figure 3A). By accounting for the extensive urban sprawl and functional integration, this perspective reflects the challenges of delineating discrete boundaries within a highly interconnected metropolitan landscape.

Regarding the delineation of the broader metropolitan area in Osaka, the approaches also vary. Buhnik (2011) limited the broader metropolitan area to the administrative boundaries of the Osaka Prefecture (Figure 3B), in contrast with the studies by Perez et al. (2019) and Aoki (2022), which identified the Keihanshin Conurbation as the core of the metropolis rather than its broader area. These conflicting interpretations highlight a fundamental difference in defining the central hub versus the metropolitan periphery, demonstrating how the same urban entity can be viewed either as the core or the entirety

[7] As of 2023, Tokyo had a population of 14.086 million, significantly ahead of the second-most populous prefecture, Kanagawa with the population of 9.229 million (Statistics Bureau of Japan, 2023).

[8] In the 2021 fiscal year, Tokyo's gross prefectural domestic product was approximately 113.7 trillion Japanese yen, representing roughly 20% of Japan's total GDP (Statista, n.d.).

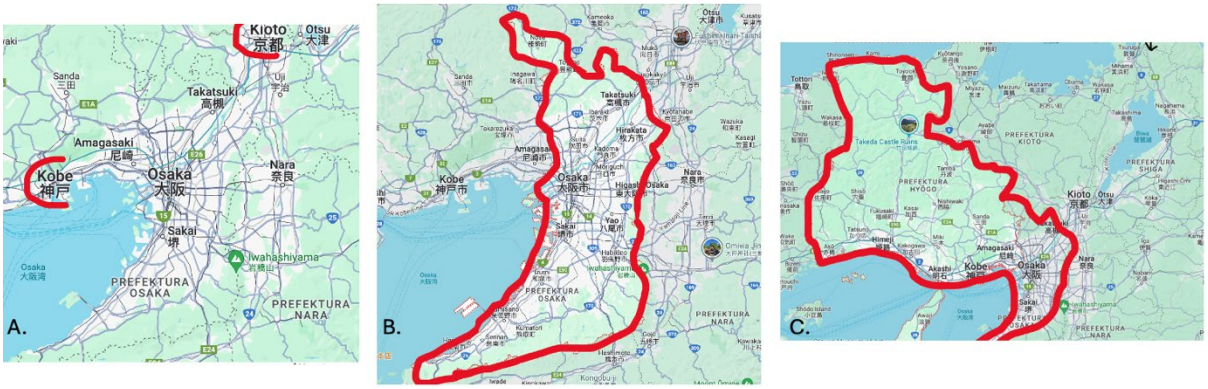

Fig. 3. Spatial delineation of Osaka's metropolitan unit and its broader surroundings – research-based approach

Source: author's own elaboration based on Google Maps.

of the metropolitan area depending on the analytical framework. Tomita et al. (2007), however, adopted a historical perspective, defining the broader metropolitan area as the former province of Settsu, covering parts of modern-day Osaka and Hyogo Prefectures (Figure 3C).

5. Conclusion

The concept of a metropolis is understood and analysed through diverse frameworks, reflecting both practical applications and academic perspectives. In the application-oriented dimension (e.g. legal and statistical purposes), differences emerge in definitions and criteria shaped by legal and administrative systems, population thresholds, and governance practices specific to individual countries or regions. These approaches provide practical tools for governance and urban planning but often fail to capture the dynamic socio-economic processes that define metropolitan regions.

In the European Union, metropolitan delimitation is standardised, which results in a consistent framework for comparative analyses, spatial planning, and policy-making across its member states, enabling a unified understanding of urban structures at EU level. Nevertheless, it should be underlined that individual countries are also allowed to implement their own criteria and terminology for metropolitan delimitation (which may lead to inconsistencies in data comparability).

In Asian countries there is significant flexibility in defining metropolitan units as no overarching legal framework such as the European Union exists. Each country employs its own approach to delimitation, often reflecting unique administrative structures, socio-economic priorities, and governance practices. This lack of standardisation makes cross-country comparisons particularly challenging as the criteria for defining metropolitan areas vary widely.

In the academic discourse, metropolises are often viewed as dynamic entities with evolving socio--economic and spatial structures. Scholars focus on theoretical interpretations, highlighting the interconnectedness and functional relationships within global and regional networks. However, significant disagreements persist within this discourse regarding what constitutes a metropolis, with debates centering on whether it should be defined as a city, a broader urban region, or a socio--economic network (as shown by the examples in this study).

The author demonstrated that the delimitation of metropolitan areas remains a complex issue shaped by both governance frameworks and functional socio-economic dynamics. The comparative analysis of European and Asian approaches indicated key differences: while European models prioritise standardisation to facilitate cross-national comparisons, Asian approaches tend to be more flexible, adapting to national governance structures and urban realities. These findings illustrate the ongoing tension between regulatory coherence and functional integration in metropolitan governance. By

examining the criteria most commonly used in metropolitan delimitation – such as population size, commuting flows, administrative boundaries, and economic linkages – this study contributes to a deeper understanding of how different methodologies influence urban planning and policy-making. In doing so, it addresses a gap in comparative research by systematically analysing how these frameworks operate across regions. Future studies should explore hybrid approaches that balance methodological consistency with the need for flexibility, ensuring that metropolitan classification systems remain both robust and adaptable to diverse urban contexts.

To sum up, the delimitation criteria for metropolitan areas comprise factors that address both administrative and functional dimensions. Administrative boundaries rely on official jurisdictional limits, such as city or prefectural borders, to define metropolitan extents. Commuting patterns, based on daily flows between urban cores and peripheral areas, are also widely used. Population size and density further differentiate urban cores from surrounding areas, providing essential metrics for comparative analyses. Socio-economic interactions (e.g. labour markets and trade networks), also serve as key criteria. In some regions, historical boundaries influence delimitation, reflecting legacy administrative divisions or cultural ties. Additionally, governance structures such as metropolitan authorities, help address cross-jurisdictional issues. Lastly, economic integration, including shared industries and regional GDP contributions, highlights the economic cohesion of metropolitan units, particularly in regions with strong economic networks.

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Delimitacja metropolitalna w perspektywie przestrzennej: wybrane studia przypadków z Azji i Europy

Streszczenie

Cel: Celem badania jest analiza i porównanie różnych podejść do definiowania i delimitacji obszarów metropolitalnych, ze szczególnym uwzględnieniem przypadków z Unii Europejskiej oraz wybranych krajów azjatyckich (Chin i Japonii).

Metodyka: W badaniu zastosowano jakościową analizę porównawczą opartą na przeglądzie dokumentów prawnych, ram statystycznych oraz literatury naukowej, uzupełnioną analizą ilustracyjnych studiów przypadków z Unii Europejskiej, Chin i Japonii.

Wyniki: W badaniu zidentyfikowano kluczowe kryteria delimitacji, takie jak granice administracyjne, wzorce dojazdów do pracy, progi ludnościowe, gęstość zaludnienia, interakcje społeczno-ekonomiczne, rozlewanie się miast, modele zarządzania oraz poziomy integracji gospodarczej. Wykazano, że Unia Europejska stosuje raczej ustandaryzowane podejścia, podczas gdy kraje azjatyckie preferują bardziej elastyczne, dostosowane do lokalnych warunków praktyki.

Implikacje i rekomendacje: Wyniki podkreślają złożoność osiągnięcia spójności w delimitacji obszarów metropolitalnych, zwłaszcza w kontekście analiz międzynarodowych i projektowania polityk publicznych. W badaniu zalecono stosowanie elastycznych i uwzględniających kontekst metod delimitacji, które godzą potrzeby zarządzania terytorialnego z rzeczywistością funkcjonalną obszarów miejskich.
Oryginalność/wartość: Badanie wnosi wkład do trwającej debaty na temat zarządzania metropolitalnego, ukazując, w jaki sposób różnice w podejściach do delimitacji wpływają na planowanie przestrzenne i spójność społeczno-gospodarczą. Artykuł oferuje pogłębioną perspektywę dotyczącą napięć między standaryzacją a dostosowaniem do kontekstu w ramach polityki miejskiej.

Słowa kluczowe: matropolia, delimitacja metropolitalna