POLYCENTRICITY AS AN INSTRUMENT OF BALANCED URBAN DEVELOPMENT IN SOFIA'S MASTER PLAN

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Abstract

In this paper we investigate the ability of the current master plan of Sofia to implement a polycentric structure of urban development. Like most large cities over the world, Sofia is growing and like most cities in Europe (e.g., Paris Moscow, Stuttgart, Milan, and many others) Sofia is suburbanizing. The form of growth/expansion is an essential issue for a master plan. Generally, three forms of growth are discussed most often by planners: monocentric, polycentric and dispersed (the latter is usually termed "sprawl"). Whereas the positions of planners regarding monocentric development are often contradicting, i.e., many planners are critical of this urban form, but others emphasize its advantages, the positions regarding sprawl and polycentricity are relatively more established. The critical attitude towards sprawl (i.e., dispersed development) is popular among most professionals, while the vast majority of planners consider polycentricity a beneficial form of growth. The General Urban Development Plan (GUDP) of Sofia, prepared between 1998 and 2003, adopted in 2007, aims to develop a polycentric urban system. Its purpose is to establish a proper balance between the development of central city areas and suburban territories. The main research question of this research is: *is the GUDP of Sofia able to neutralize the threats of sprawled (dispersed) development by promoting polycentric urban form?*

Keywords: urban growth, urban development forms, polycentrism, efficiency of planning, sustainable urban growth

ПОЛИЦЕНТРИЗМ КАК ИНСТРУМЕНТ СБАЛАНСИРОВАННОГО ГОРОДСКОГО РАЗВИТИЯ В ГЕНЕРАЛЬНОМ ПЛАНЕ СОФИИ

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Аннотация

В этой статье мы рассматриваем способность генерального плана Софии реализовать полицентрическую городскую структуру. Как большинство крупных городов в мире София растет, и, как большинство европейских городов (например, Париж, Москва, Штутгарт, Милан и т.д.) София суб-урбанизируется. Форма роста/экспансии является одним из важнейших вопросов в любом генеральном плане. Как правило, три наиболее распространенные формы роста обсуждаются планировщиками: моноцентрический, полицентрический и дисперсный (последний наиболее часто упоминается как "спрол"). В то время как позиция планировщиков относительно моноцентрического развития часто является противоречивым – многие из них относятся критически к этой городской форме, но другие указывают на ее преимущества, а позиции к спролу и полицентризму сравнительно установлены. Критическое отношение к спролу (т.е. к дисперсному развитию) пользуется популярностью среди большинства экспертов, но подавляющее большинство планировщиков смотрят на полицентризм как на полезную форму развития. Общий план развития (мастер-план) Софии, который разработан в период с 1998 по 2003 год и принят в 2007 году, направлен на развитие полицентрической городской системы. Идея мастер-плана заключается в том, что такая система обеспечит оптимальный баланс

между развитием центральных и пригородных районов. Основной вопрос данного исследования является: сможет ли Общий план развития Софии нейтрализовать опасность спроло-образного/фрагментированного развития путем стимулирования полицентрической формы роста?

Ключевые слова: рост городов, формы городского развития, полицентризм, эффективность планирования, устойчивое развитие городов

Introduction

Between 1975 and 2015 the population of the world grew by 80 % from 4.07 billion to 7.32 billion, however, in the same period the world's urban population grew more than 2.5 times - from 1.5 billion to over 3.7 billion [1]. Urban growth in such scales inevitably generates expansion. The forms of growth and expansion are determined by various geographic and socio-economic factors (see, e.g., Bertaud [2] Shubenkov [3] and Moisseev [4]) and have their important implications in all areas of human and social development [5, 6, 7, 8, 9]. Expansion nowadays in most parts of the world takes the form of suburbanization and sprawl. Accelerated expansion and suburbanization of cities is evident in Europe as well.

In Sofia, as in most large cities in Europe accelerated processes of suburbanization are observed [5]. In this paper by suburbanization we mean the urbanization of suburban areas outside the compact core at the expense of slowed down or negative trends in central city areas. Urban sprawl is a form of suburbanization characterized by very low density dispersed suburban forms. Sprawl is often defined as excessive spatial growth of cities, i.e., when the spatial expansion outpaces the population growth. Urban sprawl is assessed as a negative and unsustainable trend due to its high rates of land consumption, excessive car dependency, low efficiency of service centers outside the compact city and social segregation of suburban areas.

Polycentricity is another alternative form of urban expansion and suburbanization. According to Johansson [10] the "central ingredient of polycentric development is the interconnected nature of towns and built-up areas where urban-rural development is not contradictory but rather, complementary". Many researchers regard polycentric development as a form of growth able to neutralize the negative aspects of sprawl. Polycentric urban forms are considered effective and sustainable, because they reduce the consumption of land, utilize efficient forms of transport and contribute to the development of viable service centers with high access (on the role of transportation for urban development see Vasanen [11] and Pavlov [12]).

Although the problems of suburbanization (in its modern sense) are not treated in the current master plan of Sofia – the General Urban Development Plan (GUDP) of 2007, polycentricity is an important and clearly prominent objective of the plan. Polycentricity, as a concept aimed to preserve (or conserve) the central city areas and to stimulate the development of new centres and settlements in suburban areas, is present in all plans of Sofia since the 1940s. Actually, the current GUDP is the fourth master plan of the Bulgarian capital that strives to promote polycentric forms in the city's peri-urban territories.

This research seeks to evaluate whether the 2007 GUDP of the Bulgarian capital is able to promote sustainable form of urban growth. The main research question of this paper is: Is polycentricity as it is defined by the GUDP of Sofia able to neutralize the threats of sprawled development by promoting polycentric urban form?

Theoretical concepts of polycentric urban development

Davoudi [13] defines polycentricity by describing it as "a centre and an organised system of concentrated subcentres". Vasanen [11] states that "an urban system can be described as functionally polycentric when two-way flows between a region's core and its subcentres as well as those between the individual subcentres exist". More specifically, he underlines the "functional connections between separate centres within the urban system".

Giffinger [14] considers a polycentric system to be one with "several urban nodes (cities, settlements) linked through functional relations". Furthermore, understanding polycentricity depends on structures of different scale and in different contexts. Giffinger investigates the interdependencies at the micro level (in the city) and at the macro level (amongst different cities) to understand the mutual benefits in polycentric cooperation between central and peripheral areas in order to achieve a synergistic effect. Hence, functional links are essential for polycentric development – i.e., the interconnections and complementarity between the nodes at different levels of a polycentric structure [10]. Therefore, the concept of polycentricism should be considered in two aspects: 1) morphological – i.e., urban development patterns, referring to the size of cities, settlements and nodes and their populations, and 2) functional – referring to the distribution of activities in a polycentric system and the links between those activities.

Polycentric urban systems provide a number of benefits in urban development. They allow for effective structuring of urban space, thus creating optimal living conditions. Polycentric structures enable the application of modern approaches and IT technologies for the formation of favourable living environment by maintaining high quality of amenities and services (about the use of IT technologies for such purposes see Esaulov [15]). One specific benefit that planners often seek to achieve is the balance between the central and peripheral territories of a city [16], particularly in the process of urban expansion [17]. However, arguably the greatest advantages of polycentric urban systems are the strong functional connections between the nodes, inducing sustainable forms of mass transit. The strong functional connections provide for the development of lively and efficient urban service centres. As Aguilera and Mignot [18] (2004) argue "the emergence of a subcentre would be the natural and more economical answer in terms of mobility to the non-sustainable growth of the monocentric town".

Research methodology

In this paper we compare, on one hand, the General Urban Development Plan (GUDP) of Sofia and its concept of polycentric development and, on the other hand, the results of its implementation thus far. We analyse the GUDP, i.e., its main goals concerning the form of growth and whether the GUDP envisages the development of a polycentric urban structure; we investigate the form of the planned expansion in suburban areas; we examine whether the plan employs respective tools for the implementation of a polycentric structure; and whether the plan establishes relevant criteria for the establishment of such a structure. We also focus on the issue whether the GUDP is able to influence the spatial structure of the city and whether, as far as there are already certain results of the implementation of the GUDP, actual urban development corresponds to the objectives of the GUDP and the intended polycentric form. Our goal is to give answers to the following questions:

- Is the polycentric structure implemented in practice in accordance with the GUPD?

- As far as the polycentric structure of Sofia is implemented, does it achieve the objectives defined by the GUDP and is it actually beneficial to the city?

In order to answer these two questions, the development of the suburban areas is examined in terms of urban factors (urbanised territories, infrastructure, functional structure and construction) and demographic trends (population dynamics). Our aim is to determine whether suburban areas attract population and urban development, whether the level of compactness

(or dispersion) of urban forms change and whether it is in accordance with the planned/intended polycentric structure.

The study uses three groups of sources of information: first, to examine the provisions of the GUDP we analyse the text and graphics of the GUDP (the project and its schemes) in 2003 (in force since 2007) and its amendment in 2009 (in force since 2009); second, regarding the implementation of the GUDP for the analysis of demographic trends, we use data from the National Statistical Institute of Bulgaria (NSI); and, third, regarding the implementation of the GUDP for the analysis of urban development (urbanised territories, infrastructure, functional structure and construction), we use information from Sofia Metropolitan Municipality, the "Architecture and Urban Planning" Directorate, and the municipal company for urban planning "SOFPROEKT".

Research results

Polycentricity in Sofia's General Urban Development Plan

We start with the observation that the General Urban Development Plan of Sofia does aim to promote the development of a polycentric urban structure. According to the GUDP, the polycentric structure of the city is developed by two kinds of subcentres: 'complex service centres' and 'specialized service centres' (GUDP 2009, p. 30-31) (Figure 1). Complex service centres are "more or less a complete set of service functions", whereas specialized centres are those to be developed in the "priority areas for the development of the city - science and education, health and balneology, culture, sports and entertainment, commerce and business". Complex centres form a "hierarchical structure and [provide for] complementarity between the different levels - the general urban centre, secondary and tertiary service centres". As the GUDP stresses, "the transport and communication network of the city is a major structuring element of the system". The major city centre, which is categorized as a first level, includes "the historic core of Sofia, containing the most representative and prestigious objects of national level". Complex service centres, which are categorized as second level, are five in number and "occupy the main radial transport directions [...] and their zones of intersection with the […] ring-road" (Fig. 2). The GUDP also provides for the establishment of other kinds of complex service centres, which are categorized as third level. They are formed "in result of point and linear concentrations of public services with variable intensity around the major transportation routes and communication nodes". The lowest level nodes are specialized centres which "are an addition ... to complex service centres of the second and third level and have citywide, regional and national importance". Thus, the GUDP plans for polycentric development in two different forms, namely, 1) linear along the main transport directions and 2) nodes in the major focuses of service provision in the compact city and in the larger suburban settlements.

There are five linear polycentric forms along the main transport directions of the city and ten polycentric nodes in suburban areas. It should be noted that the functional composition of the polycentric forms, which are developed along the major transport roads of the city, narrows its focus on public services. These polycentric forms are expected to attract population; thus they are important factors in the polycentric structure also in suburban areas. These elements of the polycentric system are outlined in the GUDP as a separate level of polycentric development, one level lower than the major city centre, and one level higher than the level of dispersed settlements. In fact, the so-called complex service centres (at the second level) are used for the transition from the compact city to the polycentric structure of suburban settlements. Their shape and boundaries are not established with precision and are constantly evolving in the direction of the major transport routes. Thus at its final stage, this process completes the formation of a specific 'star-shaped' form of the overall system of polycentric forms (developed along the transport directions) and it seeks to connect with smaller suburban centres and the regional system of settlements.

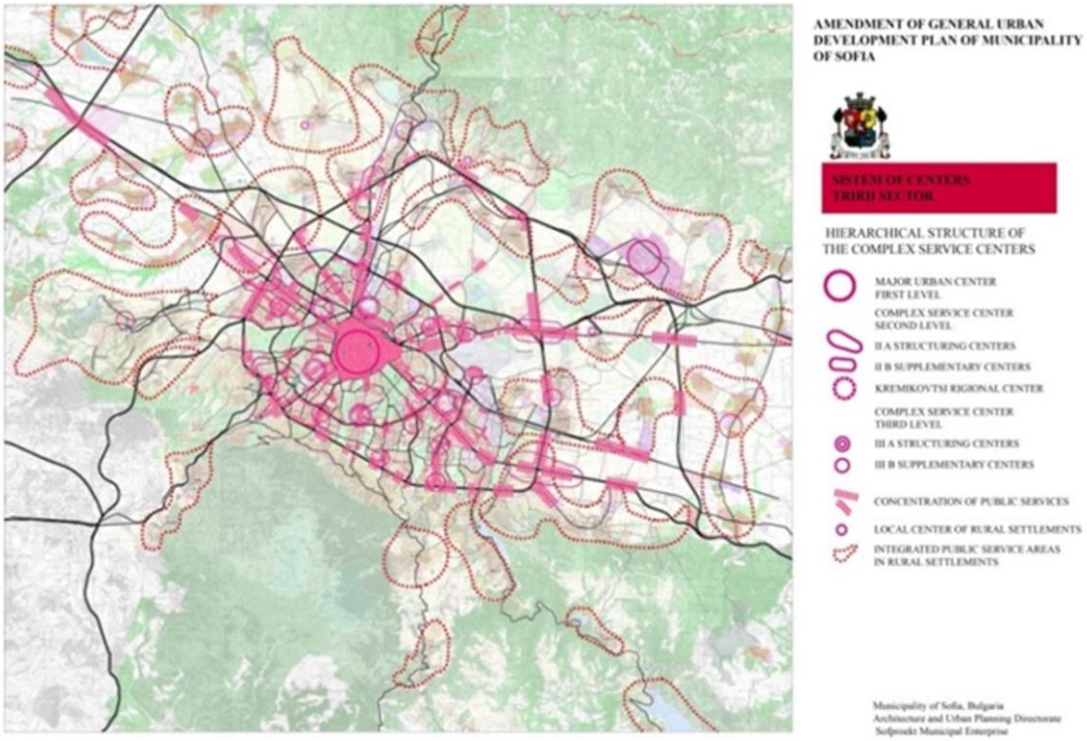

Figure 1. Polycentric structure of Sofia according to the GUDP

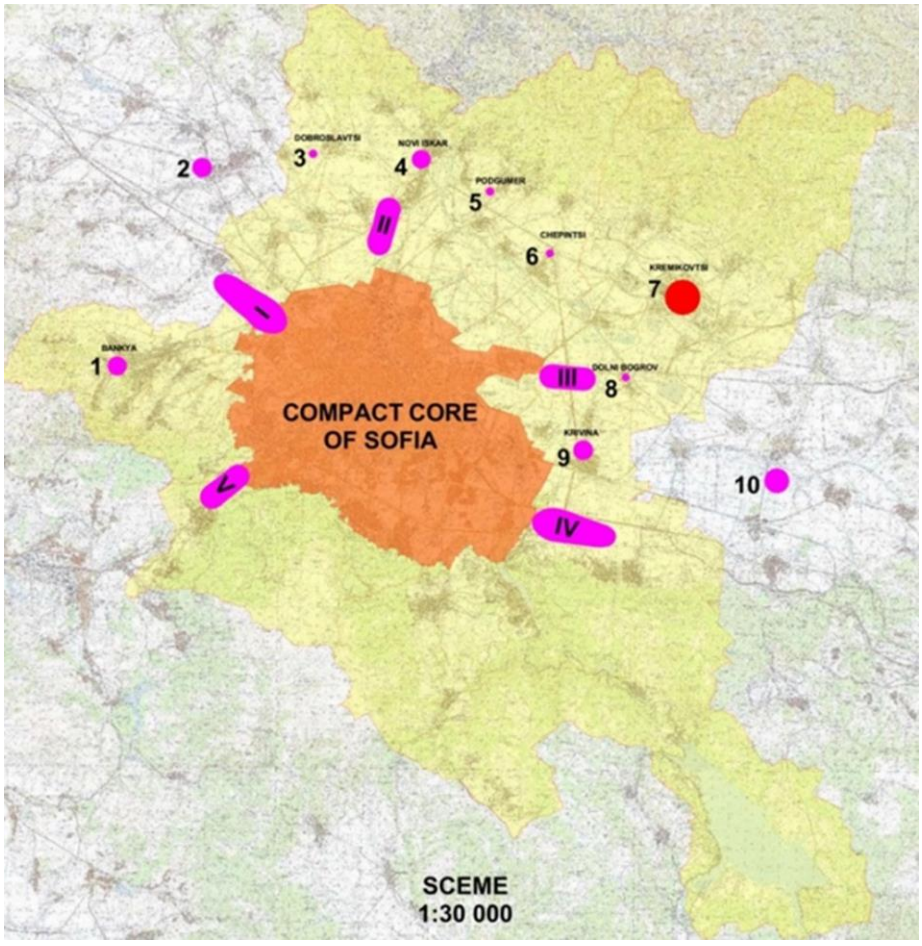

Figure 2. Dual hierarchical structure of polycentricity in GUDP: light yellow is the territory of the Metropolitan Municipality of Sofia; I–V are the linear polycentric forms along the transport axes; 1–10 are polycentric notes – settlements in suburban areas

Concerning its general structure, the polycentric system of Sofia is developed mainly in the northern suburban areas. The analytical texts of the GUDP draw no difference between the northern and the southern suburban areas. However, three of the linear polycentric forms and six nodes are located in the northern peri-urban territories, whereas only two linear forms and two nodes are found to the south of Sofia. With the Amendment of 2009 the territories for industrial activities, public services, housing, transport and other infrastructure have been reduced, while the territories for mixed functions - increased (Table 1). In fact, the development of the linear polycentric forms is directed to the major transport routes and this is done through an increase in the mixed-use/multifunctional areas at the expense of the polycentric structure of the settlements, whose planned territories for industrial purposes, public services, for transport infrastructure, and for housing have decreased.

Table 1. Lands allocated to different zoning types according to the GUDP of 2007 (2003) and the Amendment of 2009

Territory **2003**	Sofia Municipality		Sofia city		Suburban areas	
	ha	%	ha	%	ha	%
Industrial territories	5,377.6	4.0	2,115.3	10.1	3,262.4	2.9
Territories for public services	2,830.0	2.1	1,533.4	7.3	1,296.6	1.1
Territories for multifunctional services	3,696.4	2.8	2,287.3	10.9	1,409.1	1.2
Territories for transport	5,209.3	3.9	2,348.0	11.2	2,861.3	2.5
Territories for housing	15,857.7	11.8	81,55.1	38.9	7,202.6	6.8
Territory **2009**	Sofia Municipality		Sofia city		Suburban areas	
	ha	%	ha	%	ha	%
Industrial territories	4,701.6	3.5	1,609.0	7.7	3,092.6	2.7
Territories for public services	2,640.6	2.0	1,503.4	7.2	1,137/2	1.0
Territories for multifunctional services	5,073.8	3.8	3,050.2	14.6	2,023.6	1.8
Territories for transport	5,012.6	3.7	2,384.7	11.4	2,627.9	2.3
Territories for housing	15,412.4	11.5	8,260.6	39.4	7,151.8	6.3

Source: Metropolitan Municipality, 2009, 93.

Regarding the benefits of polycentricity in the case of Sofia, the GUDP adopts that such a structure would be useful “to achieve a balance in the development of the compact city and the surrounding [subutban] area” and “limit the compact growth in the city” (GUDP 2009, p. 19). As emphasized in the literature review, polycentricity is a relevant instrument to achieve a balance between the development of central areas and growth in the peripheral and suburban territories.

Analysis of the implementation of the GUDP

In this part we investigate in detail the development of the intended by the GUDP polycentric forms in Sofia’s suburban territories since 2006. Figure 3 draws a clear distinction between the compact city, its southern and northern suburban areas. We acknowledge that a nine-year period is insufficient to observe all impacts of a master plan. Nevertheless, this period allows for analysis of the trends of development.

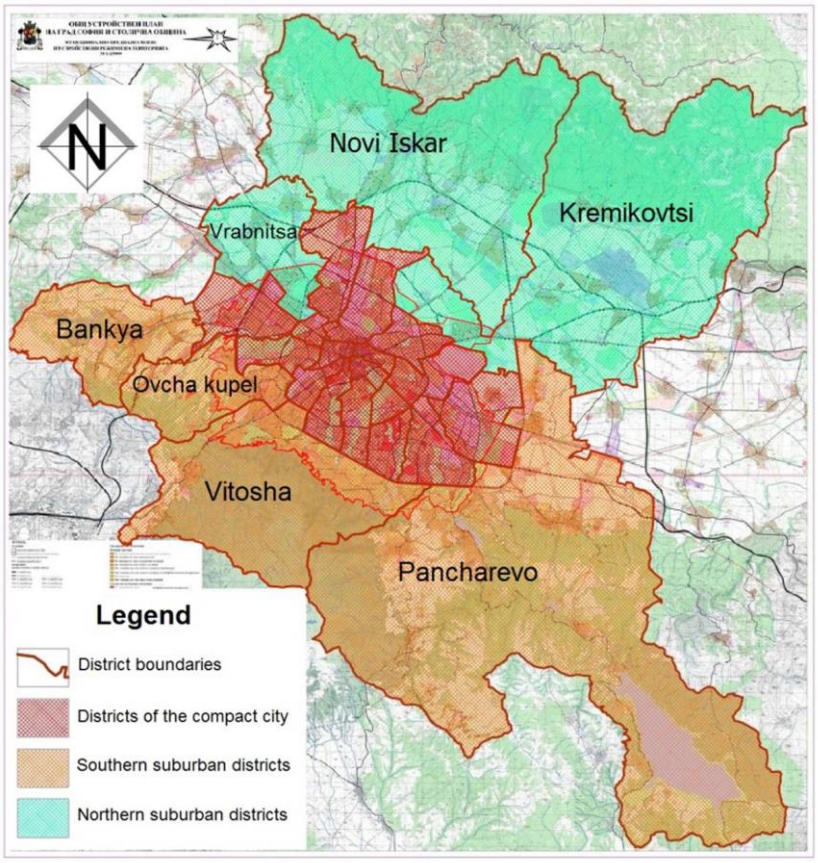

Figure 3: Scheme of the compact city and the suburban areas of the Municipality of Sofia

a) Development of suburban infrastructure

Firstly, we should note that the rate of development of infrastructure in Sofia, planned by the GUDP, is lower in the suburban areas (2.3%) than in the compact city (11.4%) in 2009. As data in Table 2 indicate, the development of new infrastructure is lower than the planned 2.3%. These low rates in suburban areas can be explained by the high rates of construction of transport infrastructure within the compact city (especially the metro railway). Nevertheless, in view of the importance of transport and utility networks for urban growth [8, 9] we conclude that the slow development of infrastructure in Sofia's peri-urban areas does not contribute to urban expansion and the development of polycentric forms in those areas.

Table 2. Share of new municipal and state roads

city districts	2006	2011	Increase (km)	Increase (%)
Northern suburban	1,035.17	1,045.71	10.54	**1.02**
Southern suburban	358.72	363.80	5.08	**1.42**

Calculations based on data from Municipality of Sofia

b) New construction and population dynamics

Data for new construction and especially new housing in the southern and northern suburban districts show that the increase in the number of buildings in the period 2006-2011 in the southern suburban districts is the largest among all suburban areas (see Table 3). However, in the southern districts the GUDP plans for only one polycentric node – i.e., Bankya. Data in the table show that the highest rates of new construction and, especially, housing construction are

observed in the Vitosha district – the most attractive, picturesque areas of Sofia's suburban territories in the foot of Vitosha mountain

Table 3. New construction in the suburban districts of Sofia 2001-2006 – 2011

City districts	Existing in 2001		2001-2006		2006-2011	
	Other buildings	Housing	New other buildings	New housing	New other buildings	New housing
Northern suburban districts	37,482	60,513	1,883	2,335	3,453	4,280
Southern suburban districts	25,271	69,008	2,942	12,410	5,393	22,751
Vitosha District	*14,307*	*36,238*	*1,892*	*6,769*	*3,468*	*15,407*

Calculations based on data from NSI 2012, Census 2011 - Population and Housing Fund

Population dynamics (see Table 4) in areas with planned local service centres (subcentres) reflect the upward trend in Bankya (9.36%) compared to the central districts (2.58%). However, we emphasize once again that it is only one of the subcentres of the polycentric structure of the city in the southern suburban territories. A comparison to the attractive Vitosha district characterized by the highest suburban rates of development, the rates in Banka District are relatively lower. We find that in the southern territories the focus of development is not in district of the local centre – an observation that casts doubts on the successful implementation of the polycentric structure in these territories. However, the rates of development of the northern suburban districts are clearly the lowest in the municipality. The obvious lack of development in these areas suggests poor performance of the GUDP with regard to its goal to boost the development of the northern territories through implementing a polycentric urban structure.

Table 4. Population dynamics it the regions of Sofia (2006-2011)

City districts	2006	Share of population in 2006	2011	Share of population in 2011	Increase in population 2006-2011	Increase 2006-2011 %
Central districts	98,249	7.92%	100,786	7.80%	2,537	**2.58%**
Intermediate districts	493,129	39.76%	512,772	39.70%	19,643	**3.98%**
Peripheral districts	406,094	32.74%	420,826	32.58%	14,732	**3.63%**
Compact city - Total	**997,472**	**80.43%**	**1,034,384**	**80.09%**	**36,912**	**3.63%**
Northern suburban	**99,182**	**8.00%**	**100,601**	**7.79%**	**1,419**	**1.43%**
Vrabnitsa	*47,685*	3.84%	*47,969*	*3.71%*	*284*	*0.60%*
Novi Iskar	*28,012*	2.26%	*28,991*	*2.24%*	*979*	*3.49%*
Kremikovtsi	*23,485*	1.89%	*23,641*	*1.83%*	*156*	*0.66%*
Southern suburban	**143,551**	**11.57%**	**156,606**	**12.13%**	**13,055**	**9.09%**
Bankya	*11,000*	0.89%	*12,136*	*0.94%*	*1,136*	*10.33%*
Ovcha Kupel	*51,602*	4.16%	*54,417*	*4.21%*	*2,815*	*5.46%*
Vitosha	*54,061*	4.36%	*61,467*	*4.76%*	*7,406*	*13.70%*
Pancharevo	*26,888*	2.17%	*28,586*	*2.21%*	*1,698*	*6.32%*
Metropolitan Municipality - Total	**1,240,205**	**100%**	**1,291,591**	**100%**	**51,386**	**4.14%**

Calculations based on data from NSI 2012, Census 2011- Population and Housing Fund

The trends of new housing construction and population dynamics provide evidence that Sofia is indeed suburbanizing, but only the trends are directed entirely to the south of the city – i.e., to the picturesque outskirts of Vitosha mountain and the Natural Park of Vitosha. In contrast, the processes in the northern suburban areas are too weak to qualify as a form of suburbanization.

Finally, we compare the general population trends in the compact city with those in suburban areas. Except for the already observed opposite trends in the southern and northern territories (very high rates of growth in the southern territories and lack of development in the northern), we should note that there is virtually no change in the share of the population living in the compact city – in 2006 this population is 80.4 % of the total population of Sofia and in 2011 it is 80.1 %. This indicates that the population trends in the city are parallel with the general trends of the urban system. Hence, Sofia was and still is a city with particularly high level of monocentricity. Thus far the General Urban Development Plan of 2007 (2003), amended in 2009, has not caused any change in the structure of the city.

Conclusion

In this paper we have studied the impact of the General Urban Development Plan of Sofia on the city's urban form. Whereas we acknowledge that the nine-year period since the adoption of the current GUDP is not enough to examine all effects of the plan, the trends are already evident. We have found no indication that the urban structure of the Metropolitan Municipality of Sofia is changing towards a polycentric one. The compact city is obviously too strong. Whereas the southern territories have proved to be highly attractive to new residents, the rates in Vitosha district are higher than those in the local service centre Bankya, so the town is becoming weaker as a node of polycentric system. In contrast, the northern territories, where six suburban nodes are planned, thus far have not been able to attract new activities and the rates of development are particularly low. All these trends cast doubts whether the GUDP will be able to develop a polycentric urban system and achieve its goal to balance the development of central city areas by boosting polycentric suburban growth. Apparently, the lack of strong connections between the city centre and the potential suburban subcentres is a factor of key importance for the implementation of a polycentric urban system of Sofia. Therefore, we conclude that the Bulgarian capital will develop polycentric patterns of expansion and will achieve the desired balance between central and suburban growth only when relevant and strong transport connections are realized.

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