

THE CHALLENGES OF THE URBAN TRANSPORT STRATEGY OF BELGRADE

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Abstract: Belgrade's main characteristics are: a) high densities, b) extremely high concentration of jobs in CBD and its central zone, c) very high level of usage of urban public transport and of pedestrian movements. According to the Newman - Kenworthy classification, Belgrade is a typical "public transport city", while due to its transport strategy Belgrade can be best described as a hybrid of the Thomson's "low cost strategy" (very high usage of buses) and "strong centre strategy" (high concentration of jobs in its CBD). This type of spatial development and urban transport strategy is extremely sensitive to the rise of personal motorization and automobile usage. Since in Belgrade: a) main mode of transport are buses, b) streets are very narrow, c) although public transport oriented, Belgrade doesn't have rail systems with separated, "exclusive" right of way (metros, and light rail systems - traffic jams at Belgrade's streets are extremely pronounced – number of vehicles per 1 km of streets is – 277 vehicles/km. Hence, Belgrade has four times more vehicles per 1 km of street network than Australian cities, two times more than metropolises of the USA and Canada, and 25% more than the West European and wealthy Asian cities. In short, Belgrade is (for a very long time) mature for a rail (metro or LRT) system, with completely separated, exclusive right of way, and much more strict private motor vehicles limitation strategy.

Key words: Belgrade, spatial development, urban densities, metro, light rail systems

Introduction

Belgrade experiences rapid economic and population boom after World War II (especially since the end of the 1960s) and, in accordance with the actual conceptions of economic growth, it focuses on the development of traditional, work-intensive (food and textile) industry (which was a common practice in metropolises of the Eastern block).

It, naturally, turned out that such an economic structure significantly retarded the economic development of Belgrade (Hajduković-Janev D., 1980).

After 15 turbulent years at the very end of the XX century, Belgrade's economic structure started to radically change during the 2000s, which is almost two decades later than in the other metropolises of central and south-eastern European transition countries.

Belgrade region has a very high share of Serbian population (17% in 2002, 19% in 2011, Tab. 1), even higher share of jobs (which rose from 25% to 33% of the total number of jobs in Serbia, for the period of 1999 – 2011, Tab. 2), and the lion's share of GDP (around 40% of the country's GDP in 2011, Tab. 3).

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Tab. 1 - Number of population according to the Censuses 2002 and 2011

Year	Belgrade region	MP* of Belgrade	CBA** of Belgrade	Serbia	Belgrade region (% share in Serbia)	Belgrade MP (% share in Serbia)
2002	1,576,124	1,264,427	1,089,617	7,498,001	21.0	16.9
2011	1,659,440	1,322,346	1,117,294	7,186,862	23.1	18.4

*MP (Master plan), **CBA (Continually Built-up Area)

Estimated according to: Statistical office of the Republic of Serbia. Municipalities of Serbia (various years). Belgrade.

Tab. 2 - Belgrade's share of total employment in Serbia

Year	Employees (in thousands)		Share (%)
	Belgrade	Serbia	
1999.	498,619	1,963,177	25.4
2005.	613,744	2,068,964	29.7
2011.	576,905	1,746,138	33.0

Estimated according to: Statistical office of the Republic of Serbia. Municipalities of Serbia (various years). Belgrade.

Tab. 3 - The share of Beograd in Serbia's GDP

Year	GDP (in RSD million)			GDP per capita (in RSD thousand)		
	Belgrade region	Serbia	Share %	Belgrade region	Serbia	Index RS=100
2009	1,083,899	2,713,205	39.9	665	371	179.4
2010	1,152,005	2,881,891	40.0	703	395	177.8
2011	1,270,003	3,204,363	39.6	771	441	174.6

GDP (Gross Domestic Product)

Estimated according to: Statistical office of the Republic of Serbia. Municipalities of Serbia (various years).

Creation of 'service-oriented' CBD

After a deep economic crisis and 15 turbulent years, followed by the 'democratic revolution' of 2000, one of the main economic goals became the creation of a 'friendly and attractive environment' for FDI (foreign direct investments). Although results were sometimes (quite) mixed and contradictory, Belgrade was, in that respect, one of the main beneficiaries. The inflow of FDI in Serbia was highest in Belgrade. As Pavlinek (2004) points out, the inflow of FDI is highest in the transitional capital cities of the Central and SEE countries. For example, Prague attracted 49% of total FDI invested to the Czech Republic, Bratislava 67.8% of total FDI in Slovakia, and Budapest 56.5% in Hungary (Blažek J., 1999; Šabić D. et al., 2012).

Even more interestingly, the highest inflow of FDI in 2010 was mainly concentrated in Belgrade's CBD (the area that consists of the parts of the municipalities Stari grad, Savski Venac, Vračar, Palilula, Novi Beograd). Almost all leading business and financial subjects, as well as leading foreign enterprises in the country, have their representative offices there (Šabić D. et al., 2012).

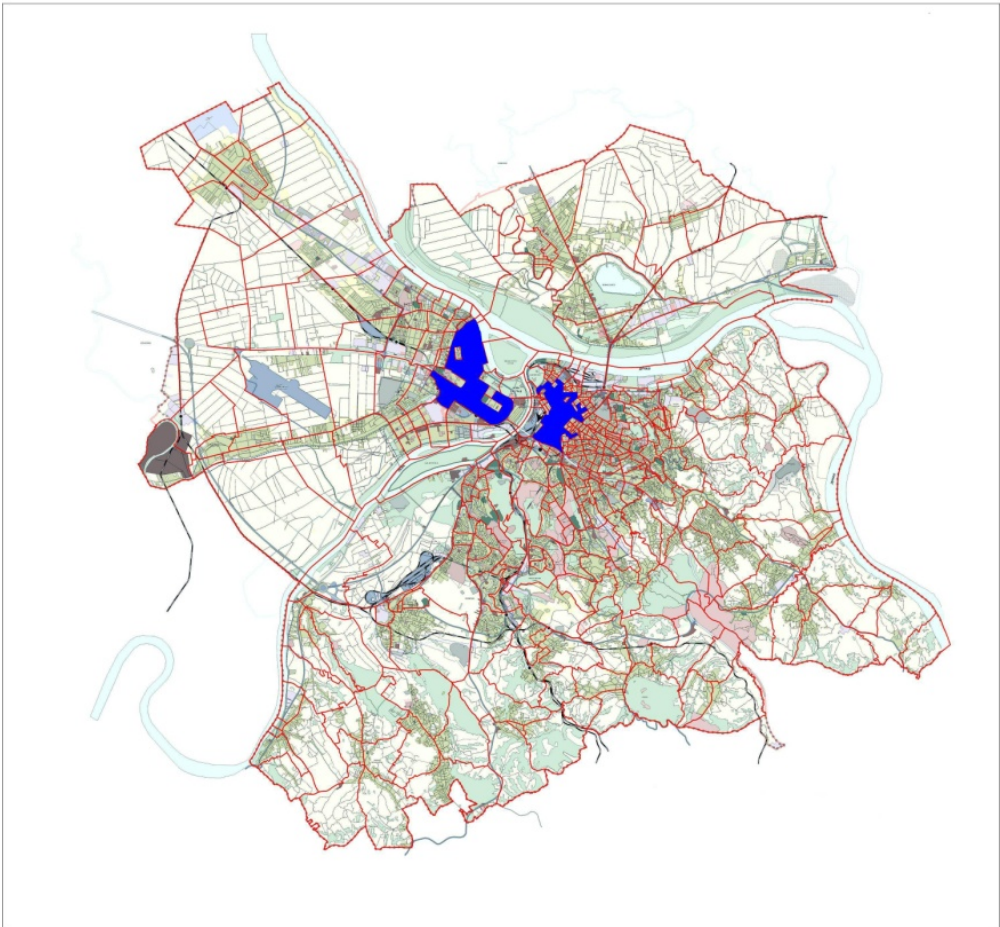
However, the first multinational companies to enter Belgrade (and Serbian market) could not find almost anything but old, obsolete office buildings, unable to meet their high-quality requirements.

The strong demand encouraged foreign investors to establish modern office buildings, required by international companies (such as, f.e., Africa Israel, GTC, CA Immo, Bluehouse).

Most of these new high-standard modern office buildings appeared in New Belgrade, the municipality that quickly converted from a former huge grey 'dormitory' into the 'Serbian Manhattan', a new extended part of the CBD - mainly, off course, due to its flat

terrain, large boulevards, easy access to the highway (Pan-European Corridor X), and the vicinity of the International Airport Nikola Tesla.

In contrast, the “old” downtown Belgrade (in terms of modern office standards) remains highly underdeveloped, with a very low supply of modern stock, and consists of refurbished old buildings in the city centre, which mainly accommodate media and publishing agencies, law firms and financial consultants, with high demand for central locations and smaller office space.



Graph 1. Belgrade's CBD (based on authors calculations)

The largest increase of office stock development happened in municipalities of New Belgrade and Palilula, which witnessed amazing enlargement of 2.3 – 2.6 times more office stock (measured in the square meters), in a mere six years (2005-2011).

Belgrade quickly changed its economic structure at the turn of the century. Instead of previously most dominant *secondary sector* (manufacturing, construction, electricity, gas and water supply), *tertiary sector* was developed (trade, consumer goods, catering, accommodation, transport, warehousing, postal service, telecommunications), and quaternary (banking and insurance, real estate, business services, research, development, public administration, defence, social security, education, health and social work, and other

public social and personal services) - which, considering service sector in total, makes roughly three quarters of the total number of jobs in the metropolis.

Tab. 4 - Office stock expansion in Belgrade (2005-2011).

Municipality	2005 (in square meters)	% in total	2011 (in square meters)	% in total	Change 2005-2011	% of change in total	% increase 2005-2011
Voždovac	2,325,485	9.1	2,664,110	6.1	338,625	1.9	14.6
Vračar	697,016	2.7	801,893	1.8	104,877	0.6	15.0
Zvezdara	1,229,698	4.8	1,287,657	2.9	57,959	0.3	4.7
Zemun	2,793,409	10.9	4,316,257	9.8	1,522,848	8.4	54.5
N.Belgrade	3,447,930	13.5	8,023,009	18.3	4,575,079	25.2	132.7
Palilula	5,560,890	21.7	14,517,219	33.1	8,956,329	49.3	161.1
Rakovica	1,425,046	5.6	1,281,215	2.9	-143,831	-0.8	-10.1
S. venac	2,005,668	7.8	2,207,946	5.0	202,278	1.1	10.1
Stari grad	2,177,845	8.5	3,895,017	8.9	1,717,172	9.4	78.8
Surčin	827,005	3.2	1,423,815	3.2	596,810	3.3	72.2
Čukarica	3,134,308	12.2	3,386,422	7.7	252,114	1.4	8.0
TOTAL	25,624,300	100	43,804,560	100	18,180,260	100	

Estimated according to: Statistical office of the Republic of Serbia. Municipalities of Serbia (various years).

Interestingly enough, these sectors are mainly concentrated in the CBD, the core area of only 4,4% of the whole net-urbanized area), which accommodates 36,4% of jobs in Sector III and 47,3% of jobs in Sector IV. With obvious jobs concentration, Belgrade obviously has a highly monocentric structure.

Additionally, it is evident that two newly emerging parts of Belgrade's CBD (in municipalities of New Belgrade and Zemun) have five times smaller job densities than the "core" CBD (which is comprised of the oldest historic area of Belgrade).

Furthermore, another distinctive feature of Belgrade's spatial development is that its *subcenters* are still *evidently "weak"* (compared to some other world metropolises). For example, Banovo brdo, one of the presently biggest Belgrade's subcenters, has 47 times lower job density comparing to the "core" CBD of "old" Belgrade!

Although Belgrade quickly changed its economic structure in favour of service sector, which were concentrated in its CBD and embraced most of the FDI, there was, of course, yet another side to this "success story", too. Even though Belgrade and Serbia *became an attractive destination for FDI* after 2000, *majority of these foreign investments come through the privatisation process, and* most of them have entered the sector of non-exchangeable goods (banking, insurance, telecommunications, real estate, retail trade) (Filipović M. et al., 2006).

For example, in the post-2001 period the greatest levels of FDI were absorbed by the *financial intermediation sector*. According to the National Bank of Serbia, during the period of 2004 – 2011, this sector attracted around €4.7 billion of foreign investments, or 28% of the total amount of foreign investment (€13 billion). The lion's share of these €4.7 billion was invested in banking (and insurance), significantly lower amounts in brokerage-dealership companies, pension and investment funds (Business Info Group, 2012)

All these processes had negative effects on the economic development of Belgrade and Serbia (since good economic development needs FDI in the sector of exchangeable goods, which encourage productivity and technological progress). Large inflows of investments to the sector of non-exchangeable goods have been intensified by migrations of population to Belgrade and resulted in a deeper demographic and economic polarization of Serbia (Šabić D. et al., 2012).

Another distinctive feature of Belgrade's spatial development is its (rather interesting) process of suburbanization.

Process of suburbanization

Belgrade can be divided into four concentric zones:

- central zone,
- middle zone,
- outer zone and
- edge zone.

During the 2002-2011 period, the most dramatic developmental changes happened in the outer and edge zones – increase of 87,000 inhabitants and 13.7 km² of net-urbanized area (while middle zone gained only 9,500, central zone lost 22,000 and CBD lost 16,191 inhabitants; to put it into perspective, whole MP area gained 74,000 inhabitants).

If we compare Belgrade with other world metropolises “through the lenses” of densities of all activities (population densities plus job densities) *by zone*, we can come to several interesting conclusions.

Firstly, density of all activities *in central zone* of Belgrade is 4 times greater than in American and Australian cities, 2.5 times higher than in Canadian, 26 % higher than in Western European metropolises, and much lower than in (both wealthy and poor) Asian cities.

Secondly, density of all activities *in suburbs* of Belgrade is 5 times greater than in American and Australian cities, 2 times higher than in Canadian, 42 % higher than in Western European metropolises, and much lower than in (both wealthy and poor) Asian cities.

Thirdly, it is evident that Belgrade has rather different spatial structure of all activities (population *versus* jobs) *in all zones*, than metropolises of the *developed* world (USA, Australia, Canada, W.Europe). Belgrade has (obviously) much *higher share of population densities* in all zones – but especially in the *suburbs* (it is especially vivid when compared with *population densities* of West European cities *suburbs*). In that respect Belgrade resembles poor Asian cities (but, of course, with much lower densities).

Fourthly, if we analyze figures of Belgrade’s quickly expanding CBD, it is evident that:

- a) CBD of “old” Belgrade still has 2.75 times more jobs than CBD of Novi Beograd and CBD of Zemun put together, but their spatial structure is, evidently, completely different
- b) CBD of “old” Belgrade has 2.4 times *more jobs* than inhabitants, while
- c) these “new-emerging” CBDs of Novi Beograd and Zemun still have 2.3 times *more inhabitants* than jobs.

Hence, if we analyze the whole area of this “extended” CBD (that includes, also, the CBD of Novi Beograd and CBD of Zemun) it has approximately *the same number of jobs and inhabitants*, and, in that respect, strongly resemble the spatial structure of CBDs of the developing Asian cities: (a) mixture of jobs and housing and (b) much larger area of CBDs, than CBDs of the developed world metropolises)

Hence, although Belgrade densities (a bit) resemble West European cities, it is exactly its quickly expanding CBD, with its balanced number of jobs and inhabitants, that resembles metropolises of the developing world.

There is, also, another similar element of Belgrade’s spatial development to the metropolises of the developing world – its ‘*low-cost*’ *urban transport strategy* (see: Thomson, M., 1978).

Urban transport strategy of Belgrade

High levels of population density and of the centralization of the employees in Belgrade call for an extremely efficient urban public transport (UPT) supply. Expressed in terms of *vehicle kilometers per capita*, the level of urban public transport supply in Belgrade is even 3.5 times higher than in American metropolises, 60% higher than in Australian and Canadian metropolises, approximately the same as the one present in Western European metropolises, and 20-30% lower than in Asian metropolises and Moscow (Tab. 5).

At the same time, citizens of Belgrade use the urban public transport quite frequently. Urban public transport in Belgrade (expressed in terms of vehicle kilometres per capita) is used 5 times more frequently than in American metropolises, 2.5 times more than in Australian and Canadian metropolises, 30% more than in poor Asian, and 20% more than in western European metropolises. Meanwhile, of course, Belgrade achieves 2 times less public transport passenger kilometers per capita than Moscow or the wealthy Asian metropolises.

Tab. 5 - Service supply of urban public transport (UPT) in Belgrade in relation to other world metropolises.

CITIES	UPT (vkm/ha)	UPT (vkm/ per capita)	Rail UPT (km/ per capita)	UPT (vkm/ha) (Bgd/met)	UPT (vkm/st) (Bgd/met)	rail UPT (km/inhab.) (Bgd/met)
Belgrade	9,629	95	51	1	1	1
Moscow	18,098	131	-	0.5	0.7	-
poor Asian	19,772	108	3	0.5	0.9	17.0
wealthy As.	19,474	114	40	0.5	0.8	1.3
European	4,474	92	60	2.1	1.0	0.8
Canadian	1,763	58	13	5.5	1.6	3.9
American	428	28	9	22.5	3.4	5.7
Australian	760	60	20	12.7	1.6	2.5

Source: Kenworthy J. et al., 1999; Jovanović M., 2005.

So, the share of UPT in the total number of trips in Belgrade is extremely high even today: according to numerous surveys it even amounts to – 50% (about 30% are pedestrian movements).

Quantitatively, the service supply of urban public transport is, therefore, quite good. The main problem, however, lies in the inadequate quality and structure of the service supply of UPT in Belgrade: there is an extremely low share of rail systems supplied by UPT (expressed in terms of seat-kilometers per capita), which is only - 20% (50% of which is held by the Beovoz, and 50% by the tram – see: Faculty of traffic and transport engineering, 2002), which is incomparably lower than in Western European cities (62%), metropolises of countries in transition (59%), wealthy Asian cities (46%), and even American metropolises (48%) (Jovanović M., 2005).

At the same time, percentage share of buses in the total volume of passenger kilometres by urban and suburban public transport is extremely high – 87.54 % (Faculty of Traffic and Transport Engineering, 2002)

Additionally, *traffic flows* in Belgrade are strongly radial. This was, also, confirmed by the results of the Belgrade Transport Model and SYSTRA research, according to which the largest share of travel takes place *in the central zone* and between the central zone and inner suburbs (59%) (while the share of travel between the outer and inner suburbs, and outer suburbs and central zone is relatively low, Tab.6).

Tab. 6 - Distribution of trips between zones in Belgrade (household surveys 2002).

	central zone	inner suburbs	outer suburbs	Total
central zone	25	7	1	33
inner suburbs	34	19	1	54
outer suburbs	8	4	1	13
Total	66	30	3	100

Source: SYSTRA, 2002.

Since in Belgrade:

- buses are, obviously, the primary means of public transportation (88% of urban and suburban public transport is conducted by bus),
- most of the urban roads are very narrow (about 67% of the primary urban street network is with a single lane per direction – Jović J., 2010), and
- despite its marked UPT orientation, Belgrade has no rail systems with a separated, exclusive right of way (metro or LRT) that is completely immune to the sharp increase in motorization and car use,

transport system of Belgrade is characterised by heavy road congestions - even in the early 90s congestion of motor vehicles on the street network was dramatically high: the number of vehicles on the urban roads was up to - 277 vehicles / km (Jovanović M., 2005).

Thus, as early as in 1990 Belgrade had *four times* more motorized vehicles per kilometer of urban roads in relation to Australian cities; *two times more* - compared to the American and Canadian metropolitan areas; and 25% more – in relation to Western European and wealthy Asian cities. Only in comparison with the poor Asian metropolises, with their really incredibly high population density, Belgrade had approximately 25% *fewer* vehicles per 1 km of urban roads! (Jovanović M., 2005).

Tab. 7. Level of motorization of the citizens of Belgrade (private motor vehicles per capita).

year	1985	1990	2000	2005	2011
Level of motorization	168	186	191	233	272

Estimated according to: Statistical Yearbooks of Belgrade

It is interesting that, after 50 years of planning and hot debates between experts and politicians, Belgrade still lacks a modern high capacity rail system with separated, “exclusive” right of way (*metro or light rail system*).

Actually, one of the main misconceptions about metro or LRT systems is a well known „expert“ approach that such an investment should pay off (or at least cover its maintenance costs regularly), which is, in fact, completely impossible in a less developed country or a country in transition (with a very limited, constrained budget). This approach completely ignores the strong interdependence that exists between transport strategy and spatial development of a metropolis; an interdependence that has strong economic consequences, namely - *agglomeration (dis)economies*.

Many authors underline serious weaknesses of economic methods and tools that are presently available for measuring economic impacts of LRT and metro systems (such as CBA analysis, for example). An influential OECD (2002) study points out that: “The main reservations include the fact that CBA *understates the economic development benefits...* In the standard cost-benefit approach, only the user benefits are taken into account. Such an approach *ignores spillover benefits (and costs) for non-users as well as many of the broader aspects*”. Also, according to Mitric (1997): “An emerging, empirically based

consensus, is that benefits of urban infrastructure investments have considerably exceeded those estimated on the basis of micro-analysis of individual projects. Only those large cities which maintain good accessibility by constructing transport facilities with superior output in speed and volume terms, manage to capture *agglomeration economies*.”

Conclusion

Belgrade's main characteristics are:

- high population densities (7,400 persons per square kilometer)
- extremely high concentration of jobs in CBD (40%) and its central zone (58%)
- very high level of usage of urban public transport (50%) and of pedestrian movements (30%).

According to the Newman - Kenworthy (1999) classification, Belgrade is a typical “public transport city”, while due to its transport strategy (using Thomson's (1978) classification) Belgrade can be best described as a hybrid of the “low cost strategy” (very high usage of buses) and “strong centre strategy” (concentration of jobs in its CBD).

This type of spatial development and urban transport strategy is extremely sensitive to the personal motorization and automobile usage levels rise.

With its strong public transport orientation (heavily relied on buses), insufficient street capacities, as well as frequent and heavy road congestions due to the increase of the level of motorization, Belgrade has been (for a very long time) mature enough for a rail (metro or LRT) system, with completely separated, exclusive right of way, and a much more strict private motor vehicles limitation strategy.

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