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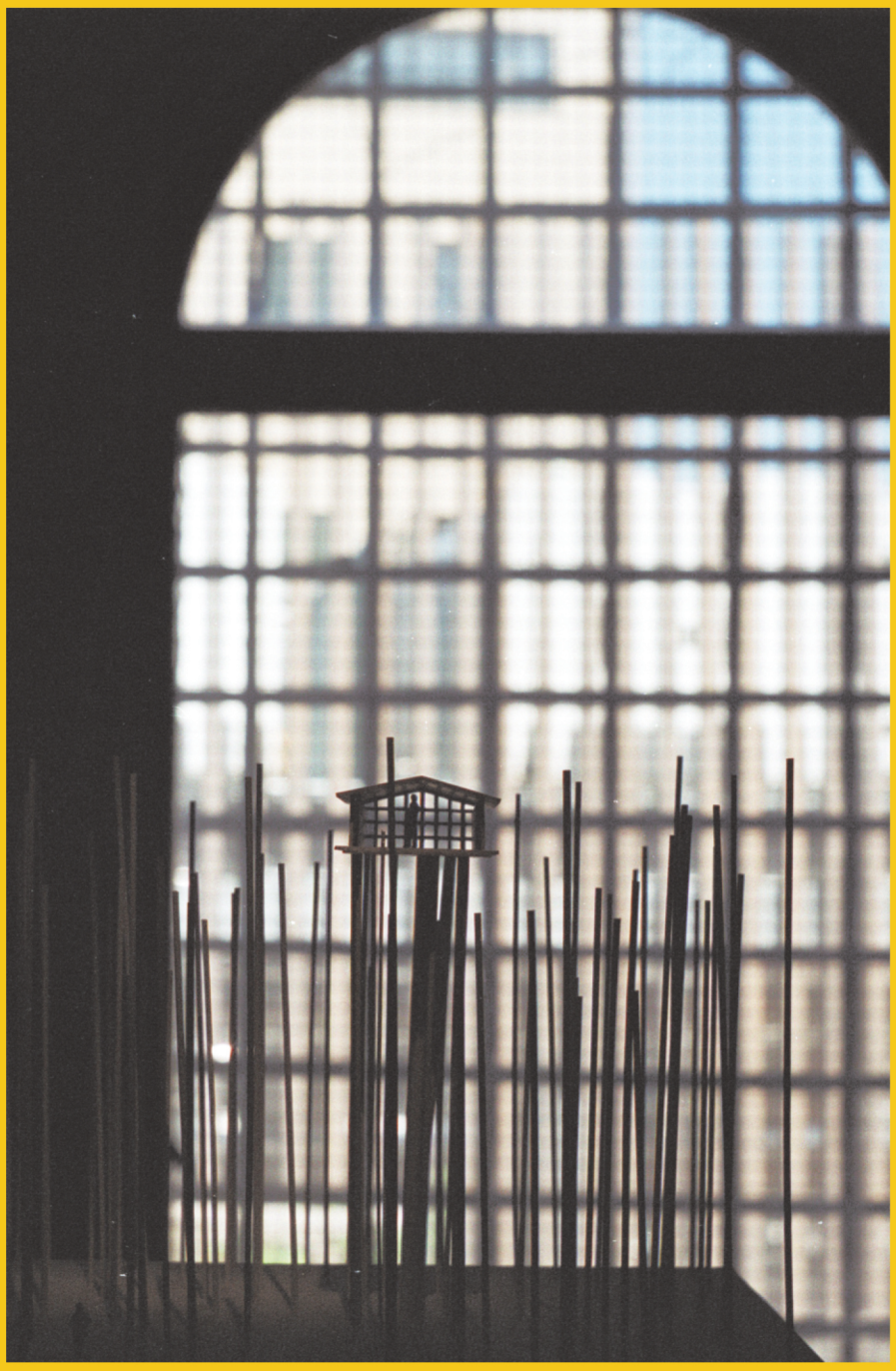

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SCOPE AND AIMS

The review is concerned with a multi-disciplinary approach to spatial, regional and urban planning and architecture, as well as with various aspects of land use, including housing, environment and related themes and topics. It attempts to contribute to better theoretical understanding of a new spatial development processes and to improve the practice in the field.

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ADDRESS

Institute of Architecture and Urban & Spatial Planning of Serbia, IAUS
Spatium
Serbia, 11000 Belgrade, Bulevar kralja Aleksandra 73/II
tel: (381 11) 3207-300, fax: (381 11) 3370-203
e-mail: journal.spatium@gmail.com, web address: www.iaus.ac.rs

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EDITORIAL

Dear readers,

Although not numerous in terms of the number of contributions, this issue of *Spatium* belongs to the most heterogeneous ones so far, covering the following themes and topics, viz.: analysis of daylight saving time effects in a specific geographical area of Belgrade; a comparative study of initiatives in three smart city programmes; some experiences from the participatory planning practices in Serbia; a review of the cultural heritage protection of a historical/archeological site of Viminacium; a comparative analysis of the market-led urban expansion in the respective metropolitan areas of Sofia and Belgrade; and a discussion of the spatio-urban impact of a hydroelectric power station.

Miodrag Vujošević
Editor-in-Chief

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SIMPLE ANALYSIS OF DAYLIGHT SAVING TIME EFFECTS IN BELGRADE CLIMATE AND LATITUDE

Marija Grujić[1], University of Belgrade, Faculty of Civil Engineering, Belgrade, Serbia
Aleksandar Radevski, University of SS. CYRIL AND METHODIUS Skopje, Faculty of Architecture, Skopje, Republic of Macedonia

Contemporary controversy about daylight saving time (DST) is mainly derived from different standpoints in studies investigating the positive and negative effects of the clock shift during summer period. From the standpoint of energy savings, most studies have consensus that the summertime clock shift in middle latitudes, with a large difference between winter and summer daylight hours, contributes to energy savings in buildings. Belgrade's mid-latitude, moderate-continental climate has a six-month long heating season and a three-month cooling season. The annual domination of the heating period assumes that the demand for heating energy also dominates in the annual energy breakdown for average office buildings. Since DST covers mainly summer time, the energy breakdown in office buildings during the DST period is dominated by the energy demand for lighting and cooling. The shift of time ahead of standard time during the DST period causes a shift in temperature, daylight availability and solar energy resources and thus a shift in the potential for the utilisation of the surrounding energy. This paper investigates how the application of DST in Belgrade's climate and latitude influences the change of climate parameters relevant for the cooling and lighting energy demand in office buildings.

***Key words*: daylight saving time, office buildings, daylight utilisation.**

INTRODUCTION

The first idea to implement clock shifting during the summer dates before the electrification era. It was introduced in order to prolong diurnal use of daylight during summer, either for enjoyment in nature or for prolonging workdays. During the Great Wars in the last century most countries imposed daylight saving time (DST) in order to save energy resources, but the losses in other areas of the economy increased due to arbitrary clock shifting in every country, county or state (Prerau, 2017). So, even today, when DST is legislated, there are *pro* and *contra* attitudes concerning its enforcement.

The effects of daylight saving time on energy savings have been studied since the 1970s. There are numerous studies that are divided in their conclusions – some conclude that the application of DST has positive effects on energy savings, while others conclude that there is an increased energy demand caused by the application of DST. A recent survey of the literature concerningthe effects of DST on energy demand (Havranek *et al.*, 2016) concluded that the design of a study has a crucial effect on its results. Reviewing 44 studies the authors concluded that "on average, the savings from DST amount to 0.34% of total energy consumption during the days when DST is applied" (Havranek *et al*., 2016, p.3). The authors also concluded that the result of their main estimate of the effects of DST is within limits established in previous literature reviews (Reincke *et al.*, 1999) (Aries and Newsham, 2008 cited in Havranek *et al.*, 2016), which place their best estimate of the effect at between 0% and 0.5%.

There are not many studies about the effects of DST on energy savings in Belgrade. Most of the available studies are focused on improving either the building envelope or the built environment (Dimitrijević, 2013) (Đokić *et al.*, 2015), or investing in buildings (Ćetković *et al.*, 2010).

The potential for energy savings in buildings depends on a wide variety of factors, but mostly on a building's site and function, its architectural design and user behaviour. If there is an adequate positive change in the specific climate parameters that influence the energy utilisation in buildings, a well-organised building design and user behaviour should lead to energy savings in buildings.

Therefore, this analysis represents a simple study of the climate parameter shift during working time, as a result

[1] Bulevar kralja Aleksandra 73, 11000 Belgrade, Serbia
grujicm@grf.bg.ac.rs

of the clock shift during the DST period, and the influence of the shift on the potential for energy utilisation in office buildings. Since DST is applied during the summer period, the heating period (and thus heating energy demand) was not considered in this analysis. During the summer period in Belgrade, the energy breakdown for office buildings is dominated by the cooling and lighting energy demand, so this analysis focuses only on the change of climate parameters that influence the energy utilisation for cooling and lighting. These parameters are: daylight hours during working time, direct insolation for four main orientations and the temperature boundary that causes cooling degree hours (*CDH*). The purpose of this analysis is not to evaluate the real conditions of environmental energy potential, but to compare the changes that happen when climate conditions change, and evaluate the positive or negative effects of the change. The analysis was carried out for typical Belgrade climate data (IWEC2 data file) (ASHRAE, 2011) using Ladybug (Sadeghipour Roudsari and Pak, 2013) software, anenvironmental plug-in for Rhino's (Robert McNeel & Associates, 2017) integrated 3-D modelling tool Grasshopper (Rutten, 2014). Ladybug is software specialising in detailed analysis of climate data. The results of the analysis were assessed for DST period only and for a period of one year.

DESIGN FRAME OF THE STUDY

The hundred-year old idea about clock shifting, in order to exploit more daylight during summer and thus save energy, seems quite contemporary when considering office buildings. Office work hours usually last during the daytime period. The beginning of working hours in each country depends on local customs and legislation. In Serbia, most administrative public or private businesses, courts and government departments start work at 7:30 am or 8:00 am. Only a small number of companies have work hours between 9:00 am and 5:00 pm. The eight-hour workday covers the majority of daytime, so any clock shift assumes a change in energy resources on the site of a building, and thus a change its utilisation.

The annual working time profile, usually known as the occupancy profile, adopted in this analysis lasts 10 hours a day, from 7:00 to 17:00, including weekends and public holydays. Since the simulation software only counts full hours, the real start of working time at 7:30 in Serbia was adopted as 8 o'clock. A ten-hour working time was adopted in order to include: net work hours (eight hours), time before the net work hours start (an hour when users are arriving at work) and time after work hours (an hour when users are leaving their work posts). Also, this time frame allows for a flexible beginning of working time in Serbia (working time from 9 am to 5 pm).Weekly patterns of working time (week days and weekends) and holidays were not included, since their occurrences in the calendar change every year and this analysis needs to include every possible typical climate parameter throughout one year. So, the adopted working time annually lasts 3650 hours, which represents an unrealistic annual working time. This kind of annual occupancy profile is usually used for comparative analysis (Reinhart *et al.*, 2013).

In European countries, daylight saving time was gradually adopted during the 1970s, but in Serbia it was first introduced by government regulation in 1983. This regulation was applied until 2005, when it was officially legislated and harmonised with EU legislation. Today in Serbia, daylight saving time is applied as in other European countries: from the last Sunday of March until the last Sunday of October. For this analysis, the period of DST was selected according to existing legislation in Serbia. The dates of DST in this analysis were set according to the DST dates for the year 2017.

Belgrade is located in the European continental region, at a latitude of 44^0 north. Its climate is moderate-continental with four distinguishable seasons, with warm and humid summer weather conditions and a relatively mild winter period with precipitation (RHMS, n.d.). Belgrade's climate is heating dominated. The heating season starts from the middle of October and lasts for six months, until the middle of April. Extremely low temperatures are limited to December and January, when cloudy weather prevails. At the beginning and end of the DST period are months which require only occasional and moderate heating. May and September are months when no heating or cooling is required. There is only a requirement for cooling during June, July and August (for outside temperatures above 26^{0}C), which can sometimes be very intensive. Low cloud coverage and clear sky conditions prevail in August, causing high outdoor temperatures and a high intensity of solar radiation.

ANALYSIS

According to Europe's average office building energy breakdown, the use of lighting energy accounts for about 14% of the total final energy use in office buildings (EC 2017 cited in Halonen *et al.*, 2010, fig.2-5, p.23), with a high tendency to increase even more. If we also consider the fact that office buildings in Europe have the highest energy consumption in the commercial building sector (BPIE, 2011), the need for daylight utilisation, and thus lighting energy savings, becomes more and more evident. Today there are many technical solutions that minimise lighting energy consumption, like LED lamps and various control systems, but the cheapest solution with the best long-term performance is the utilisation of natural daylight. Also, human beings through evolution have adapted to the natural light spectra, so the best work performance in offices can be expected if the work environment is adequately daylit.

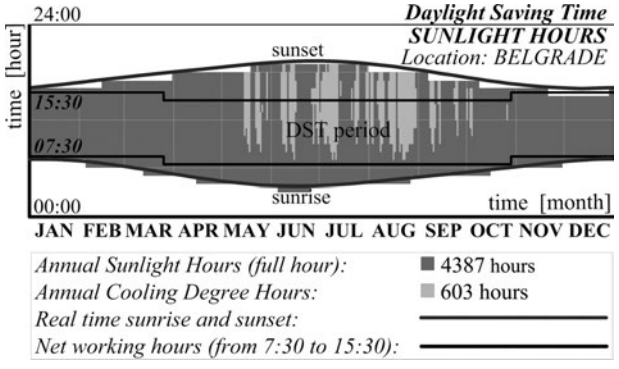

Figure 1. Full hour annual sunlight hours, sunlight hours with cooling degree hours and real time sunrise and sunset during the annual profile of net working time (from 7:30 to 15:30) in Serbia

In this analysis, a sunlight hour is considered to be an hour when the Sun is above the horizon. The total annual sunlight hours for Belgrade were calculated for an unobstructed horizontal surface (Fig. 1). A sun exposure hour or insolation hour is considered to be an hour when the surface is directly exposed to the Sun. Insolation hours depend on the surface orientation. In the real world, insolation hours do not necessarily express the presence of full direct radiation on the surface (or facade). Cloud cover can significantly reduce the insolation time or the intensity of solar radiation, but these factors were ignored in this analysis. A Cooling Degree Hour (CHD) is considered to be an hour when the average ambient outside air temperature is above the previously established base temperature for cooling (in this analysis, established as 26^{0}C) (Sadeghipour Roudsari, 2015).

If only full hours are considered, Belgrade has 4387 sunlight hours annually on a horizontal surface (Fig. 1). In standard time annual mode (Fig. 2 – A1), the selected occupancy profile for office buildings (3650 work hours annually) is 95.4% of the time within the sunlight hours range. Only the last hours of working time are outside the daylight availability, from mid-October to mid-February. In standard time mode, during the DST period only, 99% of working time is within the sunlight hours range. If DST mode is applied (Fig. 2 – A2), these percentages improve by only up to 1% (Tab. 1). As small as it is, the improvement in the sunlight hours during working time, caused by DST clock shift, might influence the energy demand in office buildings. It is important to stress that no further increase in sunlight hours during the DST period is possible, since work hours during the DST period are 100% within the sunlight hours range. At Belgrade's latitude, a very high percentage of annual working time during daytime, as high as 96% with DST annual mode, ensures environmental daylight conditions that can provide a very high probability for the utilisation of daylight in office buildings. However, the level of daylight utilisation will greatly depend on the insolation hours of the facade.

It should be stressed that the selected occupancy profile for an office building with ten work hours a day and a full hour count represents the worst case scenario. If we consider the net working time in Serbia, eight hours a day from 7:30 am to 3:30 pm, and the real time sunrise and sunset, even in standard time annual mode, work hours are 100% within the sunlight hours range for Belgrade (Fig.1).

The average cooling energy demand in office buildings in Europe is relatively small, around 4% of the total final energy demand in office buildings (EC 2017 cited in Halonen *et al.*, 2010, fig.2-5, p.23). The energy demand for cooling in office buildings in Serbia is similar. The annual cooling degree hours (*CDH*) profile for Belgrade in Figure 2 predicts the hours of energy demand for cooling buildings from mid-May to October. The need for cooling therefore exists only during the DST period of the year. In the annual mode with standard time, the calculation of *CDH* for the selected office occupancy period resulted in 534 hours annually when cooling is needed (Fig. 2 – A1) (Tab. 1). This result represents 24.6% of the working time during the DST period. With the application of the clock shift, during the DST period, the number of hours which require cooling is reduced to 486 hours, or to 22% of working time during the DST period. So, with the application of DST, there is only a 2.6% reduction in the number of cooling hours (for the DST period). However, a relative reduction from 534 to 468 hours is around

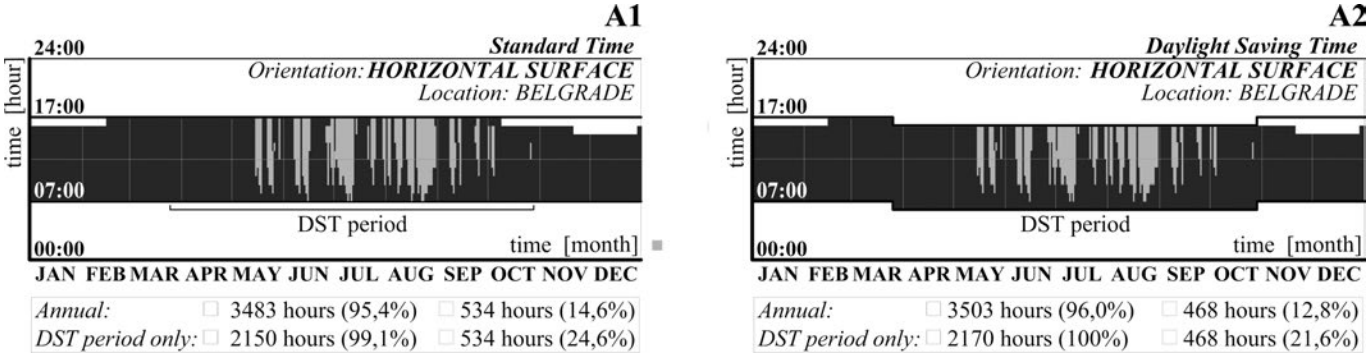

Figure 2.The annual profiles of sunlight hours and sunlight hours with cooling degree hours, for the standard time annual mode (diagram A1 -left) and for the annual mode with daylight saving time (diagram A2 - right), during the selected occupancy profile for office buildings in Belgrade's latitude and climate

Table 1. Sunlight hours and sunlight hours with cooling degree hours, for standard time annual mode and for annual mode with daylight saving time, during the selected occupancy profile of office buildings in Belgrade's latitude and climate

	Occupancy Hours*		**Sunlight Hours (during occupancy hours)**				**Sunlight Hours with Cooling Degree Hours (during occupancy hours)**			
	annual	DST period (26. 03. - 28. 10.)	annual		DST period (26. 03. - 28. 10.)		annual		DST period (26. 03. - 28. 10.)	
time mode	[hours]	[hours]	[hours]	[%]	[hours]	[%]	[hours]	[%]	[hours]	[%]
STANDARD TIME (without DST)	**3650**	**2170**	**3483**	95.4%	**2150**	99%	**534**	14.6%	**534**	24.6%
DAYLIGHT SAVING TIME (DST)	**3650**	**2170**	**3503**	96%	**2170**	100%	**468**	13%	**468**	22%

* Occupancy hours - every day during one year, ten hours a day, from 7:00 to 17:00

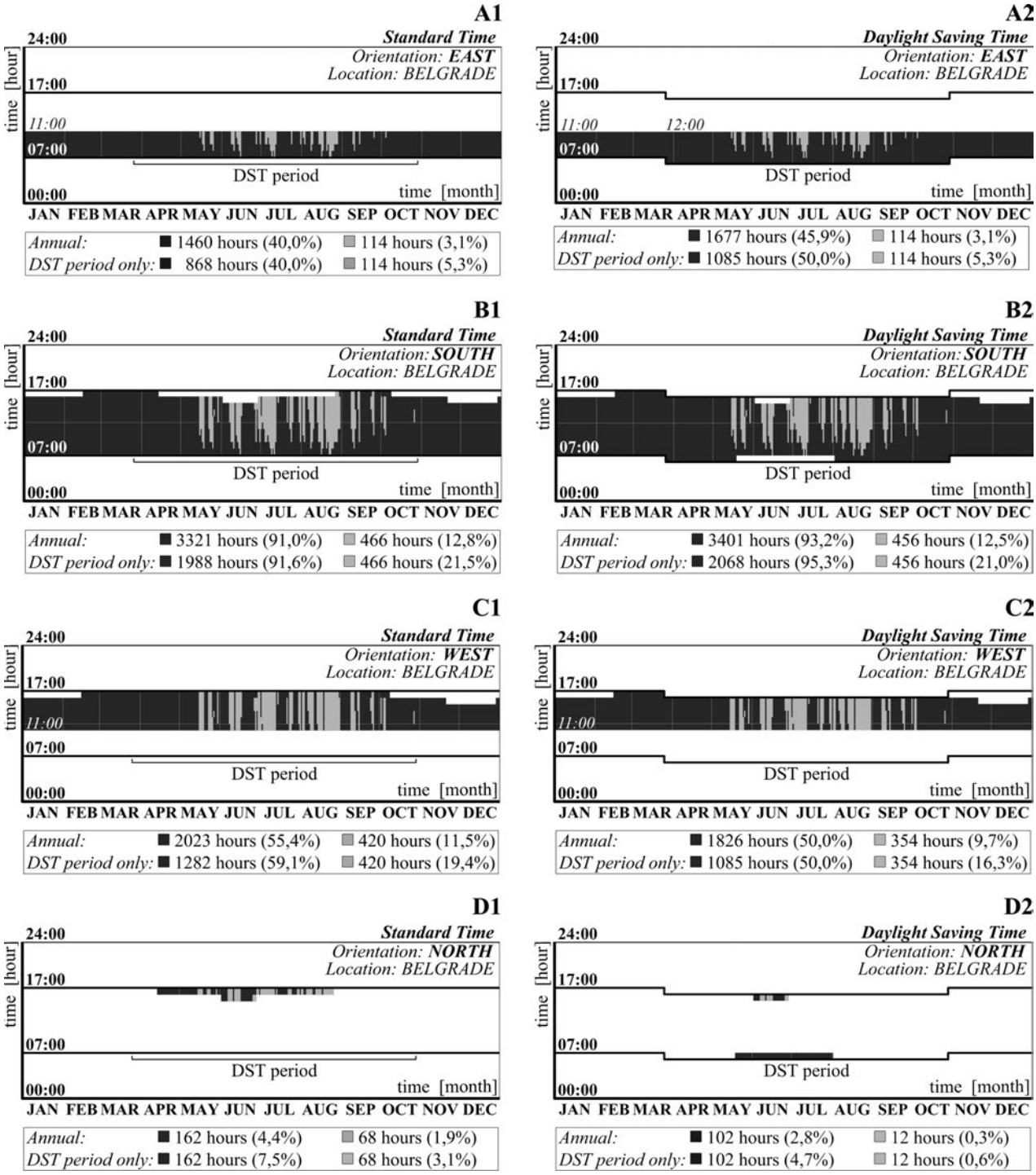

Figure 3. Diagrams of annual profiles of insolation hours and insolation hours with CDH, for standard time annual mode (left side) and for annual mode with DST (right side), during the selected occupancy profile of office buildings in Belgrade's latitude and climate

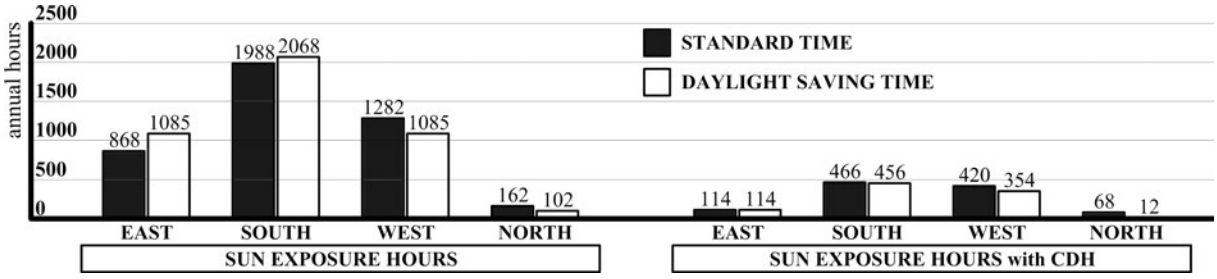

Figure 4. Comparison of annual insolation hours (left) and insolation hours with CDH (right) during standard time annual mode and during annual mode with DST (for selected occupancy profile of office buildings in Belgrade's latitude and climate)

12%, which represents a substantial contribution to the probability of cooling energy savings during the summer. With the application of DST, a reduction in the number of cooling hours during working time is caused by a one hour shift at the beginning of working time, when radiation and temperature intensity are lower and no cooling is needed (Fig. 2 – A2).

The daylight and energy performance of an office space is crucially influenced by its exposure to direct sunbeams. Direct sunbeams cause glare and thermal discomfort and substantially affect thermal gains in the office environment. In order to maintain a comfortable environment and to control thermal gains, it is necessary to apply strategies (like shading), which alter the utilisation of available daylight and thermal gains. Also, strategies designed for summer conditions, in order to prevent thermal gains, are not beneficial for the winter conditions in Belgrade, when solar thermal gains can make a substantial reduction in the heating energy demand.

As mentioned before, hours with cooling energy demand for office buildings have a 12% relative reduction with the application of DST. This reduction is associated with spaces facing all orientations, since the reduction is caused by lower temperatures during early work hours. The worst case scenario for cooling energy performance in offices is the condition when temperatures are high and cause CDH and, at the same time, there is direct insolation present on the facade. The occurrence of this condition indicates how high the CDH might be. This condition was taken into account in the assessment of the cooling energy demand for each orientation. It should be emphasised that this cooling energy condition is interconnected with lighting energy use. When insolation is present on the facade, strategies to control thermal gains are reducing daylight availability and reducing the lighting energy demand.

The highest potential of direct sun exposure is in south oriented spaces (Fig. 3 and Fig. 4). In annual mode with standard time, south orientated spaces are exposed to direct sun rays 91% of the annual working time, which is almost double that of west oriented space (55.4%), and more than twice that of east oriented space (40% of working time). North oriented spaces are only exposed to direct sun 4.4% of the annual working time, only during summer time, at the end of working time (Fig. 3). For south and west oriented spaces, the number of insolation hours with CDH is also very high (12.8% and 11.5% of working time annually, respectively). It is an indicator that summer thermal gains are very high for these orientations of office space. East oriented spaces have a much smaller number of these critical hours (insolation hours with CDH), accounting for only 3.1% of annual working time. North oriented spaces have an almost negligible number of insolation hours with CDH (0.3% of annual working time), indicating that there is a high probability of diffuse daylight utilisation with low thermal gains.

With the application of DST, there is an increase in the insolation hours for east and south oriented spaces, but there is no increase in insolation hours with CDH (Fig. 4). The increase of insolation hours takes place in the early morning hours during summer, when the temperature is lower than the rest of the day and when no additional cooling is required. With the application of some kind of thermal gain control (like shading), in south and east oriented spaces there should be no increase in the cooling energy demand, but a prolonged period of work hours with protection from thermal gains would certainly lead to an increase in the lighting energy demand.

With the application of DST, there is a reduction in the number of insolation hours for west and north oriented spaces, along with a substantial relative reduction in the insolation hours with CDH. The reduction in insolation hours contributes to the utilisation of diffuse daylight, thus reducing the energy demand for lighting. The main characteristic for north oriented spaces is the low presence of direct sun. With the application of DST, low insolation hours are further reduced (from 4.4% to 2.8% of annual working time) (Fig. 3 - D2). The greatest benefit from the application of DST occurs for west oriented spaces. With a 15.4% relative reduction in the number of insolation hours during the DST period (which relates to a 9.7% annual relative reduction in the number of insolation hours) (Fig. 4) there is high probability for an increase in diffuse daylight utilisation and a reduction in the lighting energy demand. There is also a relative reduction in the number of insolation hours with CDH of 15.7% of working time. This reduction would certainly cause a reduction in the cooling demand for west oriented spaces.

CONCLUSION

Belgrade's latitude and climate provide high daylight availability. With the application of DST, the selected worst case occupancy profile is annually 96% during daytime.

With the application of DST, working time is shifted one hour ahead of standard time, which causes a12% relative reduction in the number of hours for which cooling is necessary and about a 1% relative increase in the number of sunlight hours for the selected occupancy profile during the DST period. The relative reduction of 12% would certainly influence the cooling energy demand and certainly lead to energy savings for cooling in office buildings. Since the cooling energy demand covers only a small percentageof the total final energy demand in office buildings, its influence upon the total final energy demand amounts to around a 1% reduction. As for daylighting, a 1% relative increase in sunlight hours with the application of DST during summer is negligibly small, but still might play a small part in reducing the energy demand for lighting. A reduction in the energy demand for cooling is likely to happen in all spatial orientations except east.

The greatest benefits in energy saving can be expected in west oriented spaces. Insolation hours and insolation hours with CDH are greatly reduced with the application of DST, which leads to lower thermal gains, less protection from thermal gains and better utilisation of daylight. In other orientations there is no significant change in the climate parameters that would lead to significant lighting or cooling energy demand changes.

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DIGITAL SOCIAL INNOVATION IN SUPPORT OF SPATIAL PLANNING. AN INVESTIGATION THROUGH NINE INITIATIVES IN THREE SMART CITY PROGRAMMES.

Margarita Angelidou [1], Faculty of Spatial Planning and Development Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece

Artemis Psaltoglou, URENIO Research, Faculty of Architectural Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece

This paper examines how technologically-enabled social innovation can support spatial planning. Social innovation is a long-standing practice; however, in recent years its popularity, importance and applications have increased due to both the financial and social challenges that cities face, and due to important technological advances. Digital Social Innovation (DSI), more specifically, is increasingly penetrating smart city programmes and strategies throughout the world. Through research into nine DSI initiatives in the context of three smart city programmes (Amsterdam, Barcelona, New York), we point out the functions and benefits of incorporating DSI in spatial planning and trace its different levels and characteristics. The conclusions suggest that: online and offline means are equally important in DSI for spatial planning; the mix and degree of involvement of different sectors varies significantly across DSI initiatives; spatial planning and place making experts and professionals have a distinctive role within these initiatives; and particular attention should be paid to scaling and uptake issues.

Key words: **urban planning, collaborative planning, citizen empowerment, civic innovation, online platforms and tools.**

INTRODUCTION

In recent years, cities have been increasingly pressured to become more attractive, innovative and competitive, as globalization has opened up competition for human capital and financial resources to a wholly new scale. As if this was not enough, they are expected to do more with less; recent economic downturns have decreased city budgets, compelling governments to downsize their investment in social, environmental and economic welfare. Innovative cities compensate for this widening gap by promoting social and human capital development and mobilizing citizens as agents of change, hoping to achieve faster and more inclusive growth through alternative routes.

In parallel, citizens are becoming more informed and participatory by their own initiative. They claim democratic representation in policy making and governance; they come up with resourceful ideas, open pathways to innovation and often become innovators themselves. Urban citizens have the capability to summon and incite citizen and community movements from the bottom-up. They come up with solutions that government could never think of, let alone implement. Ongoing scientific discussions have introduced new concepts and theories that represent the new dynamic participation of citizens in policy making, product development and service provision. Such concepts include grassroots innovation, co-creation, crowdsourcing, bottom-up engagement, open innovation and so forth. Among them lies social innovation, broadly referring to new ideas, concepts and business models that are focused on promoting public welfare.

The above deeply transformative developments in society could not have left spatial planning unaffected. Online, real-time, ubiquitous technology, grassroots movements, the pressure to do more with less, and the desire of people to shape their own future, have led to the rise of social and participatory innovation platforms for collectively transforming urban environments.

Altogether, we are undergoing a situation in which the government's ability to react to urban challenges and proactively plan for the future is extremely limited, while citizens and their communities increasingly assume action

[1] Headquarter Building, Faculty of Engineering, Aristotle University of Thessaloniki Campus, 54124, Thessaloniki, Greece
mangel@auth.gr

to fill this gap by means of innovating. The role of digital platforms and tools is critical in this transformative process, allowing for large-scale, real time monitoring and informed decision-making next to saving significant financial and human resources. However, as explained in the literature review of section 2, digitally enabled social innovation is a critically under-studied and documented concept in the social field, including spatial planning. Also, despite the fact that smart cities –among others – address issues of spatial planning, and urban regeneration and development, with the digital sphere influencing the physical one, spatial planners are often not included in their design.

This paper aspires to stimulate the related discussion in the academic community and serve as inspiration for the pursuit of new research paths. It also aspires to present urban policy makers with a comprehensive view of the emerging opportunities and methods to promote urban innovation and effective spatial planning. More particularly, the purpose of this paper is to examine how and in what ways Digital Social Innovation (DSI) can support spatial planning and development. This is achieved by analyzing the dimensions and functions of DSI initiatives related to spatial planning in the context of broadly known and accredited smart city programmes that favor and welcome such kinds of initiatives (analytical justification in section 3). Several different levels of spatial planning are addressed, focusing on the city scale: urban design, urban planning and strategic planning for urban development.

In terms of structure, the following section (Section 2) presents the notion of social innovation and offers a thorough literature review about the relationship between DSI and spatial planning and development, focusing on the tools and methods that may be used to this end. The next section (Section 3) is dedicated to the case study research that took place for the purpose of this paper. It includes the research methodology and the research findings from nine DSI cases in the context of three smart city strategies, and it closes with a synthesis of the research findings. The last section (Section 4) presents the Conclusions from the research. It offers a critical discussion and policy recommendations for leveraging DSI for more effective spatial planning.

LITERATURE REVIEW

Social Innovation in the contemporary context

Social innovation is a broad quasi-concept (Davies *et al*., 2014) which generally refers to the development of new and innovative ideas, services and business models to address social issues. Its foremost purpose is to address challenges for which the public or the private sector cannot provide solutions alone, due to financial or operational constraints. Such challenges include social exclusion, environmental degradation, public services provision, public health and others (Murray *et al*., 2010). To this end, social innovation invites input from the public sector, the private sector and civil society, which are called to unite their forces in order achieve complementarities and thus maximize results. Although social innovation may produce economic benefit, its primary concern rests with social benefit. An operational definition of social innovation is provided by the OECD (2011), whereby *'Social Innovation refers to new strategies, concepts, ideas and organizations that meet social needs of all kinds - from working conditions and education to community development and health - and that extend and strengthen civil society'.*

During recent years, social innovation has attracted increased interest from academics, entrepreneurs and policy makers due to the economic challenges that some of the world's most developed countries have come to face. Indeed, urban citizens have been increasingly exposed to poor public services, high unemployment, financial austerity, social disparities and international migration. In most cases, public authorities lack the necessary funds to address such large scale and complex issues, whereas the business sector is only marginally concerned with solving problems that do not generate quick profit. Social innovation not only seeks to provide new and innovative solutions, but also to restrain the overconsumption of resources and provide locally customized answers, hence opening the way to more efficient solutions (European Commission - DG Regional and Urban Policy, 2013).

Science and Technology have a very important role to play when it comes to social innovation; they allow for large-scale response not only to economic, but social problems, as well (OECD, 2011). Online platforms and digital tools enable people to exchange and share knowledge that generates significant social, economic and environmental benefits (Angelidou and Psaltoglou, 2017; Ivanović-Vojvodić and Stupar, 2015). They contribute to the advancement of knowledgeable, participatory and creative citizens, communities and social actors, and they enhance the knowledge base, innovation capability, and creativity of populations (Aurigi, 2006; Haque, 2012). Furthermore, large-scale engagement favors the equal representation of stakeholders and highlights social needs more effectively (ARUP *et al.*, 2011; Bays and Callanan, 2012). Online platforms also yield very significant economic benefits; through user input, cities save resources, streamline processes and generate solutions that have not yet been addressed by the market (ARUP, 2011; Bakici, 2012). In environmental terms, online platforms eliminate the necessity for physical travel and the existence of physical workplaces. Urban resilience, greenhouse gas reduction and health benefits are achieved through the development of applications for a cleaner environment, transport and waste management (ARUP *et al.*, 2011). Citizens become more energy-wise, as they become aware of their own resource consumption. Thus, the term "Digital Social Innovation" has been coined, referring to '*a type of social and collaborative innovation in which innovators, users and communities collaborate using digital technologies to co-create knowledge and solutions for a wide range of social needs and at a scale and speed that was unimaginable before the rise of the Internet'* (Bria *et al*., 2015).

Digital Social Innovation for intelligent urban development

Social Innovation has been used in public planning for over fifty years now (Angelidou, 2015; Maeng and Nedovic-Budic, 2008). The famous Dutch woonerfs, for example, which are streets that accommodate pedestrians, bicyclists, and people along with cars – were first introduced by Dutch

residents who took it upon themselves to reclaim public space in residential communities, meeting the social need for safety, livability and social interaction in urbanized spaces. The movement grew so massive, that woonerfs were formally incorporated in the spatial planning standards of the Dutch state in 1976 (Lydon and Garcia, 2015).

Thanks to recent technological advancements, however, social innovation has acquired a new characteristic: given that ubiquitous connectivity of smart city systems allows real-time interaction, innovators can be engaged 'on the go', especially through social media. This instant and direct interaction elevates the effectiveness of bottom-up approaches to an entirely new level. Although it is an idea still under exploration, open and social innovation is put forth by many urban development scientists as a basic ingredient of the successfulness of smart, intelligent and eco city strategies (for example Almirall, 2012; Angelidou, 2017; 2016a; 2015; 2014; 2012; Bakici, 2012; Komninos, 2011; 2015; Paskaleva, 2011; Schaffers *et al.*, 2012). DSI approaches capitalize on the skills and knowledge of the city's people and advance intelligence, innovation and problem-solving capacity in cities. Web 2.0 platforms, underpinned by smart devices and networks, provide an unprecedented opportunity for broad-scale user engagement and codification of input and information, enabling advanced city functionality and improved operations. Constituent involvement, facilitated through web-based collaboration, leads to the development of locally customized solutions that efficiently address both existing and emerging urban problems, and elevates the collective intelligence of the population to a whole new level of innovation, knowledge and skills (Bria, 2012). In this process, people are the essential source of innovation, as the collective intelligence that stems from the populace holds unprecedented potential for tackling city-wide problems. This form of intelligence is usually ignored in exclusive top-down approaches for the development of smart cities. However, empowering people to find and build their own solutions may allow the full potential of smart cities to be realized. In this context, any adequate model for a smart city must focus on the intelligence of its citizens and prioritize participatory processes (Haque, 2012, Angelidou, 2016a, Angelidou, 2015). As A. Greenfield stated, *'the city is already smart. The intelligence is just bound up in the actions and behaviors of its users. If we harness that intelligence, we win'* (Young, 2011).

In recent years, DSI has been variably exploited in the policy context, while the majority of public policies favor social and open innovation (Bakici, 2012). Innovative governments see Web 2.0 platforms as a way to engage quadruple helix stakeholders (citizens and civic organizations, public sector, private sector, academia) in providing their ideas, solve problems collectively, and develop and test new products. Bottom-up approaches, facilitated through digital networking, can become part of the strategy for spatial planning and development, namely the creation of smart cities in several different ways (Almirall, 2012; Bakici, 2012; González and Rossi, 2012), including:

- **User engagement**, referring to the involvement of the people of the city, interest groups and organizations (i.e. 'stakeholders') in all or some stages of smart city development (Almirall, 2012; Bélissent, 2012; Nam and Pardo, 2011; Schaffers *et al.*, 2012). User engagement can extend across the design and execution of policies (Paskaleva, 2011) and cover the full value chain of service planning, designing, commissioning, managing, delivering, monitoring, expanding and evaluation activities (Bovaird, 2007). Digital tools that may be used to stimulate engagement include collaboration platforms, citizen reporting platforms, social media (such as Facebook, Twitter, LinkedIn), and also more traditional means, such as surveys, interviews, focus groups and meetings (Bélissent, 2012; Hodgkinson, 2011; Seltzer and Mahmoudi, 2013).
- **Crowdsourcing**, which is the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an 'open call'[2], is considered another one of the basic mechanisms for the bottom-up engagement of urban stakeholders (Almirall, 2012; Bakici, 2012; Evans-Cowley, 2011; Schuurman *et al.*, 2012). In general, motives to participate in crowdsourcing procedures include monetary compensation, altruistic reasons (the 'opportunity to contribute'), fun/pleasure, recognition, self-development, passion for problem solving, and reputation (Bakici, 2012; Evans-Cowley, 2011). Cities release 'open calls' to attract interested participants in submitting creative proposals/ideas for solving the city's problems. In recent years, Web 2.0 technologies have facilitated crowdsourcing techniques tremendously.
- **Prizes, Challenges and Competitions.** One part (the 'seeker') challenges a third party or parties (the 'solvers') to identify a solution for a particular problem and rewards winning contestants. Rewards can be of all kinds: money, objects or services. Many players in the market are using open challenges or open calls in order to get the users to participate in building a 'smart' solution or a service, often in conjunction with crowdsourcing and citizen engagement (Evans-Cowley, 2011; González and Rossi, 2012; Schuurman *et al*., 2012).
- **Living labs** are open innovation platforms that engage stakeholders in real life contexts to test breakthrough concepts and assess their potential value for society as a whole (Bakici, 2012; European Network of Living Labs, 2013; González and Rossi, 2012; Paskaleva, 2011). Methodology-wise, a living lab engages in four main activities: co-creation, exploration, experimentation and evaluation (European Network of Living Labs, 2013). Currently there are about 400 living labs only in Europe. Recent research has focused on the connections and synergies between living labs and smart cities; it has found that living labs are ideal test-beds for gaining useful knowledge and experience with regard to smart city solutions (Paskaleva, 2011; Vicini *et al*., 2012).
- **'Big Data'** refers to the vast amounts of data that are produced and collected daily in our cities. It comes from different sources (government, sensors, social media)

[2] As defined for the first time on J. Howe's blog in 2006, URL:< http://crowdsourcing.typepad.com/>.

and can be used in creative ways towards helping a city become 'smart'. Recent technological advancements have played a decisive role in the utilization of data for the common good; on the one hand, powerful analytics, data-mining[3] techniques and mashups[4] have allowed for the analysis of large quantities of data and their correlation in resourceful ways to identify trends and reach conclusions about the urban environment and the incidents that happen (or are prone to happen) therein. On the other hand, technology-savvy citizens and developers have used this data to develop innovative smart city applications that improve the daily life of the city's users. The idea of big data (including open data) is especially popular in terms of how it can enhance the smartness of cities and their citizens (Almirall, 2012; Bakici, 2012; Bays and Callanan; 2012, Bélissent, 2012; Haque, 2012; Kalampokis *et al*., 2012). However, despite the growing interest, the idea is still largely under exploration.

- **Open sensor networks**, as means of ubiquitous connectivity that allow the city's users to be connected and engaged at all times. In essence, ubiquitous connectivity enables the seamless and constant provision of cloud computing and Future Internet services, and this is the reason why it can be considered another tool for bottom-up engagement (Bakici, 2012; Carter, 2012; Hodgkinson, 2011; Schaffers *et al*., 2012).

Spatial Planning in Smart Cities

Smart cities represent a conceptual urban development model based on the utilization of human, collective, and technological capital for the enhancement of development and prosperity in urban agglomerations. The working definition of a 'smart city' is the following: '*smart cities are all urban settlements that make a conscious effort to capitalize on the new Information and Communications Technology (ICT) landscape in a strategic way, seeking to achieve prosperity, effectiveness and competitiveness on multiple socio-economic levels*' (Angelidou, 2014).

An important factor to account for is that in using ICT tools for spatial planning and development, all initiatives are inherently place-specific. They cannot exist without spatial reference, and each urban challenge is unique and constantly affected by its societal, political and economic context. Thus, many DSI initiatives are not only supported by means of online tools and platforms, but also by means of offline methods, such as focus groups, discussion groups and task forces that work with actual plans, models and physical interventions. These allow the better framing of those initiatives in their contexts of application.

Given the spatial implications of the smart city movement, one could also argue that the development of technologically augmented cities requires the involvement of spatial planners, computer scientists and engineers. Physical and digital projects in the context of the smart city strategy should not be interpreted as unrelated dimensions, but should complement each other (Aurigi, 2006), and spatial planning can hold an enabling role to this end (Nam and Pardo, 2011). However, despite the fact that smart cities address issues of spatial planning, regeneration and development, with the digital sphere influencing the physical one, spatial planners are often not included in their design. This approach results in incomplete approaches to urban problems and leads to strategic deficits. The case of IBM's 'Smarter Cities' programme is a very characteristic and broadly mentioned one: The global technology vendor, counting 435,000 employees worldwide, and with the 'Smarter Cities' programme running since 2008, until recently did not employ a single urban planner to work on the programme (Doig, 2012).

CASE STUDIES

Methodology

The literature review of Section 2 revealed that although DSI is already on the rise from the bottom-up, and despite its potential for application in spatial planning practices, its benefits and the different ways it can be applied are unknown. Consequently, the opportunities emerging from DSI are underutilized by spatial policy makers. Accounting for this knowledge gap, this paper aims to examine how and in what ways DSI can support spatial planning and development. More particularly, it seeks to provide answers to the following research questions:

- Which particular aspects of spatial planning can be facilitated by means of DSI?
- What are the benefits of incorporating DSI practices in spatial planning?
- Who are the major stakeholders involved in this process?
- Which methodologies, tools and technologies can be used to incorporate DSI in spatial planning?

Case study research (Eisenhardt, 1989; Yin, 2003) presents a fitting research method for answering the above research questions, because it allows for the induction of in-depth insights about the questions to be answered. More particularly, case study research methods allow researchers to arrange and analyze qualitative data in a way that allows for the detection of underlying patterns and similarities, thus facilitating the emergence of overarching conclusions and results and allowing for the development of new theoretical constructs about the research in focus.

Moreover, smart cities, due to their inherent implementation with the use of digital applications and tools, are ideal frameworks where advanced cases of DSI initiatives in support of spatial planning and development can be found. DSI has actually been a priority in many successful smart city initiatives undertaken by cities such as New York, Washington, San Francisco, Berlin, Barcelona, Amsterdam, Helsinki, Manchester, Stockholm and others (Angelidou, 2014; 2016b; 2017). For the purposes of this paper, three smart city initiatives were selected, based on the following criteria:

[3] Data mining is the computational process of discovering patterns in large data sets with methods of artificial intelligence, machine learning and statistics, in order to extract meaning from a raw dataset.

[4] *'A mash-up is a Web application that combines data from multiple sources to create powerful analyses that can identify patterns that were not previously visible'* (Bays and Callanan, 2012).

- The existence of an integrated strategy: they have integrated, standalone smart city strategies, with an explicit framework of actions and included projects.
- The degree of data availability: they offer insights on the specific objective of this research, which is to identify DSI initiatives specifically related to place making, spatial planning and urban development.
- A citizen-oriented approach: they adopt citizen driven design methods, and seek to empower citizens as agents of change.

It is especially important to note here that in the smart city strategies researched, information sharing and citizen request platforms are made openly available in full to quadruple helix stakeholders, and these stakeholders are provided with training opportunities on how to use these data in constructive ways related to spatial planning. This is a necessary precondition for the substantial enrichment of the spatial planning processes though DSI.

Accounting for the previous considerations, the research methodology is built on research into nine different instances of DSI initiatives related to spatial planning that have been developed in the context of the above smart city strategies. These nine initiatives are initially analyzed independently and then synthetically with regards to the research questions mentioned above. In the following section we elaborate on the findings of each case with respect to DSI in the context of spatial planning and development.

Findings

The Case of Amsterdam

Amsterdam Smart City is an innovation platform whereby actors from the government, the private sector, academia and civil society collaborate in developing and testing new solutions by means of specifically designed and dedicated projects. The ultimate goal of the platform is to increase the livelihood and sustainability of the city of Amsterdam. The smart city projects are arranged across six themes: i. Infrastructure and Technology, ii. Energy, Water and Waste, iii. Mobility, iv. Circular City, v. Governance and Education, vi. Citizens and Living. Anyone can start their own project on the platform and seek collaborators. The result is new technologies, new solutions and new business models in these areas (Amsterdam Smart City official website, 2016; Angelidou, 2016a; 2016b).

Within the smart city platform, there is a host of DSI initiatives directly related to spatial planning and development. Three noteworthy initiatives include:

- **The Hackable City** (http://thehackablecity.nl): an initiative that explores the potential of new modes of collaborative city-making, using digital technologies and new media. Citizens, design professionals and knowledge institutions come together to collaborate in spatial planning and city management with the ultimate purpose of increasing democracy, livability and resilience. They are empowered towards acting on complex and common urban problems in modern, networked societies. The smart city strategic methods used in this initiative include user/citizen engagement, co-design, challenges and crowdsourcing.
- **Games for Cities** (www.gamesforcities.com): an initiative that explores how serious gaming can improve city-making and provide solutions for urban issues. Such issues can be related to urban regeneration, migration and the inclusion of minority groups, urban violence and resilience. Through games, coalitions are formed among contributing parties, while a common understanding of urban issues is promoted and citizens gain hands on insights about the potential action routes in terms of city making. The platform is facilitated by online and offline means. The smart city strategic methods used in this initiative include challenges, user/citizen engagement, co-design and crowdsourcing.
- **TransformCity (ZO!City pilot)** (www.zocity.nl): an online urban transformation dashboard for participatory place making and spatial planning. By means of storytelling, data-sharing, co-creation, crowdsourcing and crowdfunding, stakeholders co-design urban neighborhoods that are more inclusive, resilient and sustainable. The smart city strategic methods used in this initiative include user/citizen engagement, co-design and crowdsourcing.

Figure 1. "Games for Cities" in action. Various stakeholders assume distinct roles and co-create urban districts accounting for diverge needs and viewpoints
(Source: www.gamesforcities.com)

The Case of Barcelona

The Smart City of Barcelona is an initiative commissioned to improve the quality of life for the citizens of Barcelona in an inclusive outlook. Quality of life is achieved by more efficiently meeting citizens' needs; such needs span the areas of the environment, mobility, businesses, communications, energy and housing. Technology and innovation are substantial pillars of the strategy, enhancing sustainability and self-sufficiency. The smart city platform of Barcelona comprises projects in the following areas: i. Public and Social Services, ii. The environment, iii. Mobility, iv. Companies and business, iv. Research and innovation, v. Communications, vi. Infrastructures, vii. Tourism, viii. Citizen cooperation and ix. International Projects. Stakeholder engagement is a fundamental dimension of the city's strategy, realized though ubiquitous connectivity, open data and urban labs, which encourage citizens to be more active and participative (Barcelona Smart City official website, 2016; Angelidou, 2016b; 2016b; Bakici *et al*., 2016).

DSI initiatives related to spatial planning and development in the context of Barcelona's smart city platform include:

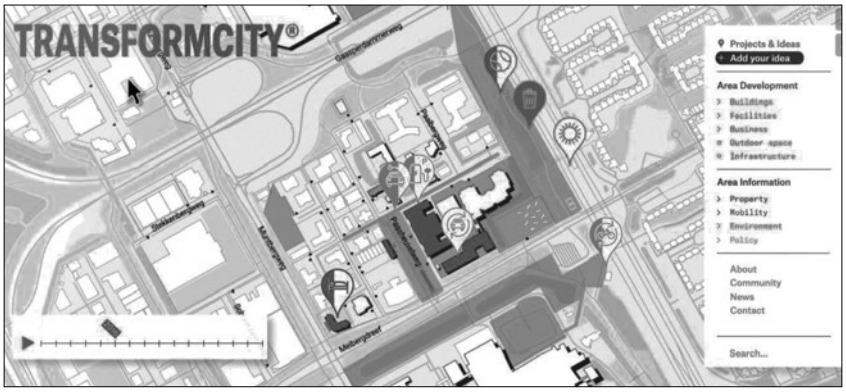

Figure 2. "TransformCity" - ZO!City pilot platform. Users can log in places of interest, provide suggestions and make comments about the optimal development of a site
(Source: http://www.zocity.nl/)

- **Sustainable Barcelona Map** (www.bcnsostenible.cat/en): interactive online map and social network. It collects bottom up social and environmental data from the city's users and features places and initiatives of environmental and social value to the public. Users can locate sustainability initiatives across districts and neighborhoods and contribute to their improvement and scaling, interact with other users and even add their own initiative. The smart city strategic methods used in this initiative include open sensor networks, big data, crowdsourcing and user/citizen engagement.
- **BUITS (Empty Urban Spaces with Territorial and Social Involvement) Plan** (http://ajuntament.barcelona.cat/ecologiaurbana/ca/pla-buits) is an initiative for collective spatial planning through the proposal of temporary uses for municipal buildings and open spaces that are currently under-used. The foremost purpose of the project is to set up activities of high added value in terms of public interest and social involvement in urban regeneration and revitalization. The project also aims to raise awareness and promote social inclusion. The smart city strategic methods used in this initiative include crowdsourcing, big data and user/citizen engagement.
- **Sentilo** (http://www.sentilo.io/wordpress/) is an online platform that collects and depicts information from sensors distributed throughout the city of Barcelona. It transmits information about the energy consumption of public buildings, as well as urban noise and pollution levels. Examples of urban functions facilitated through this platform include smart public lighting, green spaces irrigation and monitoring of parking spaces. Citizens can use the platform data to make more informed decisions, participate in spatial planning, or create new smart city applications. The platform is offered for usage by any city, as it has been created upon free software components. The smart city strategic methods used in this initiative include open sensor networks, big data, crowdsourcing and user/citizen engagement.

The Case of New York

New York's plan for a smart and equitable city was launched in 2015. The foremost goals of New York's strategy are social inclusion, urban resilience and environmental sustainability.

Figure 3. "Sustainable Barcelona Map", featuring the locations of sustainability initiatives currently running in Barcelona
(Source: http://www.bcnsostenible.cat/en/)

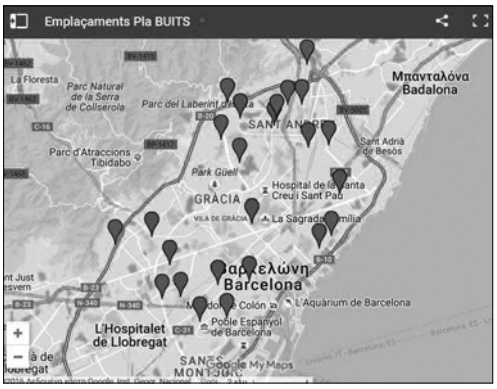

Figure 4. "BUITS Plan" map, featuring all the empty places in Barcelona where bottom-up input for temporary and sustainable uses is invited
(Source: http://ajuntament.barcelona.cat/ecologiaurbana/ca/pla-buits)

Equity, in the sense of equal access to opportunities for all, has a central role in the strategy; it is characteristically mentioned that *'Every New Yorker should have access to high quality, community-based City resources that enable residents to thrive'* (NYC Mayor's Office of Tech + Innovation, 2015). In addition, the website of the smart city of New York hosts periodic calls for innovative ideas that could improve the quality of life for the residents of the city by responding to specific challenges. It should be noted here that the city of New York has previously implemented and completed other digital and smart city strategies (City of New York, 2011; 2013), which allows the city administration to use its previous experience to its benefit.

Representative DSI initiatives and projects related to spatial planning and development within New York's smart and equitable city strategy include:

- **Neighborhoods.nyc** (www.neighborhoods.nyc) is essentially an integrated public authorities' information and citizen reporting online platform. It provides information about public transport services, social and schooling services, public health, construction works, quality of life, etc. Local community groups can use it to develop web-based hubs for collaborative spatial planning, civic engagement, online organizing and information sharing. The smart city strategic methods used in this initiative include user/citizen engagement, crowdsourcing and co-design.
- **MyNYCHA** (http://www1.nyc.gov/site/nycha/mynycha/mynycha-landing.page) is an online tool that allows users of real estate developments to access and contribute information about the services available therein. More particularly, it allows quadruple helix stakeholders (citizens, public, private, and non-profit sectors) to build innovative partnerships for better access to the city's housing stock. Themes addressed span the demographic data of the population residing in the developments, the availability of family services, engagement opportunities and emergency preparedness plans. The smart city strategic methods used in this initiative include living labs, big data, user/citizen engagement, crowdsourcing and co-design.
- **IdeaScale for quality of life issues** (https://ideascale.com/resource/new-york-city-police-department/) is a real time street intelligence platform whereby citizens recommend to the New York Police Department (NYPD) neighborhood-based quality of life improvements in areas such as reducing noise pollution, safety/crime and illegal parking. Local police officers respond in their area of authority. The smart city strategic methods used in this initiative include user/citizen engagement, crowdsourcing, co-design and challenges.

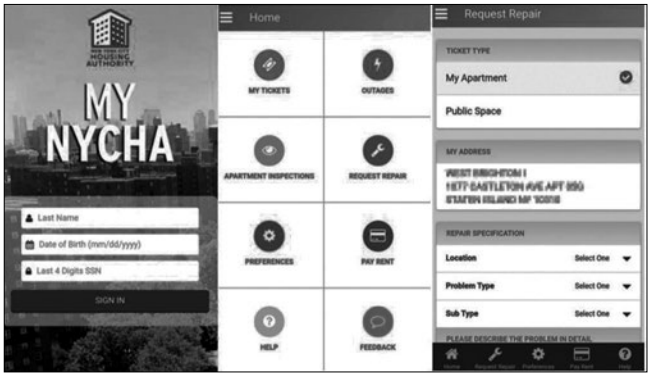

Figure 5. Screenshots from the mobile application of MyNYCHA, featuring the different areas of interest with regards to real estate developments
(Source: http://www1.nyc.gov/site/nycha/mynycha/mynycha-landing.page)

Synthesis of Results

In examining the previous nine DSI cases, we can first point out the **particular aspects of spatial planning that can be facilitated by means of DSI.** These include:

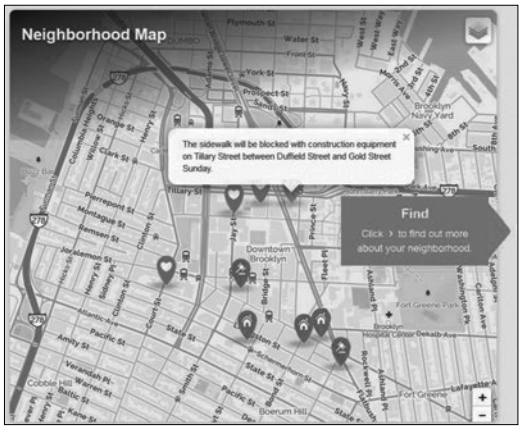

Figure 6. Snapshot from Neighborhoods.nyc depicting citizen reported issues on a neighborhood map
(Source: http://www.neighborhoods.nyc/welcome.html)

- **Collaborative planning**, in the sense of actually co-designing and co-creating spatial forms and structures for the city.
- **Better informed spatial planning**, facilitated by the insights coming from sourcing large amounts of data and opinions from the city's stakeholders. In turn, spatial planners can use these insights to develop better and more targeted plans and urban stakeholders can participate in the spatial planning dialogue and public consultation in a more informed way.
- **Collaborative place making and branding**, for instance in reconciling stakeholder interests and building a common vision as to what kind of place they want to live in.
- **Solutions to specific challenges with a spatial element,** for example with respect to underprivileged and underdeveloped areas. Using these data, urban stakeholders and particularly citizens and their communities can develop their own digital applications related to spatial planning for addressing specific challenges.

In sequence, the benefits of incorporating DSI in spatial planning and development include:

- **Spatial Resilience,** in the sense of retaining functionality and effectiveness in the face of unexpected events, times of crisis and beyond.
- **Quality of life,** referring to the well-being of individuals and specific population and community groups, reflected by factors such as public health, access to services and resources.
- **Awareness raising,** namely making citizens more aware of the long and short term implications of human activity upon the inhabited environment and making them aware of the requirements of the different stakeholder groups that co-exist in the city environment.
- **Environmental Sustainability,** in the sense of saving energy and resources and reducing the environmental impact of human activity within cities.
- **Claiming affordable housing and public amenities**, by making information available and facilitating the co-design of public spaces, public services, citizen rights, events, points of interest and so forth.

- **Social inclusion**, in the sense of providing minority or socially marginalized population groups opportunities to confer and develop stronger bonds with their city and its inhabitants

The research also showed that **the stakeholders involved in DSI-driven spatial planning** typically include the city's major users, i.e. citizens and their associations, community groups and non-governmental organizations, public authorities (municipal and metropolitan), civic enterprises, knowledge institutions (universities, research organizations, scholars) and design professionals.

From the above research we can also infer that are different levels and characteristics of exploiting DSI in the context of spatial planning and development. These include:

- **The used Methodologies.** They typically include i. Games – storytelling, ii. Living labs and pilot testing of new ideas, services and products, iii. Crowdsourcing and crowdfunding for new ideas and solutions, iv. Citizen engagement, co-design and co-creation by means of workshops, focus groups etc.
- **The available Tools and Technologies.** These include i. Open digital hardware that users can utilize to capture and transmit information into platforms for social good, ii. Open Networks, used to transmit information and share resources (for ex. sensor networks) iii. Open Data, used in creative ways to provide insights about unexplored issues and develop applications for social good and iv. Open Knowledge, used to inform and engage users in submitting their own piece of knowledge or other resources and ultimately create new knowledge and solutions to address social challenges (Bria *et al*., 2015).

Accounting for the above analysis, we can design the following model towards inclusive DSI in the context of spatial planning and development (Figure 7). In the center of the model are the spatial planning aspects that are facilitated by means of DSI; at the edges are the benefits arising from incorporating DSI practices in spatial planning, the stakeholders involved in this process and the methodologies, tools and technologies can be used to this end.

CONCLUSIONS

In this paper with analyzed nine instances of DSI, as they have been incorporated in three smart city strategies. We found that DSI serves different spatial planning and development functions, such as collaborative planning, better informed spatial planning, collaborative place making, and solutions to specific challenges with a spatial element. The stakeholders involved come from all the constituents of the quadruple helix: public sector, private sector, academia, and – most importantly – from citizens and civic organizations. The role of the latter group is essential in generating a wealth of ideas, achieving consensus and increasing uptake. The most common methods include serious games, living labs, crowdsourcing and co-design. The available tools and technologies can be distinguished depending on the technology and purpose of the DSI initiative.

Speaking of the quadruple helix, it is noteworthy that the mix and degree of involvement of different sectors varies significantly across DSI initiatives. The involvement and empowerment of citizens is consistent, as it is the basic ingredient of DSI. However, there is always an orchestrator or facilitator of the initiative – this role may be variably assumed by representatives of the public sector, the private sector (predominantly civic entrepreneurs), community groups or non-governmental organizations. Especially in challenge-focused initiatives, there is also usually an 'owner' of the challenge, and this is where an orchestrator or facilitator becomes indispensable.

One step further, and building on the above spatial consequences of DSI for spatial development and planning, we see that planning and place making experts and

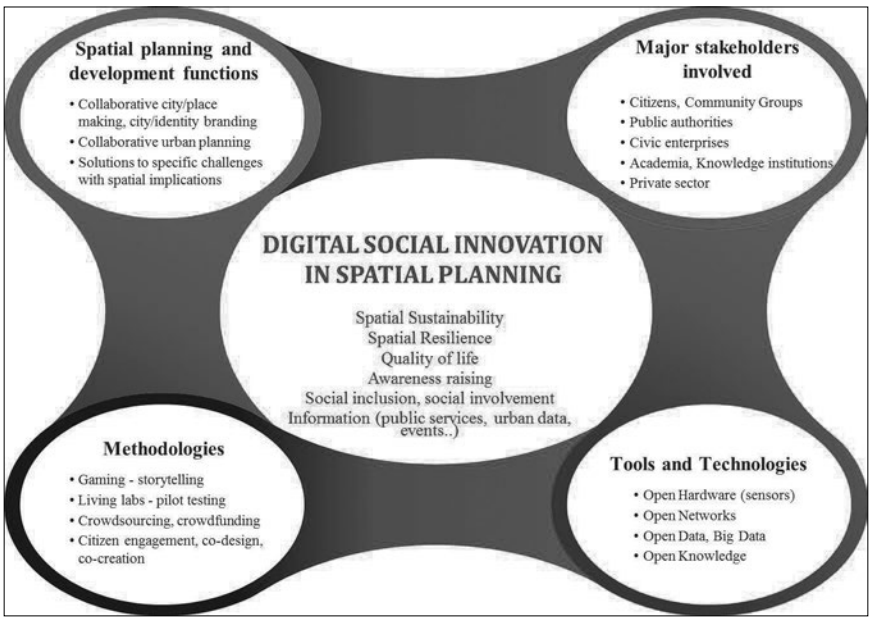

Figure 7. Integrated Model for the incorporation of Digital Social Innovation in spatial planning and development (Source: authors)

professionals have a distinctive role to play within these initiatives. In Von Hippel's (2005) words, they are the so-called 'lead-users'. These individuals are the ones who possess the experience and training to transform abstract ideas into spatial strategies and plans, granting potentiality and functionality to abstract ideas. They have a trained and informed view of what is achievable and what is not; they know the rules and guidelines; they seek to work out a compromise to include the needs of all parties involved.

In any case, it is challenging to tell exactly what the best solutions for cities are, as most challenges are multi-leveled and open-ended. Without doubt, however, the diffusion and scaling of DSI is critical in sourcing a large volume of input. Smart cities, their people, and data that stem from their activities may be today's hot topics, but the complex networking processes of cities and their theoretical background are still issues to be studied. In this sense, interesting topics for future research arising from the work presented in this paper include i. the assessment of the contribution of the different DSI tools and methods in spatial planning, based on the impact generated though the case studies and ii. The investigation of the prospects for applying the solutions analyzed here to cities with other characteristics or to usual spatial planning practice.

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BEYOND FORMALITY: A CONTRIBUTION TOWARDS REVISING THE PARTICIPATORY PLANNING PRACTICE IN SERBIA

Nataša Čolić[1], Institute of Architecture and Urban & Spatial Planning of Serbia, Belgrade, Serbia
Omiljena Dželebdžić, Institute of Architecture and Urban & Spatial Planning of Serbia, Belgrade, Serbia

Participation has been present in the Serbian legal framework in the domain of urban planning since the 1950s. Its scope and legal definition have evolved with the transition to democracy, markets and decentralised governance. In line with EU standards, Serbia introduced an additional level of participation in the form of early public inquiry in 2014. Still, participatory planning practice is often seen as a formality which lacks sufficient effect on the planning solution, and requires qualitative improvements in citizen and stakeholder involvement. The main aim of this paper is to suggest that the use of alternative methods of participation in the domains of informing, consultation and active participation may increase the effectiveness of participatory planning practice. Thus, this paper points out some examples of good practice, and argues for the importance of recognising the existing base of knowledge and expertise in order to respond to contemporary requirements in the field of urban planning.

Key words: **participation, urban planning, formality, alternative methods, good practice.**

INTRODUCTION

Most democratic countries share the view that participation is one of the main attributes of civil society, and that citizens have the right to affect the decision-making process (Kumar, 2002). During the last decade, participation has been operationalised internationally in the field of action and strategic planning, that is, in the process of drafting local, regional and national development policies and plans. In Serbia, participatory planning practice was first introduced in the 1950s (Basic Resolution on General Urban Plan, 1949) and has evolved in line with the transition to democracy, markets and decentralised governance (Tsenkova and Nedović-Budić, 2006).

Current participatory planning practice in Serbia recognises the early public inquiry, introduced in 2014, in line with the EU standard for two-level participation, and the public inquiry, which is traditionally part of urban planning legislation. Accordingly, there is a certain level of cooperation between relevant institutions involved in the process, while the transition to markets involves negotiating with investors during the plan drafting procedure. Be that as it may, participatory planning practice in Serbia is often seen as a *formality* which has no significant effect on the final planning solution. Moreover, the low level of active citizen participation and the lack of provision of feedback information on the implementation of plans reinforce the notion that Serbian planning professionals often describe local participatory practice as declarative (Čolić, 2017).

In 2012, Serbia officially became a candidate for accession into the European Union. As a result, various international programs in the field of strategic and action planning, policy development and land management are ongoing, and some of the main procedural requirements of these programs are the transparency of the decision making process and public participation (Čolić and Dželebdžić, 2018). Moreover, the new legal framework also recognises the need for more extensive participatory practices. The requirements of such a rapidly changing environment suggest that the existing local experience should be acknowledged. Thus, the dissemination of examples of good local practice can be seen as potentially making the implementation of participation more effective in the future.

PARTICIPATORY PLANNING IN SERBIA

This section will briefly outline the theoretical directions that can be considered in relation to the Serbian local context,

[1] Bulevar kralja Aleksandra 73/II, 11000 Belgrade, Serbia
natasacolic89@gmail.com

and it will go on to identify some of the contemporary requirements for the operationalisation of participation. The aim of this section is to provide background information and argumentation for acknowledging the need for disseminating good local practice beyond formality. It should be noted that this paper does not seek to elaborate the overall scope of significant literature on participatory practice, but rather it discusses current tendencies and some possible future directions.

Some theoretical implications

Despite the notion that the strand of communicative planning theory represents a base for planning practices in Western societies, it is often suggested that since socialism, the dominant planning model in Serbia is based on the principles of instrumental rationality (Lazarević-Bajec, 2009). In relation to participation, rational planning is most often associated with observed and agreed facts that direct actions, where participation serves to provide legitimacy for top-down decisions (Campbell and Marshall, 2000; Petovar and Vujošević, 2008) and the actions of planners aim "...to help define public policy objectives as merely the application of their professional judgement to narrow technical issues" (Klosterman, 1978:38). Communicative rationality is, on the other hand, based on the assumption that social groups and individuals are able to learn from each other and that this knowledge affects behaviour in decision making (Healey, 1997; Innes, 2004), while acknowledging that not everyone possesses the means of communicating, explaining or achieving their interests (Flyvbjerg and Richardson, 2002). It should also take into account that each participant's rationality is accompanied with passions (Mouffe, 1999) and neither side is powerless, but the victory depends on the way power is executed (Lukes, 1974); in it, technically competent professionals become active facilitators and mediators of the public voice (Forester, 1999:155).

Taking into account the widely discussed critiques of the communicative approach to planning (Fainstein, 1999; Flyvbjerg and Richardson, 2002; Innes, 2004), the issue of balancing the variety of interests in the process appears even more perplexing in the local context of a post-socialist country like Serbia. This is a context in which political, societal, institutional and economic transition is often followed by the scepticism of the professional and political elites towards the engagement of the public in the planning process (Petovar and Vujošević, 2008; Čolić *et al.*, 2013), and in which planning, as a societal practice, is often accompanied with the issues of achieving an appropriate balance between normative commitments, on the one hand, and flexibility and dealing with the variety of interests, on the other. In a situation in which rigidness and control become ineffective, and flexibility opens the field for manipulation, the following dilemma emerges: when is it desirable to impose mandatory regulations, and when should implementation of the interests of local decision makers be allowed (Dželebdžić, 2013)?

Contemporary practice imposes new requirements for planning professionals, as well. As Petovar and Vujošević (2008) point out, the development of emancipatory and modern planning requires planners/researchers to expose the process to public scrutiny, protect the public interest and actively practice public participation. However, it might be an uneasy change of heart for technically competent professionals to become active facilitators and mediators of the public voice. In such cases, the dissemination of examples of good practice might help other professionals, researchers and subjects of the research to question their ongoing practice and ethics, and thereby work to produce change (Schram, 2012:19). Moreover, exposing generally positive examples to public and professional scrutiny may challenge the prominent contemporary power (Flyvbjerg *et al.*, 2012).

Requirements of the contemporary planning context

As Huxley and Yiftachel (2000:339) explain, the relation between planning and state policies is something that defines the specific nature of planning practice. In the case of Serbia, both state policies and the societal context can be observed as a changing notion – if taken that the country has experienced both a socialist regime and a market economy, coupled with all the transitional stages in between. Additionally, the contemporary planning context in Serbia is influenced by a variety of external and international factors, especially since the country became a candidate for entering the EU (ESPON, 2018). This section discusses some of the main requirements of the contemporary planning context in relation to participatory planning practice in Serbia.

An analysis of generations of planning laws points out the long lasting existence of an established normative basis that guarantees the right of citizens to participate in urban development processes. It should be noted that there are significant differences between the level/methods of participation that each generation of law declares.[2] Contemporary tendencies in the amendment of the legal planning framework for participation are marked by introducing two-level participation in the Law on Planning and Construction (2014) in order to adjust practice to EU standards, and the adoption of a Law on Planning Systems (2018). This legal novelty sets the framework for implementing public policies by means of a set of participatory methods at the level of informing and consultation. As Čolić *et al.* (2017) point out, the proposed participatory methods are overregulated and do not fully correspond to the local experience in Serbian planning practice, or to the guidelines of the Resolution on public participation of the Council of Europe (2011).

Despite the long tradition of participation in the Serbian planning framework, the low level of citizen engagement in planning processes represents one of the main weaknesses of contemporary participatory practice (Danilović-Hristić

[2] The early socialist era is mostly characterised by the top-down approach to planning, without the real possibility to submit a complaint or affect the outcome of the plan until 1961 (Law on Urban and Regional Spatial Planning, 1961). On the other hand, the era of the 1970s and 1980s was coloured by extensive public engagement which involved specific activities such as the presentation of plans to sub-municipalities, questionnaires, expert discussion, public inquiry, and the possibility to submit a complaint, as well as feedback informing methods (Nedović-Budić *et al.*, 2011). The 1990s saw radical changes in the domain of political, economic, sociological, ideological and cultural norms and standards, as well as the transition from collectivist ideology towards patterns of pluralism (Bazik and Petruševski, 2005).

and Stefanović, 2013). This notion might be rooted in the strong top-down role of the State during socialism, since in the post-socialist circumstances citizens are still traditionally used to perceiving planning as a public sector activity which does not require their involvement (Petovar, 2010). Other contemporary issues in implementing participation are identified as: the insufficient or late provision of information about specific planning initiatives; citizens' lack of knowledge (and hence power) on their rights to participate in the decision-making process; and the lack of transparency of the planning process. The lack of obligation for public presentation of the planning concept during the early public inquiry can be addressed as another procedural weakness (Čolić, 2006). This presentation was an integral part of planning practice until 2003, and served to provide basic information about development goals to the general public – in simple language which they understand. Also, public presentation is useful to describe the possible effects of the plan and clarify the legal planning language and graphics that general public often finds difficult to comprehend.

The weakened role of sub-municipalities (in Serbian: mesne zajednice) represents another issue attached to contemporary practice. The sub-municipality level was formed during the early socialist era and it held considerable executive power (Vujošević and Nedović-Budić, 2006). Traditionally, sub-municipality representatives are seen as key gatekeepers between planning professionals, local politicians and citizens. Moreover, sub-municipalities often have a significant role in informing and mobilising citizens to gather around their common interests, especially in rural areas.

Another significant issue relating to current participatory practice is the lack of legal obligation for providing feedback information to citizens after the participation process is completed (Čolić, 2017). If people are not informed in a timely manner about the fate of their initiative or complaint, then they might not be willing to participate in any future processes. On top of that, there are no effective sanctions for violation of the right to participate within contemporary planning practice in Serbia. Thus, current practice is limited to postponing the submission of the planning document in the adoption procedure until the comments and complaints from the public inquiry are remedied. Finally, the methods for evaluating planning practice are insufficiently substantiated, especially in relation to participation (Dželebdžić, 2002). Taking the former points into consideration, the general lack of motivation for public involvement can be, in addition to other issues, attached to the poor level of informing citizens about the participation process, as well as the lack of provision of feedback.

Some of the contemporary requirements for Serbia, as an EU candidate, refer to the need for increasing the transparency of the decision making process as a precondition to ensuring real opportunities for citizens (Council of Europe, 2011). The recommendations of the Council of Europe relate to the greater use of informal/alternative forms of participation, which can be used within formal participatory procedures as an "incentive for a better urban governance and improvement of the quality of life" (Čolić *et al*., 2013). Informal/alternative forms of participation include a wide range of methods at the level of informing, consultation, active participation and feedback informing, and they provide a level of flexibility in implementation (International Association for Public Participation – hereafter IAPP, 2004). In relation to contemporary challenges in the field of urban planning, the main aim of this paper is to complement the existing base of knowledge on the implementation of alternative participatory practice in Serbia.

ALTERNATIVE PARTICIPATORY PRACTICE IN SERBIA

This chapter will first outline the methodological approach to the analysis of participatory practice in Serbia. It will go on to present examples of good practice in which public participation was implemented through alternative methods within the formal procedures of drafting local urban plans.

Methodological approach

Secondary desk-based data analysis[3] was applied in order to gather evidence on the treatment of participation in Serbian planning legislation and practice. The analysis aimed to identify some of the main strengths and weaknesses of the contemporary participatory planning practice in Serbia. It was performed by examining the (1) legal framework and obligatory procedures for the preparation and adoption of urban plans; and, (2) documents which outline the EU requirements for improving the participatory planning framework in Serbia. Secondly, the analysis aimed to identify cases in which participation was implemented beyond minimal obligations within the formal planning procedures.

The sample for the secondary data analysis of examples of good practice was derived using the purposeful sampling strategy, by means of which a single case (or small number of cases) can be decisive in explaining the phenomenon of interest (Bryman, 2012). Thus, sampling was directed towards identifying the cases in which alternative participatory actions:

- Were incorporated within formal planning procedures at the early stage of plan preparation,
- Aimed to enhance more realistic planning concepts by identifying the needs and interests of different actors, and
- Enhanced the overall transparency of the process and exposed the plan to public scrutiny.

Some of the examples are based on the individual actions of planners, while others are supported by the EU and international programs. Presentation of the findings is organised around three key levels of participation – informing, consultation and active participation, while an additional level of feedback informing is incorporated within these themes (Figure 1). It should be noted that some cases include several different levels and methods of participation.

[3] The analysis was carried out by the authors of this paper for the purpose of drafting the National Sustainable and Integrated Urban Development Strategy of the Republic of Serbia 2030 (2018).

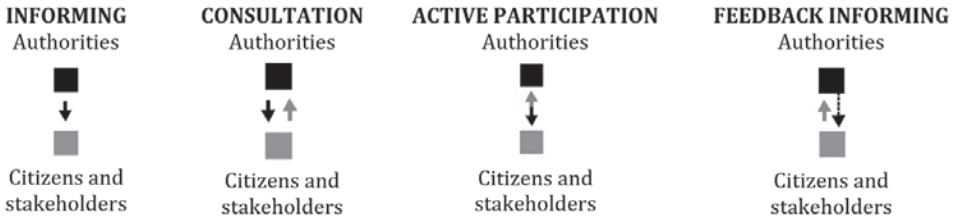

Figure 1. Levels of participation
(Source: IAPP, 2004)

Informing

Besides the traditional methods of informing the public about a participation event via newspapers, other alternative methods are being incorporated within formal planning processes:

- Public presentation at the sub-municipality level in the case of the General Regulation Plan (hereafter PGR) for the area of Kać,
- Local municipality website, info-points in the case of the Detailed Regulation Plan (hereafter PDR) for the area of "Savapark" in Šabac,
- An exhibition in the case of the PDR for the area of "Savapark" in Šabac, and
- Printed promotional material in the following cases: PDR for the area of "Savapark" in Šabac, PDR for the tourist area of "Rajkovo" in Majdanpek, PDR for the "Resava" housing development.

According to the planner in charge of drafting the PGR for the area of Kać, public presentations in the sub-municipality were particularly useful for explaining the possible future effects of the plan. The presentation aimed to clarify the intentions of the planner and help gain citizens' trust in order to maintain longitudinal communication in the later stages of the planning process (Pavlović, 2017). In this case, representatives of the sub-municipality were a resourceful medium for the dissemination of information to or from the local community, as further addressed. Moreover, local municipality websites were used for informing citizens and stakeholders in the process of preparing a number of Detailed Regulation Plans across Serbia (Zindović, 2017; Čolić, 2018). In the cases identified it was expected that adequate advertising of the participation event was the main precondition to ensure the attendance of participants at the presentation of the plan and increase the transparency of the whole process.

Info points, exhibition panels and printed promotional material were additional methods of informing citizens prior to formal participatory processes such as early public insights, including the public insight in the case of the PDR for the area of "Savapark" in Šabac (Figure 2). According to the planner in charge, these alternative methods of informing enabled citizens to perceive the planning concept in a strong visual content, thus producing a receptive translation of formal planning language to the local community (Zindović, 2017). The main purpose of informing in these cases was to notify the general public about future actions. Nevertheless, if complemented with other levels of participation (as in the following examples), informing can be a particularly important means of increasing the transparency of the process and mobilising participants, while insufficient and non-transparent informing can often be one of the main preconditions for manipulation.

Consultation

Besides traditional formal methods of consultation via public inquiry, and since 2014 early public inquiry, consultation with citizens in sub-municipalities is the most common example of acting beyond the minimal legal obligations in Serbia. Other alternative methods of consultation identified in local planning practice are:

Figure 2. Alternative methods of informing in the early stages of the planning process
Left: Exhibition "City goes out to the river, park gets into the city" in an early stage of the planning process for the PDR "Savapark" Šabac, 2016-2017;
Right: Informing youth about the potential effects of the plan through the method of info-points at the Šabac Summer Festival, 2016
(Source: Zindović, 2017)

- discussion groups with stakeholders in the following cases: PGR "Industrial Zone – Sport Airfield" in Kraljevo; PDR for the tourist area of "Rajkovo" in Majdanpek; PDR for "Jugovo" in Kladovo,
- public-private dialogue in the process of drafting thirty six PDRs across Serbia.

Consultation with citizens in sub-municipalities is often used to collect valuable bottom-up data with the aim of re-evaluating the initial planning concept. In some cases in Serbia, questionnaires are disseminated through sub-municipality representatives, who are often gate-keepers that share information between the planner, local politicians, public enterprises and citizens. The planner in charge should take citizen comments into account and incorporate them in the Draft Plan.

Some captivating examples of consultations at the sub-municipality level were applied during the process of drafting the PGR for area of Kać, the PDR for Šumska in Novi Sad, and the PDR for Vojinovo in Sremska Kamenica. After the consultation processes were completed, planning professionals provided feedback information by contacting citizens via telephone. These actions were directed towards increasing trust in planning authorities among the local inhabitants (Pavlović, 2017). According to the planner in charge, citizens were interested to follow up the plan implementation phase and get involved in future processes. On the other hand, this method might not be as successful if there is a low level of communication between the sub-municipality representative and citizens, or, if there are some hidden agendas or interests which disrupt the planning process.

Some other cases have incorporated alternative methods of consultation via discussion groups, which took the form of meetings with stakeholders within the formal procedure of drafting General and Detailed Regulation Plans. In all of these cases, the municipality organised meetings attended by public enterprises, and representatives of the administration and planning commission (see Figure 3). Discussions were held for the purpose of establishing longitudinal collaboration with key stakeholders. The experience from the process of drafting the PGR "Industrial Zone – Sport Airfield" in Kraljevo, the PDR for the tourist area of "Rajkovo" in Majdanpek and the PDR for "Jugovo" in Kladovo, points out that discussion groups contributed to a better mutual understanding, while discussion between the representatives of different institutions aimed to help identify rational and realistic planning solutions (Mueller *et al.*, 2015).

Besides consultations in sub-municipalities and discussion groups, it is useful to mention the method of public-private dialogue. This method is in the form of a meeting between the local authorities, investors and other relevant stakeholders early in the planning process, when the conceptual plan is defined. The implementation of public-private dialogue within the formal procedures of early public inquiry occurred in thirty six cases of drafting PDRs across Serbia.[4] Meetings were conceived as a combination of presentations that facilitated dialogue between representatives from the public and private sectors, followed by an interactive panel discussion.

Some of the benefits of such process were recognised as: enhanced envisioning of investor needs; early recognition of conflicts; harmonization of the requirements of different public enterprises and hence shortening the procedure; establishment of more realistic planning solutions for timely implementation; increasing the level of transparency and trust in the work of the administration; balancing public and private interest; and enhancing public awareness on the importance of dialogue and cooperation (Čolić, 2018). Reports on early public inquiries have been uploaded on local municipality websites. Some of these reports contain detailed answers to individual complaints obtained during the participation process to provide feedback information, as well. What should be noted is that the effectiveness of online informing methods depends on the level of computer literacy among the local community.

[4] Prepared by Čolić, R. (2018) as a monographic study: *Encouraging local sustainable and economic development through preparation of Detailed Regulation Plans.*

Figure 3. Alternative methods of consultation during formal planning procedures;
Discussion between investors and representatives of the public sector in the early stage of drafting the conceptual design solution for the PGR "Industrial Zone – Sport Airfield" in Kraljevo (2012)
(Source: http://www.direkcijakv.net)

Active participation

Active participation is supposed to represent the highest level of democratic decision making in the planning process, whereby citizens and stakeholders are given power to push for their individual/common interest. The analysis identified several examples in which different methods of active participation were incorporated within the formal planning process for the purpose of drafting General and Detailed Regulation Plans:

- Workshops in the case of PGR "Industrial Zone – Sport Airfield" in Kraljevo,
- Visioning in the case of PDR for the area of "Savapark" in Šabac, and
- "Speak out!" in the case of PDR for the tourist area of "Rajkovo" in Majdanpek.

In the case of the PGR "Industrial Zone – Sport Airfield" in Kraljevo, the workshop included representatives of the administration, experts, representatives of public enterprises, and also local businessmen, the Chamber of commerce, Privatization Agency, and more. This method was used to verify the results obtained from the initial analysis early in the planning process, and to re-evaluate of the problems identified and potential of the area, and additional participants' comments were incorporated in the Draft Plan. A workshop was also used for balancing the needs between the private and public sectors, discussing the project management, and, forming a Building Register and Atlas of locations for potential investors. The head of the Directorate for Planning and Construction in Kraljevo saw this process as an alternative and multidisciplinary way of planning which contributed to a more realistic envisioning of the possibilities for the development and financing of specific projects, while ensuring environmental protection and social care for all (Čolić *et al.*, 2013).

The method of visioning was used for the purpose of identifying future development steps for the area of Benska Banja, as part of the PDR for the area of "Savapark" in Šabac. This method was beneficial for connecting different public sector enterprises, and also the non-governmental sector, civil associations and citizens in joint discussions and cooperation in shaping the vision of a desirable future (Zindović, 2017). The added value of the method of visioning is the level of freedom in joint thinking and discussion about the common future, where the whole process can be seen as a game which may provoke innovative ideas.

Another active participation method "Speak out!" was implemented in the process of drafting the PDR for the tourist area "Rajkovo" in Majdanpek. "Speak out!" resembled a public exhibition in which different aspects of future development of the area were presented on thematic posters. Stakeholders and citizens gathered around each poster and spoke about the main problems and development potentials of the area. Local citizens were keen to talk about the vision for Rajkovo and the possibilities of enhancing the local tourist offer based on the natural, historical and archaeological value of the area. Hikers and mountain bikers provided valuable information about the important spatial characteristics of the territory which local planning experts were not familiar with. Facilitators carefully annotated each comment and later used this data for preparing the Draft Plan.

In these cases, active participation aimed to allow citizens and stakeholders to express their knowledge and experience in a creative way. The expectation is that participants would develop a sense of personal responsibility for the implementation of the solutions adopted (Sarkissian and Bunjamin-Mau, 2009). While these cases may confirm the intention towards achieving these aims, daily practice often denies the possibility for attaining an equal level of eloquence and power among the participants in the decision making process.

CONCLUDING REMARKS

Planning legislation is Serbia is recognisable in relation to the treatment of participation, through established instruments, procedures and mechanisms. Within formal practice, the main purpose of participation is to secure the legal right of participants to be involved in the planning process. Still, there is a general understanding that participation is a legal formality, and has not reached its full capacity within the planning context of Serbia.

Figure 4. Alternative methods of active participation in the early stages of the planning process; "Speak Out" event in Majdanpek, PDR for development of the tourist area "Rajkovo" (Source: authors)

On the other hand, the EU integration process and cooperation with international programs suggest that Serbian planning practice is often used as a test ground for various methods of participation in the process of preparing local urban development strategies, action plans, urban designs and feasibility studies and urban and spatial plans (Čolić *et al.*, 2013). Even without external influences, some planning professionals operationalise participation beyond the minimal requirements in the legal framework, through the implementation of alternative methods for public and stakeholder engagement. In such cases, specific methods of participation are shaped in line with the requirements of the local context and plan, and include: extensive advertising of participation, directly informing citizens, performing public presentations in sub-municipalities, organising meetings with stakeholders, instructing citizens on how to fill out complaints, and providing feedback information. Some cases were identified as examples of good practice, to be disseminated between practitioners in order to help other professionals to solve similar problems in local contexts.

In the rapidly changing environment in which many countries are faced with the need to implement various imported concepts for sustainable urban development without the possibility for prior testing, the dissemination of examples of good local practice can be seen as making the implementation of participation potentially more effective. Thus, the main idea of this paper was to demonstrate that there is a significant reservoir of knowledge and expertise in participatory practice *beyond formality* within the local context of Serbia.

Some of the main opportunities for improving practice have been identified as more extensive informing and consulting at the sub-municipality level, and engaging citizens, stakeholders and interest groups in the early stage of the planning process. Digitalisation of the planning process is also seen as an opportunity for improving transparency of the process at various levels, whereby more extensive public participation may be achieved through developing a national infrastructural geo-spatial data base, supported by a platform for e-participation. Furthermore, the provision of feedback information may cause an increase in the level of citizens' trust in institutions, and inspire future activities in the maintenance of common areas/public space, as well as increase engagement in future participatory processes. Finally, examples of good practice should be disseminated via professional platforms, scientific and expert meetings, scientific journals and other sources. Such a professional platform would ideally have a longitudinal form in order to increase the level of institutional transparency and help professionals and researchers to question their ongoing practice and ethics, and thereby work to produce change.

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EVALUATION OF THE PROTECTION AND PRESENTATION OF HISTORIC BUILDINGS IN THE VIMINACIUM ARCHAEOLOGICAL PARK IN RELATION TO THEIR SPATIAL CONTEXT

Emilija Nikolić[1], Institute of Archaeology, Belgrade, Serbia

Viminacium was the capital of the Roman province of Moesia Superior and an important legionary fortress. Today it is an archaeological park with protected and presented historic buildings and contemporary facilities, situated by the thermo power plant and strip coal mine near Kostolac in Serbia, and it is identified as a cultural property of exceptional importance for the Republic of Serbia. The protection and presentation of the historic buildings in Viminacium to date can be divided into groups as follows: basic protection and presentation; integrated protection and presentation through interpretation; and integrated protection and presentation through reconstruction and revitalisation. All the processes can be discussed within the framework of the evergreen topic of heritage conservation - the quest for the proper protection and presentation of buildings, which is often connected with the spatial context.

***Key words*: Viminacium Archaeological Park, protection, presentation, protective structure, spatial context.**

INTRODUCTION

Almost two millennia ago, *Viminacium* was the capital of the Roman province of *Moesia Superior* and an important legionary fortress. It was identified as a cultural property of exceptional importance in 1979, but the process of its institutional protection was only completed in 2009, with the adoption of the *Decision on the Determination of Viminacium Site in the Village of Stari Kostolac as an Archaeological Site*, with clearly defined boundaries and protection of the surrounding area (Decision, 2009). From 2006 it has been an archaeological park with protected and presented historic buildings and contemporary facilities, situated 3 km south of the Danube, in the arable fields near the Kostolac B thermo power plant and Drmno strip coal mine, not far from the town of Kostolac in Serbia (Figure 1). The exploitation of coal in the wider area of the Viminacium site that has lasted for almost 150 years, and the production of electricity in thermal power plants developed over more than seven decades, have resulted in the permanent disappearance of a large number of ancient buildings and their relocation from their original sites to the safe area of the archaeological park (Viminacium, 2018). Another specific of the park is its large area, mostly unexcavated, and individually presented historic buildings scattered over it (Figure 2). The small number of *in situ* remains that have been discovered and protected and the relocated buildings are supplemented by various methods of narrative and physical interpretation. Dejan Radovanović (2015), an archaeologist from the Regional Institute for the Protection of Cultural Monuments of Smederevo writes about Viminacium Archaeological Park, telling us that "with its status, organisation and achievements, this unique centre in our country and the surroundings is moving many standards, but it also opens numerous questions and contrary opinions". The existence of this situation is very important for society and for the development of cultural heritage sites, as a part of a quest to find a solution for their proper protection and presentation.

The first official excavations of *Viminacium* were conducted in 1882 by the National Museum and architect Mihailo Valtrović, when he investigated places where the villagers had dug out graves, and measured the Roman city and fortress. He also recorded ramparts and several buildings (Valtrović, 1884). The research was continued in 1902 and 1903 by archaeologist Miloje Vasić, who examined the buildings and a street in the city core (Vasić 1903). In 1973 and 1974, the Institute of Archaeology conducted

[1] Knez Mihailova 35/IV, 11000 Belgrade, Serbia
e.nikolic@ai.ac.rs

Figure 1. Aerial view of the Viminacium Archaeological Park
(Source: Google Earth Pro 7.3.0.3832 (32-bit) image from July 2017, with protected and presented sites marked by the author of the paper)

Figure 2. Up: A view from the thermal power plant to a part of the Viminacium Archaeological Park (Source: author of the paper, July 2015). Down: A view to the Viminacium Archaeological Park with Domus Scientiarum Viminacium in the foreground (Source: photo-documentation of the Institute of Archaeology Belgrade - Project Viminacium)

excavations[2], when the city wall and certain city buildings were investigated (Zotović, 1973; Kondić and Zotović, 1974). In the period from 1977 to 1991, large-scale protective research was carried out on the territory designated for the construction of Kostolac B thermal power plant, when necropolises with more than 10,000 graves were excavated, including brick and pottery kilns (Zotović, 1986; Zotović and Jordović, 1990; Korać and Golubović, 2009; Korać and Mikić, 2014).[3] After a break during the 1990s, when illegal excavations at the site reached their peak (Blagojević *et al.*, 2002), the research was continued in 1997. In 2001, Miomir Korać became leader of the Institute project. Since then, research by the Institute of Archaeology and the Center for New Technologies Viminacium has taken place without interruption, in the form of modern scientific research (geophysical research, remote detection, photogrammetry), systematic excavations of the city and legionary fortress, and protective excavations in the peripheral areas that are endangered by the expansion of the strip coal mine and the thermal power plant complex. This continuous research has stopped the looting and made it possible to present the ancient buildings and construct modern facilities, thus forming the archaeological park for tourists. In addition to

[2] The research was led by the archaeologists Ljubica Zotović, Vladimir Kondić and Vladislav Popović.

[3] The research was organised by the Republic Institute for the Protection of Cultural Monuments (archaeologists Časlav Jordović and Mirjana Tomić), the Institute of Archaeology (archaeologist Ljubica Zotović), and the National Museum in Požarevac (archaeologists Milan Pindić and Dragana Spasić) (RZZZSK, 1998).

this, a legal boundary between the archaeological site and the progressive mine has been established. Since 2002, the northern gate of the legionary fortress, the city and fortress walls, urban communications, city baths, the amphitheatre, and several necropolises, villas, suburban settlements, aqueducts and other structures relating to the water supply system have been partially or completely excavated.

INTERNATIONAL DOCUMENTS FOR THE PROTECTION AND PRESENTATION OF ARCHAEOLOGICAL SITES

Many international charters, conventions, guidelines and recommendations relating to the research and conservation of cultural and natural heritage, resulting from the work of several international organizations, such as UNESCO, ICOMOS and the Council of Europe, deal with archaeological heritage. Consulting these documents is very important, but it is often very hard to fulfil the principles defined in them. The conservation of a monument is a cultural activity, and all cultural activities are controversial with no pre-defined recipes. There is no intervention that meets all the criteria of "an abstract idea of 'conservation correctness' that is irreproachable both from a theoretical and a technical point of view"; each site has a different story and requires a special approach, and each building can, in many ways, go through conservation processes (Rizzi, 2007). Although only some of the documents are legally binding for the states that signed them, it is a moral obligation for those who work in the area of the protecting and presenting cultural heritage to be acquainted with all of them. Sometimes, it seems that consulting the documents limits the processes. However, their purpose is to enhance the heritage protection, and this is the way in which these documents should be accepted.

Among the UNESCO documents, in addition to the *Convention on the Protection of World Cultural and Natural Heritage* adopted in Paris in 1972 (UNESCO, 1972), which is the basis for the protection of the world's cultural and natural heritage (Rukavina, Obad Ščitaroci and Petrić, 2013), it is important to mention the *Recommendation on International Principles Applicable to Archaeological Excavations* from New Delhi, adopted in 1956. This emphasised the need for public availability of the explored sites, with the establishment of educational institutions or museums in their vicinity (UNESCO, 1956). As for the documents adopted by ICOMOS, the most influential document to date is the *International Charter for the Conservation and Restoration of Monuments and Sites (Venice Charter)* adopted in 1964. According to the Charter, conservation measures include consolidation (which can be carried out with the help of contemporary techniques, if traditional ones are inadequate), restoration (which has to stop where the assumption begins and its goal must be respectful of the contribution of all building periods), and anastilosis (with a clear difference between the historical structure and the new binding materials), while they *a priori* exclude reconstruction. The historic building is related to the located area, so its relocation is allowed only if it is saved by doing so, or if the relocation is justified by national or international importance (ICOMOS, 1965). The *Charter for the Protection and Management of the Archaeological Heritage (Lausanne Charter)* adopted in 1990 emphasises archaeological heritage as a non-renewable resource with the recommendation of its preservation *in situ*, and the importance of using non-destructive methods of research. This means avoiding complete archaeological excavation, leaving undisturbed parts for the future, and limiting excavations to endangered places, or those important for explaining scientific problems or more effective interpretation. Reconstructions must be distinguished from existing structures and wherever possible, they should not be carried out directly on archaeological remains (ICOMOS, 1990). The *Charter for the Interpretation and Presentation of Cultural Heritage Sites,* adopted in 2008 in Quebec, recognised the interpretation and presentation of heritage as part of its protection and management process, and emphasised the need to construct an easily recognizable interpretative infrastructure according to the character of the space, as well as the organization of cultural events in those areas (ICOMOS, 2008). The *Recommendations of the First International Conference of ICOMOS on Archaeological Parks and Sites (Salalah recommendations),* adopted in 2015 in Salalah, Oman, define archaeological parks as a link between scientific research and the general public. The area should be designed to ensure the protection of archaeological remains, with controlled entrances, and sections that are accessible and have been interpreted and explored, and it should be surrounded by an appropriate buffer zone. Anastilosis (with high accuracy), consolidation (to ensure stability and security) and *interpretative stabilisation* (if reversible and does not damage original materials or context) are allowed. All additional elements must be clearly visible compared to the original ones, while reconstruction which is not science-based at the site is forbidden. It is also necessary to build interpretative centers and museums (ICOMOS, 2015). The Council of Europe adopted the *European Convention on the Protection of the Archaeological Heritage* in London, in 1969, as the first European charter dedicated to the protection of this heritage, aimed at preventing the illegal excavation and trafficking of artefacts. The Convention was revised in 1992 and adopted in Valletta, and has since been based on integral protection. It advocates the preservation of sites *in situ* and the formation of protected areas, even if there are no visible remains (COE, 1969; COE, 1992). The *Charter on the Use of Ancient Places of Performance* (*The Verona Charter*) from 1997 was created in order to promote the use of theatres, amphitheatres, circuses, etc. (COE, 1997).

THE PROTECTION AND PRESENTATION OF HISTORIC BUILDINGS IN VIMINACIUM

Following excavation, the remains of historic buildings buried for centuries must be physically protected because they are, in most cases, very sensitive to various environmental impacts. The first way to protect them is to re-cover them with earth. Another way is to leave them uncovered, conserve them and repeat this process on a regular basis with constant monitoring. The third way is to conserve them and cover the site with a protective structure with a less demanding monitoring process. The decision to build the protective structure must be made in accordance with many factors. In this process, location analysis and the perception of the value of the historic structure are very important. The final decision must enable interdependence between the conservation procedures and the protective

structure, and the management and monitoring of the site. In addition to this, the erection of protective structures needs to be a reversible process (Ivanović-Šekularac *et al*., 2017).

In 1988, two tombs excavated during the large-scale research of *Viminacium* necropolises, known as "memorias", were covered with a joint protective structure. It was not until 2003-2004 that the next protective structure was built, when the northern gate of the legionary fortress and the city baths were covered. In 2003 and 2008, the aqueducts and other water supply facilities threatened by the progression of the strip mine were relocated, and since then, they have been waiting for their first public presentation (Mrđić, 2007; Blagojević and Stojković-Pavelka, 2004; Nikolić, 2016). During 2005, part of the necropolis with the Mausoleum was covered, and Viminacium Archaeological Park, with its ancient buildings, service functions and constant supervision, was officially opened in 2006 (Anđelković Grašar *et al.*, 2013; Golubović and Korać, 2013; Mrđić, 2012). Soon after, the Archaeological and Scientific Research Center *Domus Scientiarum Viminacium* was built near the Mausoleum, in the immediate vicinity of the Drmno strip mine (Figure 2 and Figure 3). It was designed as a house with a peristyle, with the interweaving of traditional and modern materials.[4] Although it is considered to be a kind of reconstruction, it can be said that it is actually a type of association with a Roman house. It fits to the image of a flat area with unexplored ancient architecture, and it has already become an inseparable part of the archaeological park as one of its motifs, and thus one of the factors of its integrity (Nikolić, 2014a).

Figure 3. Domus Scientiarum Viminacium (Source: photo-documentation of the Institute of Archaeology Belgrade - Project Viminacium)

Contemporary processes of scientific research and the sustainable development of archaeological sites require their inclusion in contemporary life. One of the methods for their inclusion is the erection of new buildings for education and public use on archaeological sites. One such building is *Domus Scientiarum Viminacium*, which hosts scientific conferences, workshops and summer schools, and also many other events. In 2011, an international summit of the state presidents of south-eastern Europe under the auspices of UNESCO took place here. Its exhibition space hosted a national archaeological exhibition in 2013, celebrating 1,700 years of the Edict of Milan (Nikolić, 2014a; Ilić and Nikolić, 2015). Today the collection of *Viminacium* wall paintings and sarcophagi is exhibited here, as well as contemporary works of art – a model of *Viminacium* and the bronze heads of Roman emperors, supplemented with virtual archaeology. Another method is the activation and revitalisation of historic buildings, which was achieved in the Mausoleum in 2008, when a concert by French soprano Emma Shapplin was organised in its space, as well as in 2013, when the partially reconstructed Roman amphitheatre hosted the opera "Aida" (Ilić and Nikolić, 2015).

The planning and regulatory solutions for the Viminacium site, with rules for the design, construction and use of the space, are determined by the *Spatial Plan of the Special Purpose Area of the Viminacium Archaeological Site*, adopted in 2015. The area of the Plan is divided into three entities: public use and the entrance (parking zone with entrances and communications zone), purpose built constructions (scientific and research zone, and scientific and touristic presentation zone), and the archaeological sites (archaeological research zone and conservation, restoration, reconstruction, revitalisation and presentation zone, with contemporary constructions to aid the function of the archaeological site) (Spatial Plan, 2015; Nikolić, 2017). The protected ancient buildings that will be presented in this paper are: the northern gate of the legionary fortress, city baths and the amphitheatre (in the conservation, restoration, reconstruction, revitalisation and presentation zone, with contemporary constructions to aid the function of the archaeological site), the Mausoleum (in the scientific and research zone), the craftsmen's centre (in the scientific and touristic presentation zone) and the memorial buildings with triconchal memorial building B (situated outside the area defined by the Spatial Plan). These historic buildings are protected and presented in a variety of ways, which can be divided into groups as follows: basic protection and presentation; integrated protection and presentation through interpretation; and integrated protection and presentation through reconstruction and revitalisation. Although accepted as a kind of exhibition space and connected to paleontological remains, the Mammoth Park (in the scientific and touristic presentation zone) will be described in brief here, as an integral part of the Viminacium Archaeological Park.[5]

[4] The authors of the architectural project for *Domvs Scientiarvm Viminacivm* are architects Emilija Nikolić, Brana Stojković-Pavelka and Božana Lukić, and archaeologist Miomir Korać, while the construction project was developed by civil engineer Zoran Cekić.

[5] The *Spatial Plan of the Special Purpose Area of the Viminacium Archaeological Site* was developed by the team of JUGINUS, Belgrade, led by the architect Marin Krešić and spatial planner Dubravka Pavlović. The authors of the protective structures over the northern gate of the legionary fortress, city baths and Mausoleum in Viminacium are members of the team gathered around the architect and professor from the Faculty of Architecture, University of Belgrade, in retirement – Dr. Vojislav Kujundžić. The project for the protective structure over the memorial buildings was completed by architect Dragoljub Todorović and civil engineer Jaša Preger. The architect Slobodan Barišić was in charge

Basic protection and presentation of historic buildings

The basic protection of historic buildings in Viminacium includes the partial restoration and physical protection of the buildings with protective structures. The buildings protected in this way are the northern gate of the legionary fortress and the city baths. The protective structures were made using constructions that enable the wood to bridge spans exceeding the limitations of its natural growth. These structures are the first of this kind formed in Serbia, while the use of a PVC membrane as a cover is one of the first uses of this material in our country. To date, protective structures over archaeological sites of this type in Serbia, in addition to Viminacium, have been made at Mediana, and Drenovac near Paraćin (Vasić-Petrović and Momčilović-Petronijević, 2015).

The temporary protective structure over the *in situ* remains of the northern gate of the legionary fortress (Figure 4 - left) was completed in 2003. Here, the LKV system (lightweight roof trusses) made it possible for short beams made of solid wood with steel plate connectors to form constructions that could bridge the required spans. However, the large number of short beams and trusses placed at a relatively small distances from each other play a dominant role in the space, and the relatively low height of the overall construction makes the remains of an ancient monumental building like the entrance gate look like a pile of building material, without offering the possibility of imagining the entity that they were once part of. The remains can be viewed from only one position at the entrance to the space and, apart from the narrative provided by the guide, there is no other interpretation, which would be very difficult to achieve anyway. The structure made above the *in situ* partially restored remains of the city baths (Figure 4 - right) was completed in 2004. The temporary protective structure consisting of nine carriers is made of glued laminated timber. Here, the principle of the minimum number of necessary elements for the stiffening of the structure was used, which allows a much taller construction, almost cancelling its presence in the space in relation to the ancient remains, thus allowing them to dominate. However, the protective structure does not lose its own monumentality. Further, apart from the guide's narrative and the partly presented floor heating of the baths within its remains, there are no other types of interpretation in the space, and the ancient building is viewed by means of a tour around it.

In archaeological sites, protective structures that have lightness and flexibility, and which use a minimum amount of material are mainly preferred. Such structures are often completely prefabricated, i.e. mounted at the site itself, and the disassembly is, in most cases, simple (Hebbelinck *et al.*, 2001). The intended purpose of such structures can be permanent, or sometimes temporary in situations where they serve as an interim solution until another construction is achieved that was, at that particular moment, unavailable (Mollaert *et al.*, 2011). The protective structures over the northern gate of the legionary fortress and the city baths were intended to be temporary. However, as long as they still stand there, they affect the overall impression of the Viminacium Archaeological Park. They fulfil the basic function of physically protecting the ancient remains and provide a basic level of presentation, but they negatively affect the preservation of the authenticity of the context because they emphasise themselves and act independently in an area which belongs to the city and legionary fortress of *Viminacium*. This method of protection is unsustainable in the future, when more buildings are excavated that will also require some form of physical protection. *Viminacium* was a city with all the functions typical of a Roman city - paved streets, temples, theatres, baths and residential buildings. An important question exists here, that of how to incorporate buildings that used to form the live urban fabric of an ancient city, but that are in ruins today, into one unified site presentation (Nikolić, 2015). There is a similar dilemma in Herculaneum and Pompeii. Since excavations

of the conservation of triconchal memorial building B. The project of the protective structure over the craftsmen centre was completed by the civil engineer Krstan Laketić. The authors of the projects for the reconstruction of the amphitheatre are architect Emilija Nikolić and civil engineer Krstan Laketić, while the projects for the consolidation of its ancient remains were completed by the civil engineer Zoran Cekić. The authors of the projects for the Mammoth Park are architect Emilija Nikolić, archaeologist Miomir Korać and civil engineer Krstan Laketić.

Figure 4. Northern gate of the Viminacium legionary fortress (left) and Viminacium city baths (right) (Source: photo-documentation of the Institute of Archaeology Belgrade - Project Viminacium)

Figure 5. Viminacium memorial buildings (left) and Viminacium craftsmen centre (right)
(Source: up left: Todorović, 1991; other photos: photo-documentation of the Institute of Archaeology Belgrade, Project Viminacium)

of the centuries-buried ancient cities began in the 18th century, the buildings and decorations have decayed due to atmospheric influences and a large number of visitors. This begs the question of whether the stucco decoration and wall paintings should be moved to the museum, with non-decorated walls left behind, thereby losing the special value of the place and renouncing what lava naturally conserved, or whether it is better to cover the whole space with a protective structure, convert it to a museum, and thus lose its extraordinary urban value (Rizzi, 2007). Both approaches put the authenticity and integrity of the sites into question.

Many tombs were discovered during the extensive archaeological research of *Viminacium* southern necropolises that was conducted during the 1870s and 1980s, before the construction of Kostolac B thermal power plant. In the tombs of G-4815 and G-4816, called "memorial buildings" or "memorias", during 1986 and 1987, partial restoration works were carried out, and in 1988 the tombs were covered with a protective structure (Figure 5 - left). The structure is made of concrete and wood and the roof is covered with metal sheets (RZZZSK, 1998; Todorović, 1991). The space below the protective structure is illuminated through the roof, receiving mild daylight. The tombs are not able to be interpreted in any way. Access to the structure is problematic because it is isolated from the rest of the Viminacium Archaeological Park. It is a part of the thermal power plant complex, and it is difficult to include a visit to it. The protective structure provides the basic protection and presentation for the site, but its construction and appearance, which resembles that of a building, makes it different from the protective structures seen in the previous two examples. It physically protects the remains and provides a basic level of presentation, but also acts as an independent building in the space. However, after the physical destruction of its original context, that of a Roman necropolis, which occurred as a result of the construction of the thermal power plant, the protected tombs can no longer belong to it, nor can the presentation of the context be accomplished. In that respect, the protection of the ancient remains here is appropriate. Since they are still *in situ*, they are in their original relationship to the Roman city and, with their preservation, the relationship between the destroyed southern necropolis and the city is maintained. During the previously mentioned extensive archaeological research in the area of the thermal power plant, the so-called "triconchal memorial building B" was also preserved and partially restored in 1985 (RZZZSK, 1998). This building is not covered by a protective structure and is unavailable to visitors, since it is an individual building without any chance of presentation as long as the industrial facilities are active.

After relocating from the thermal power plant zone to the archaeological park in 2015, the complex of three Roman brick kilns, called the "craftsmen's centre" was temporarily covered by a protective structure of an eaves type (Figure 5 - right). The construction is made of glued laminated timber and covered with ceramic tiles. Access to the space below the construction is from its longitudinal side, and the space is viewed via a tour around the kilns. Any interpretation of the space other than by the narrative does not currently exist. However, the kilns are covered with the eaves as a temporary solution, with the aim to include the craftsmen's centre in the Limes Park of Viminacium – a replica of a typical Roman city street with surrounding houses, planned to be built in this zone in the future. In this way, the kilns will become a part of a newly refurbished ambient unit that will depict ancient life and, thus, receive a more fitting interpretation. The protective structure today physically protects the ancient remains and provides a basic level of presentation, but acts as an independent structure in the space. The kilns are separated from their original context, which was destroyed by the construction of an industrial facility which forced their relocation. The role of this protective structure is only to physically protect the historical remains of the kilns, since today there is no context to which they should be connected. In this way, the design of the structure, which is dominant in the space today, is justified. With it, a part of the archaeological park that was empty until the kilns were relocated, was given a new character – the introduction of a human building intervention. When the space develops into the intentionally created context of Limes Park, this protective structure will no longer be an adequate physical element in it and its domination will not be justified. Then, a new protective structure for the kilns will be needed, whose design will be conditioned by the new context.

Integrated protection and presentation of historic buildings through interpretation

The only site at Viminacium Archaeological Park in which integrated protection and presentation was carried out using interpretation is the Mausoleum (Figure 6). This is an *in situ* presented part of the eastern *Viminacium* necropolis, with a restored and partially reconstructed central grave that belonged to a high-ranking individual in the Roman hierarchy (Golubović and Korać, 2013). It is the starting point for visitors and the first site that is presented to them in the archaeological park. The protective structure over the remains of the central grave and part of the necropolis was constructed in the period from 2004 to 2005. The structure, covered with a PVC membrane, is made of glued laminated timber in the shape of a truncated square based pyramid.

Figure 6. Viminacium Mausoleum
(Source: photo-documentation of the Institute of Archaeology Belgrade - Project Viminacium)

The remains below the protective structure are presented in three forms. The first is an overview of the site from a contemporary level, the second is an entry to the space where a closer look at the graves is obtained, and the third provides visitors with the story of the "underworld", leading them through newly built, semi dark underground corridors with painted antique graves, giving them the ability to observe *in situ* art from the imaginary level of the deceased, with an additional narrative interpretation provided by the guide (Nikolić and Roter-Blagojević, 2017). In this part of the archaeological park, an interpretive approach to funerary wall painting was applied (Anđelković Grašar *et al*., 2013; Golubović and Korać, 2013). Salvador Munoz Vinas (2005), a contemporary theorist of conservation, instead of insisting on the truth as a result of an uncompromising pursuit of authenticity, supports "legibility" as "the ability of an object to be correctly comprehended or 'read' by the observer". The presentation of the Mausoleum in Viminacium provokes the existence of the authenticity of the place, with a new structure embedded within the ancient building, but on the other hand, it provides a deeper understanding of it. According to a survey carried out in 2012, among the Mausoleum visitors coming from English speaking areas, 74% based their impressions on the explanations provided by guides, reconstructions and costumed people, while only 26% based their impressions on the archaeological remains (Anđelković Grašar and Tapavički-Ilić, 2013).

We can say that the protective structure over the Mausoleum fulfils the basic function of physically protecting the ancient remains, and provides a basic level of presentation, as well as an extended level of presentation, which includes interpretation due to the new physical structures embedded in the ancient space. Although it was planned to be a temporary structure, its position, which represents a natural elevation in the area, has given it additional domination over a large part of the Viminacium site. However, the Mausoleum was situated outside the *Viminacium* city fabric, and, thus, the protective structure does not endanger it. Moreover, viewed from its inner space, the pyramidal shape of the structure accentuates the ancient remains, especially the central grave (Golubović and Korać, 2013). For these reasons, this protective structure has greater value, and its temporary character can be changed to become permanent in the future. Today, it is the most recognisable physical symbol of the Viminacium Archaeological Park.

In Serbia, examples of protective structures that have brought integrated protection and presentation through interpretation to archaeological sites can be found in Sirmium, above the Imperial Palace (Škorić, 2014) and in Lepenski Vir, above the relocated prehistoric settlement (Jovin and Temerinski, 2003). According to the concept of construction and the use of materials, they are close to the structure over the memorial buildings in Viminacium. However, although the intention for both structures was to cover sites, they have also brought new museum and service facilities, which is not the case either for the structure over the memorial buildings, or the one over the Mausoleum. Thus, from initially being simply protective structures, they have become presentation buildings that also have an integrated protective function.

The presentation within the Mammoth Park was developed with the assistance of a protective construction and in the form of interpretation. The construction itself, raised above the relocated mammoth skeletons, has become a kind of exhibition building, surrounded by the outdoor park arrangement. Therefore, it can also be called integrated protection and presentation through the formation of an exhibition space (Figure 7). The construction was erected in 2014 above the relocated mammoth skeletons found in the mine in 2009 and 2012. It is located within the border of the protected area of Viminacium, which is the final edge of the development of the strip mine. The intensive passable green roof with natural light, above the construction of

glued laminated timber, follows the slope of the surrounding terrain and thus forms an underground exhibition space. The creation of space below the level of the present-day soil is an association with the time context in which the mammoths lived, which is very distant from the present. The entrance to the space is accessed by an earth road that relates to the passage through the natural canyon. The central skeleton, preserved in its entirety, is oriented as it was in the mine. The attempt to partially restore the authenticity of the context in which the animals once lived has been partially achieved using traditional natural materials in the space and layers of sand brought from the spot where they were found. The Mammoth Park has become an attractive ambience, but it has not become an independent museum building. Since it is directly related to the site where the exhibited skeletons were found, it is an integral part of the archaeological park, and it does not dominate over the ancient remains (Nikolić, 2017).

Figure 7. Mammoth Park
(Source: photo-documentation of the Institute of Archaeology Belgrade - Project Viminacium)

Integrated protection and presentation of historic buildings through reconstruction and revitalisation

Viminacium's amphitheatre went through another form of protection, by way of a partial reconstruction (Figure 8). This is the only Roman amphitheatre that is currently being explored in the territory of today's Serbia. During 2013, extensive conservation works were carried out on the building, which led to its successful revitalisation, and today a quarter of the auditorium can again receive spectators (Nikolić, 2014b).

During the protection of historic buildings, problems with their construction occur in two basic forms. One form occurs in those buildings whose assembly, as merely a constructive feature, is seriously disrupted. Then, a construction of contemporary materials is made that relieves the original constructive elements. The other form occurs when an assembly, as an inner feature of the building that influences the function and layout of the building space in history, is disrupted. The solution to the first form of the problem appears as a technical measure which ensures the safety and durability of a building, assuming that we take care not to compromise the monumental properties of the building. However, the solution to the second problem form is much more complex, because then the constructive assembly represents a feature of the building as a monument (Đorđević, 1978). Both cases have occurred with the Viminacium amphitheatre, where it was necessary to strengthen the basic stone walls using contemporary materials, but also where the main characteristic of its ancient structure – the wooden construction – was interpreted as an important part of the reconstruction.

Figure 8. Viminacium amphitheatre
(Source: photo-documentation of the Institute of Archaeology Belgrade - Project Viminacium)

The walls of the ancient amphitheatre were made of wood and stone, depending on its historical phase, while the auditorium was always wooden (Nikolić and Bogdanović, 2015). The conservation works were based on information obtained by excavations, geometry and comparisons to other Roman amphitheatres, but also on interpretation. In the reconstructed wooden structure, traditional timber joints were replaced by modern ones, and because of the exposure to atmospheric influences, larch laminated timber was used instead of solid oak timber. One part of the arched arena wall was preserved and restored in its original stone material and was not covered by a protective structure, while a quarter of the auditorium, the other part of the arched arena wall, an entrance to the building, and a part of the city rampart were restored and reconstructed using glued laminated timber. Reconstruction of the building parts

made of stone using glued laminated timber provides a clear separation of the old parts from the new ones, while at the same time their easy installation and disassembly enables reversibility and shows the transparency of the entire intervention (Nikolić, 2014b). Similar interventions in the wood were carried out during the protection of the Roman amphitheatre in the French village named Grand (Bertaux *et al*., 2000), and also during the coverage of the part of the Villa of Trajan in the territory of the ancient Afilae (today Arcinazzo Romano, province of Rome) and "Basilica" in the Villa Romana del Casale (today Piazza Armerina, Sicily) (Germanà, 2013) (Figure 9).

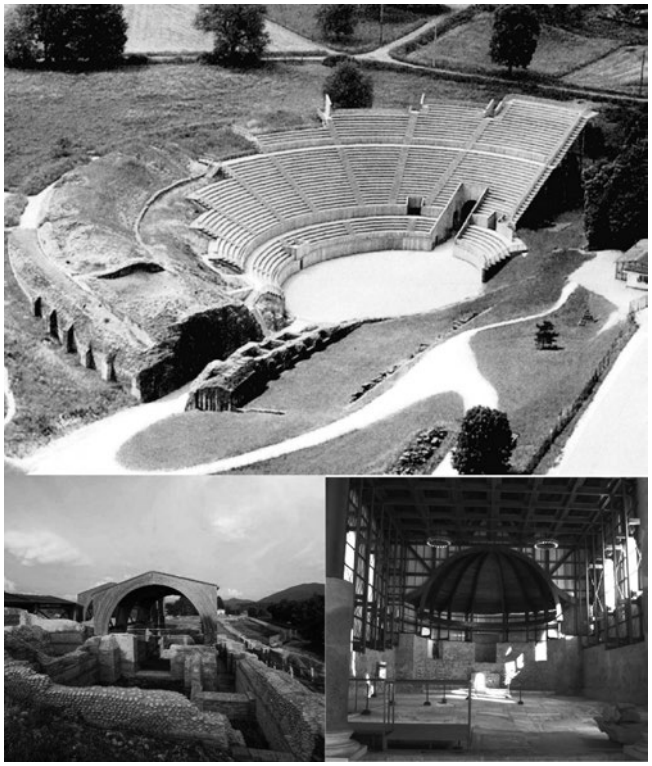

Figure 9. Interventions in wood executed during the protection of Roman buildings. Up: Roman amphitheatre in the French village named Grand (Source: Bertaux et al. 2000)
Down left: Villa of Trajan in the territory of the ancient Afilae, Italy (Source: Cinti, Castro 2011)
Down right: "Basilica" in the Villa Romana del Casale, Sicily (Source: Vivio 2015)

Every reconstruction process can always be discussed in terms of it being a "slippery path", because we can choose between the roads of "excessive reconstruction" and "insufficient protection" (Rizzi, 2007). The preservation of the authenticity of the Viminacium amphitheatre through various interventions can be discussed in terms of an evaluation of the mix of the traditional and contemporary materials and construction methods applied. The reconstruction of the Roman amphitheatre *in situ* has revitalised a part of the ancient city and has positively responded to the preservation of the authenticity of the context. Moreover, the reconstruction has become the protective structure over the ancient building and added a physical interpretation to it, without jeopardising the historical remains.

CONCLUSIONS

Covering part of a historic building or a ruin protects it from atmospheric influences, and it can also contribute to an increase in its value and, thus, encourage future conservation (Hebbelinck *et al*., 2001). The protective structure is a new addition which should be distinguished from the original remains, but also enhance "the architectural continuity of a historic place" (Aslan 2007). It must not dominate, whether it is classified as temporary or permanent (Šekularac and Šekularac, 2006).

It is of the utmost importance to determine the priorities during the design of any building intervention at a historic site. In this context, the architecture of protective structures must bear the subordinate role of a structure that emphasises something else, and not itself. Otherwise, it does not fulfil the protection function, because when we protect something, we do so by protecting its physical characteristics, but also its significance and influence. How should architects deal with the architecture of protective structures, when they know that it cannot dominate and emphasise itself, even if it is of a temporary character? The reconstructed amphitheatre, as a kind of the protective structure, can be an example in which the attempts to fulfil the previously mentioned recommendations for the order of priorities are visible. The partial restoration and reconstruction of the amphitheatre set up the building to the level between associative reconstruction and partial interpretation, with the goal of necessary protection and appropriate revitalisation.

The last two generations of students from the master academic studies, in the module "Structural Engineering", at the Faculty of Architecture, University of Belgrade, had the archaeological site of Viminacium as a given design location. The students of professor Nenad Šekularac offered a whole range of solutions for protective constructions over the ancient buildings. In 2015/2016, they worked on designs for the protective structures over the city baths and a brick kiln, while in 2016/2017 they designed the structures over the city baths and aqueducts. The structures were made of wood and steel and the most successful ones were those integrated into the surroundings with their shapes. An important contribution of these works is the emphasis on the design of protective structures which needs to be a part of the architecture as well as part of the construction, which is often not the case in practice. They should be, as described by one of the students when talking about her solution, "an inspiration and a challenge".[7]

In 2015, Viminacium was placed on the UNESCO Tentative List, under the title "Frontiers of the Roman Empire WHS – FRE", as a part of an international monument consisting of other Roman cities, towns, camps and fortresses along the former Roman limes (Korać *et al.*, 2014; UNESCO, 2015). The presentation of the remains still under the earth, but whose traces can be recognised using different detection techniques and instruments is well known in the world. One of the forts of the former Upper German – Raetian Limes in

[7] The student's name is Milica Petrović, and her design of the protective structure over the Viminacium city baths was chosen by the jury for the The Timişoara architecture biennial (BETA 2016) in the category of graduation projects (Betacity, 2016).

the area of Ruffenhofen, Germany, a part of the "Frontiers of the Roman Empire" already inscribed on the World Heritage List (UNESCO, 2005), is presented by planting different sorts of low non-destructive vegetation which form and outline the interior areas and buildings of the former fort and accentuate its walls and ditches, enabling visitors to visualise their dimensions, especially looking from a nearby hill (Deutsche Limeskommission, 2010) (Figure 10). Should we present the ancient city of *Viminacium* by excavations and different ways of protection using protective structures, integrate the excavated ruins into the environment leaving them uncovered, or leave most of the city unexcavated, but marked for future generations? Each of these decisions can be justified by international documents in the area of cultural heritage, and can bring successful results in the area of protection and presentation.

Figure 10. Roman fort in the area of Ruffenhofen, Germany (Source: Römerpark Ruffenhofen 2018)

With the relocations mentioned here and industrial development, different forms of authenticity of the craftsmen's centre, the aqueduct, memorial buildings and triconchal memorial building in Viminacium were diminished. At the same time the authenticity of the historical unity of the Roman city and its surroundings was decreased. For example, the spatial relationship between the *in situ* city baths and the relocated aqueduct is one of those that was disturbed, which also happened with the relationship between the craftsmen's centre and the memorial buildings in the necropolis. Thus, one of the upcoming challenges in the conservation processes in Viminacium will be the permanent protection of the aqueducts and craftsmen's centre and the formation of their new spatial context - Limes Park. Furthermore, the way to permanently protect the previously mentioned *in situ* buildings of Viminacium in the future, which are today covered with temporary structures, and also those that will be excavated in the future, will be one of the most important decisions that managers of the site and designers will face. Probably, the only undisputed principle that should be followed in the future presentation of Viminacium is *emphasizing the whole over its parts*, no matter what interventions we decide to use. It can give important and very much needed spatial value to Viminacium Archaeological Park, where excavations will last for decades.

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REGULATING MARKET-LED URBAN EXPANSION IN THE NEW MASTER PLANS OF SOFIA AND BELGRADE

***Aleksandar D. Slaev*[1]**, Varna Free University, Faculty of Architecture, Varna, Bulgaria
Slavka Zeković, Institute of Architecture and Urban & Spatial Planning of Serbia, Belgrade, Serbia
Atanas Kovachev, Varna Free University, Faculty of Architecture, Varna, Bulgaria; University of Forestry, Sofia, Bulgaria
Tamara Maričić, Institute of Architecture and Urban & Spatial Planning of Serbia, Belgrade, Serbia
Tanja Bajić, Institute of Architecture and Urban & Spatial Planning of Serbia, Belgrade, Serbia

Like most European cities, cities in South-east Europe (SEE) have been growing throughout the 20th century, however, since the end of the 1980s, the mechanisms of urban growth and expansion have changed radically: from development fully determined by central planning to market-led urban development. This paper examines how planning in large SEE cities is coping with the challenge to balance the action of the market and achieve planning goals relating to the form of urban growth and expansion. As case studies we analyse the master plans of Sofia and Belgrade and their implementation. We have two research questions: first, whether planning in the two cities has considered the role of the market when defining its objectives, measures and solutions regarding the forms of urban growth and the development of in suburban areas, and, second, whether planning has been able to influence the market or cooperate with it in order to achieve its objectives in suburban development.

***Key words*: Post-socialist development, suburbanisation, urban growth, market-led urban development, market-planning relationship.**

INTRODUCTION

Urban growth, expansion and suburbanisation have been powerful development trends in Europe throughout the 20th century, particularly since WWII. Such trends have also been observed in South-east Europe (SEE), however, because most SEE countries were communist until the end of the 1980s, the mechanisms of urban growth and expansion have changed substantially in the transition period (Nedović-Budić *et al*., 2012, Zeković *et al*., 2015; Kovachev *et al*., 2016). As researchers have found (Nedović-Budić and Tsenkova, 2006; Hirt, 2007; Zeković and Maričić, 2008; Maričić and Petrić, 2008; Vujošević *et al*., 2012; Daskalova and Slaev, 2015), the new trends are in many aspects similar to suburbanisation in western countries. Western type suburbanisation is usually associated with urban sprawl, which is, generally, considered a negative trend. Researchers regard sprawl as a form of expansion generated by the market, but also determined by planning factors (e.g., Gong and Wheeler, 2002). While the market is, in principle, the leading force in suburbanisation, successful planning can steer urban development towards sustainable forms of growth (EEA, 2006; Nedović-Budić *et al*., 2016). For this purpose, planning should study the market processes, analyse their drivers and find mechanisms and tools to cooperate with the market, and then regulate and mitigate it. Unfortunately, as authors have pointed out (Bertaud, 2003; Holcombe, 2013; Anderson *et al*., 2012; Slaev, 2016a, 2017, among others), planners often ignore the role of the market in urban development. In this respect, planners in post-communist SEE countries face even bigger problems because of the lack of experience with planning in a market environment.

The objective of this study is to examine how planning in SEE cities is coping with the challenge to balance the action of the market and achieve planning goals in a market environment. As case studies we analyse the master plans of Sofia and Belgrade and their implementation, since these plans have been adopted with a particular focus on suburban development. Sofia and Belgrade are suitable case studies for this research, because as typical SEE capital cities they have experienced high rates of growth throughout the 20th century (Kovachev *et al*., 2017) and accelerated market-led development in the period of transition. In

[1] Chaika Resort, 9007 Varna, Bulgaria
slaev@vfu.bg

2011, the population of Sofia was 1,291,591 (NSI, 2012) and that of Belgrade was 1,659,440 (SORS, 2014). Both cities prepared new master plans at the beginning of the 2000s: the plan of Belgrade was adopted in 2003 (changed in 2006, 2014) and amended in 2016 and that of Sofia in 2007 (changed in 2009). In 2000, the urbanised area (UA) of the compact city of Belgrade was 18,880.56 ha and that of the suburban settlements in the city region was 18,198.91 ha; in comparison, the UA of the compact city of Sofia was 16,408.06 ha and the city's suburban UA was 7,806.31 (Krunić *et al*., 2014; Slaev *et al*., 2018). The two capital cities had already faced substantial problems relating to the processes of market-led suburbanisation, and the form of urban expansion was a topical issue that the master plans had to deal with.

Therefore, our research questions are:

1. Has planning in Sofia and Belgrade considered the role of the market when defining its objectives, measures and solutions regarding the forms of urban growth and the development of its suburban areas?
2. Has planning been able to influence the market or cooperate with it in order to achieve its objectives in suburban development?

To answer the first question we examine what objectives are identified in the master plans regarding suburban areas and how planning aims to achieve them and, also in this regard, whether planning analyses the role of the market and the actions of the market forces. To answer the second research question we evaluate whether planning has been able to influence the market or cooperate with it on the way to achieving its objectives. We do that by examining the course of the implementation of the plans using statistical information and data about processes in suburban areas since the adoption of the two master plans.

THEORETICAL FRAMEWORK OF THE STUDY

Two theoretical issues are important to this study. The first issue is related to the factors determining the performance of planning – its ability to effectively direct urban development to the desired form of urban growth. Planning performance is assessed through performance-based and conformance-based criteria (Faludi, 1989). The former criterion evaluates a plan's outcomes and impacts, whereas the latter measures the conformance between the plan's goals and the actual outputs. Relevant to our study is the latter criterion. Slaev and Nedović-Budić (2017) argue that a plan's performance depends on the phase of the planning cycle. According to Taylor (1998), a cycle of planning (developing and implementing a plan) comprises five phases: 1) situation analysis, 2) target definition, 3) development of a tree system of objectives, sub-objectives and priorities, 4) application, and 5) monitoring and feedback. According to Slaev and Nedović-Budić, the performance of planning at the later stages is generally poorer than its performance at the earlier stages. This is because each subsequent phase in the planning cycle sets new requirements, but in each subsequent phase the number of errors grows as new errors multiply those of the previous phase. Therefore, plans are generally weaker in their later phases, but most urban planners do not account for this fact.

The second theoretical issue, which is important to this study, is whether planning is able to balance and "co-operate" with the market. Holcombe (2013) maintains that to properly cooperate with the market, local governments should not interfere much with the affairs of market participants, but should focus on planning their own activities – primarily, the development of the infrastructure (see also Slaev and Kovachev, 2014; Slaev, 2016b). Bertaud (2003) defined three main components of planning that define its relationship with the market: 1) the development of primary infrastructure, 2) zoning and planning regulations, and 3) local fiscal tools, e.g., taxes and fees. In this paper, when discussing issues of the performance and efficiency of planning, we focus on the elaboration and use of zoning regulations and the transport network patterns.

Under the influence of different contextual factors, like global economic discourse and political pressure, the existing rights have been replaced by the rules of new urban order. The urban order has a legal basis that arises from dynamism and contextual demands, and urban society phenomena. Banzhaf *et al*. (2017) state that land use is always under pressure due to the impact of different factors, and that urban planning has limited impact on land consumption. Urban development is under the strong impact of international companies, global financing and international institutions through city branding. The urban land market is imperfect and subject to government interventions (Begović, 1995; Knaap, 1998), while land use is determined by the market mechanism of supply and demand (Harvey and Jowsey, 2004).

REGULATING MARKET-LED SUBURBANISATION PROCESSES IN THE MASTER PLAN OF SOFIA

Preparation of the new General Urban Development Plan (GUDP) of Sofia started in 1998 and was completed in 2003. For two major reasons, the initial phases of the plan were developed along with preliminary socio-economic studies. One reason was the slowdown in socio-economic planning in Sofia in the 1990s, and the other reason was the urgent need to develop a new master plan, since the previous plan had been adopted 37 years previously. Thus, the Regional Development Plan of the Sofia Region 2000-2006 and the Development Strategy of Sofia, were prepared with the technical assistance of World Bank "Cities Alliance" experts in parallel with the first stage of the new master plan, i.e., the Forecasts for Socio-economic and Spatial Development in the period 1998-2001.

Accounting for the action of the market

Studying the market processes and market forces was an important goal for the GUDP. Indeed, the plan analysed the impact of market forces in the development of the city's economy, the land and property market, the investment trends, etc. An important observation regarding the balance between the development of central and suburban areas was that market trends maintained very high rates of development within the core city and in the southern suburban areas, whereas the rates in the northern territories were low (Metropolitan Municipality, 2003: 2).

Objectives of the new GUDP concerning the development of Sofia's suburban areas

The GUDP (Figure 1) defined its main objectives concerning Sofia's suburban areas based on two key factors. The first factor was the forecast for the growth of the city's population. The plan envisaged that the population would grow by 140,000, and that therefore, there would be a great need for new housing units (Metropolitan Municipality, 2003: 136), but the forecast was that only 25 percent of the new housing construction would be outside the compact city. The second factor was the perceived optimal balance between the development of the compact city and the suburban areas. One of the main objectives of the GUDP was to reallocate "urban functions to achieve a better balance of all urban activities" and remove "the overload" from the compact city". Initially, the GUDP did not aim to limit the high urbanisation trends in the southern territories, but emphasised the threat they presented to the large green areas (so-called green edges). However, the policy of containment of the development of the southern areas became dominant in the Amendment to the GUDP of 2009 (SOFPROEKT, 2009). Both the initial plan and the Amendment emphasised that the northern suburban areas were the main reserve for future development (Metropolitan Municipality, 2003: 136; SOFPROEKT, 2009: 36).

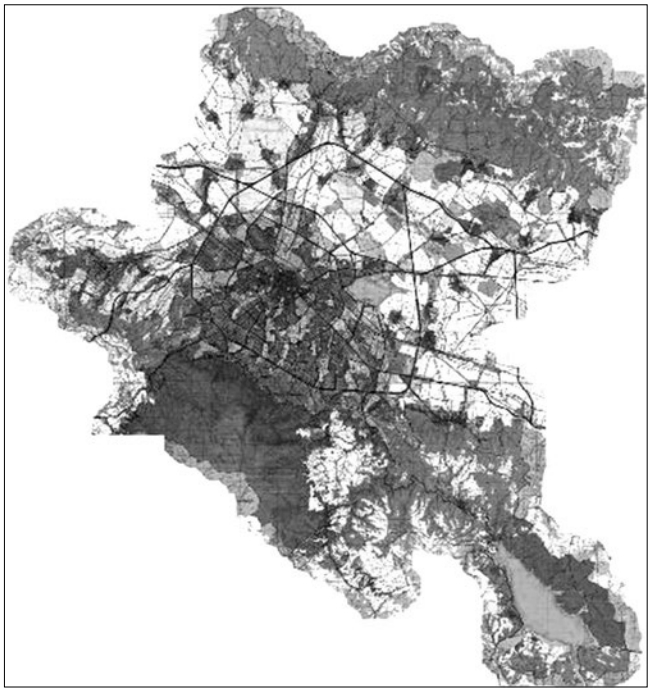

Figure 1. GUDP of Metropolitan Municipality, adopted 2007 (Source: Metropolitan Municipality of Sofia, 2003)

Measures in the new GUDP of Sofia concerning the development of the suburbs

One focus of our study of the relationship between planning and the market in this paper is the use of zoning regulations and another focus is the relevant design of transport networks. Regarding the zoning structure of the territories, the GUDP stipulated a reduction of agricultural lands from the then 49,340 ha down to 41,208 ha, and to 36,112 ha in the 2009 Amendment. This decrease was offset by an increase in urban areas (+8,580 ha) and in forest and green lands (+8,170 ha). The biggest increase went to habitation (+1,900 ha) and to the zones for mixed-use developments – mainly residential and service functions (+4,920 ha). Vast areas of agricultural lands reserved for housing by the previous master plan (1,961) mainly in the southern outskirts remained with the same designation. Thus in practice, the biggest increase in residential areas was planned in the southern suburban areas. However, in serving the goal to direct urban development northwards, considerable portions of land in this direction were designated for "long term reserve", i.e. for urbanisation in the long term (e.g. in 20 years) or sooner, if considerable investment interests emerged.

Regarding the opportunities for developing service and commercial activities in suburban areas, the GUDP aimed to facilitate such developments through the promotion of mixed use zoning along the high class corridors and the junctions of the ring road with the main highways.

Concerning the forms of mass transit, the focus of the master plan was on the metro railway system. In just 5-6 years, the development of this system drastically improved the access to many peripheral areas of the compact city, but it did not influence the access to the suburban territories. In fact, the GUDP did not stipulate any significant improvement of the mass transit networks out of the compact city. Concerning the development of the road network in Sofia's suburban areas, the main effort is the ring road. Before 2000 the ring was a two-lane road with only a short four-lane section in its north-east part. With the GUDP the entire ring road had to be upgraded to a six-lane set.

Early results for the implementation of the 2007 GUDP of Sofia

Our study finds that so far the GUDP is failing to achieve its objectives in suburban areas – namely, to contain the development of the southern territories, preserve the green areas and promote the development of the northern territories. To assess the results of the implementation of the plan in the course of a decade, we used data from SOFPROEKT (the municipal company for planning) and the Cadastral Agency. We investigated the changes in three suburban districts: one southern – Vitosha, and two northern – Novi Iskar and Kremikovtsi. The data in Table 1 show that just like in the period before the adoption of the GUDP, the rates of development are highest in the southern suburbs. The expansion of the urbanised area in Vitosha in the period 2006-2013 was twice that of Kremikovtsi and more than five times greater than Novi Iskar. Hence, so far, development trends have not changed. Furthermore, the GUDP has failed to save the green edges in the southern areas. Neither are the northern suburban areas growing: data from NSI (2012) proves that between 2006 and 2011 the population of Novi Iskar and Kremikovtsi grew by only 650 residents.

The liberal policy of the GUDP that promoted service, commercial and industrial functions along the high-class transport corridors and the ring road resulted in the fast development of such functions in a number of locations (however, with some delay, compared to residential development). New, although small, industrial zones

emerged close to the transport junctions in the northern suburban territories, while service and commercial activities proliferated along the Southern Arch (see the next paragraph).

Table 1. Changes in the urbanised area in three suburban districts

Characteristic/ indicator	Vitosha	Novi Iskar	Kremikovtsi
Urbanised area in 2006 [ha]	2,514.43	2,751.44	3,405.68
Urbanised area in 2013 [ha]	3,131.27	2,806.42	3,707.55
Change in the urbanised area 2013/2006 [ha]	616.84	54.98	301.87
Change of urbanised area in percentage [%]	24.5%	2.00%	8.86%

Regarding suburban infrastructure, the construction of the ring road has already made substantial progress. The ring comprises four sectors – southern, western, northern, and eastern. The southern and the northern sectors have major importance for the development of the suburban areas. However, the northern sector comprises two routes: one called the Northern Arch that passes through the suburbs, and another one, the Northern Tangent, adjacent to the compact city (see Figure 2). The Northern Arch would have a major impact on suburban development while the Tangent would hardly have any. The construction of the southern sector of the ring road, called the Southern Arch, started in 2007 and was completed in 3 years. The Western Arch and the Northern Tangent were completed in 2016. When the Eastern Tangent is finished (planned for 2018) and the ring is closed, the building of the Northern Arch will not be urgently needed. In view of the shortage of funding it may be delayed until 2022-2025 or longer, and this will be crucial for the development of the northern suburban areas.

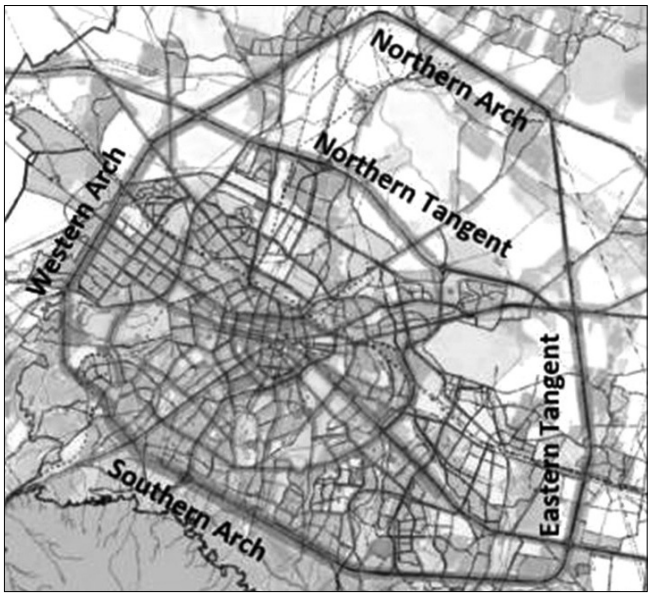

Figure 2. Traffic loads on the main street routes of Sofia (Source: Metropolitan Municipality of Sofia, 2003)

Summary of the findings concerning the 2007 GUDP of Sofia

Concerning the first research question, we find that the GUDP of Sofia paid special attention to the action of the market; however, the analysis of the market processes was not well structured, and in some respects even confusing. When defining its objectives, the GUDP did not consider how they related to the interests of market participants – businesses and households. The plan stated that the city core had to be "unburdened" and that growth in the southern suburban areas had to be limited, while growth in the northern areas should be boosted, but it did not examine why residents wanted to move to the southern and not to the northern suburban areas. The plan also stipulated spatial solutions that were often irrelevant to its objectives. For instance, the growth of the northern suburbs required improvements in the mass transit networks, but no improvement was planned. The vast territories designated for urbanisation in the southern districts did not correspond to the objective to contain urban development in these districts. The "distant prospect" zoning in the northern districts proved to be an inefficient tool to boost urban growth. Thus far the GUDP has not been able to steer suburban development in the desired directions, because it has been unable to employ the most pertinent tool for cooperation with the market – the development of infrastructure. In reality, infrastructure development stimulated urban expansion to the south and not to the north, i.e., opposite to the plan's objectives.

REGULATING MARKET-LED SUBURBANISATION PROCESSES IN THE MASTER PLAN OF BELGRADE

Accounting for the action of the market

In 2016 the new Master Urban Plan (MUP) of Belgrade 2021 was adopted (Figure 3) based on the MUP Belgrade 2021 (2003) (City of Belgrade, 2003), with a few changes (the last one in 2014). The MUP was based also on the Regional Spatial Plan of the Administrative Area of the City of Belgrade and the City of Belgrade Development Strategy (2008). In 2017 Belgrade adopted the City of Belgrade Development Strategy (RAREI, PALGO). The main aims and tasks of the MUP are: urban renewal and intensive use of the existing urban structures by increasing their quality, compactness and density, and by transforming industrial and other water front areas (brownfields); urban zones of mix use; the rational spread of urban construction land and the preservation of undeveloped high quality land. The aim of introducing zones of mixed use includes accepting already existing, planned or spontaneous complex urban structures of different purposes and contexts in the urban tissue. The aims in the area of housing include the transformation and replacement of worn-out housing stock, remediation of unplanned construction, construction of new housing settlements, development of social and accessible housing, improvement of infrastructure equipment, optimum land use, etc.

With the previously defined planning solutions for commercial zones, the backbone of Belgrade's planned development determines the potential locations for large urban projects, the development of the urban waterfront, and the rehabilitation and transformation of previous industrial and military complexes (brownfields). The MUP foresees a large increase in transportation zones, economic areas and commercial zones, especially the structural transformation of the river waterfronts, with their important market dimension. The direct impact of market and investor

interests is, for example, present in the urban re-zoning of Belgrade Port proposed by the MUP Amendment (2006), "Belgrade Waterfront" project (2014), a new settlement "Makiš" and other large urban projects. In the competition for European cities and regions of the future, organised by the Financial Times in 2006, Belgrade was announced as the "City of the future of South Europe".

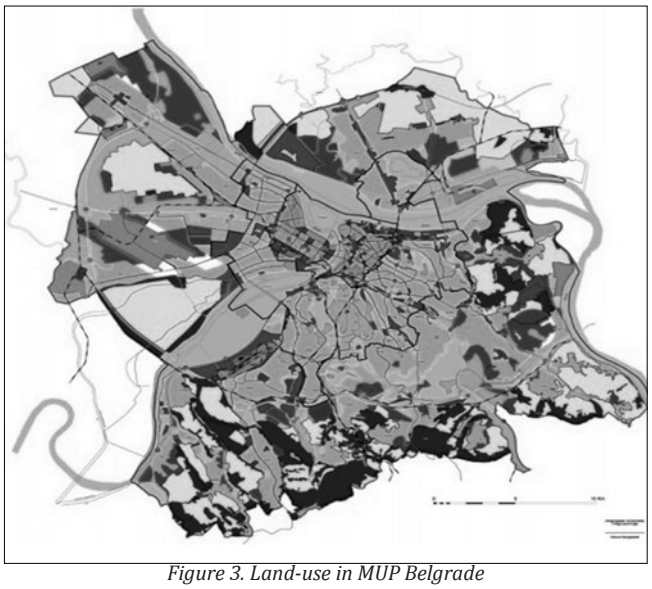

Figure 3. Land-use in MUP Belgrade (Source: Master Urban Plan of Belgrade, 2016)

The urban land policy and communal economy have not been transformed yet, although the following are evident: the strong influence of market mechanisms; insufficient approaches and methods for land evaluation; no taxation of added urban land values; "investor urbanism"; different subsidies to investors for construction land; a "fast-lane" approach to cheap and attractive locations; the introduction of *lex specialis* for some large urban projects (Zeković and Vujošević, 2018); and intensive development of the "grey" market.

Objectives of the new MUP of Belgrade concerning development of the suburbs

The Belgrade MUP (2016), as strategic planning document, defined general planning solutions for urban development at a significantly lower level of detail compared to the previous Belgrade MUP (2003).

Specific strategic aims referring to the development of suburban areas were not defined. These include the aims of optimisation and rationality in land use (bigger offers and the flexibility of purposes for space to prevent uncontrolled construction and the irrational engagement of undeveloped construction and other land in peripheral zones, the sustainable planning of transportation and communal infrastructure, public transport, etc.), speeding up the process of rehabilitation and the inner transformation of the urban tissue, and creating attractive and economically sustainable urban areas as generators of development and transformation of a wider area. Table 2 contains the key urban development indicators of the Belgrade Metropolitan Area (level NUTS 1). The data indicate a very high degree of urban sprawl and extremely inefficient urban land-use policy.

Table 2. Population, economic growth and urban construction land in the Belgrade Metropolitan Area (1991-2011)

Indicators	1991	2002	2011	Index 2011/1991
1. Population	1,602,226	1,576,124	1,659,440	103.6
2. GDP total (in billion €)	8.5	5.76	12.78	150.4
3. Urban construction land (ha)	37,3311	-	111,2602	298.0

Source: [1] Corine Land Cover (EEA, 2013) and [2] RGZ (2013)

Implementation of the MUP is based on its more detailed elaboration via plans of general regulation, with guidelines for the compilation of detailed regulation plans. The minimum scope of a plan of general regulation for a construction area is an urban area, with guidelines to include several areas inside the border of each plan for more efficient implementation. This process is initiated by the responsible organisation (*Belgrade land development public agency)*, covering 80% of the total construction plans. The only detailed plan has been adopted for the remediation of illegal construction (the settlement of Jajinci), and another one is under deliberation (Smederevski put), both of which are designated as priority areas for the remediation of suburban areas.

Measures in the MUP concerning the development of the suburbs

The MUP of Belgrade planned for substantial changes in the structuring and zoning of the territory of the city. According to the plan the biggest decrease in the period 2001-2021 will be of agricultural land, from its share of 51.1% to 18.4%, mostly because of conversion to economic zones and industrial parks along the key transport routes, followed by a sharp increase in green surfaces. In the period 2010-2021 the largest changes go to transport zones (7,352 ha), economic zones (3,326 ha), housing zones (2,349 ha) and commercial zones and centres (2,129 ha). The decrease in agricultural land from 38,352 ha to 14,344 ha (from 2010 to 2021) and an increase in built urban land illustrate extremely inefficient and unsustainable urban land use. In terms of spatial distribution and organisation, the MUP defined three broad areas (Figure 4), out of a total of 77,851 ha, viz.: 1) central zone (3,236 ha); 2) intermediate zone (11,538 ha); and 3) peripheral zone (63,077 ha), all divided into 20 urban areas (57 in the previous period).[2]

The market pressure and growth of the "real-estate bubble" are manifested by mass illegally constructed buildings in Serbia. According to data from the Ministry of Building, Transportation and Infrastructure, there are 266,655 illegally constructed buildings in Belgrade, or 13.0%

[2] In the central zone there are three historic urban core areas: old Belgrade, Zemun and the core area of New Belgrade. The *Middle zone* includes a continuously built urban area and it is characterised by organised complexes of housing construction, concentration of urban functions along the main city roads and less compact urban structures. The *Peripheral zone* is characterised by mainly family housing construction, unplanned and unorganised construction with inadequate levels of communal equipment and lesser degree of availability and coverage of public functions and contents.

of the total illegal buildings in Serbia. The structure of illegally constructed buildings in Belgrade is dominated by residential buildings (76.2%), auxiliary buildings (6.7%), residential-business buildings (6.4%), and commercial buildings (5.4%).

Among the priority suburban areas for the rehabilitation of spontaneously formed tissue, the previous MUP designated the settlements Altina, Padina, Mirijevo, Jajinci, and settlements on the Banat side of Belgrade. The largest numbers of pressures for new development since 2000 have been in the Mirijevo and Altina suburbs. In the new MUP there are no specific measures stipulated for regulating the settlement conditions in illegal and informal settlements.

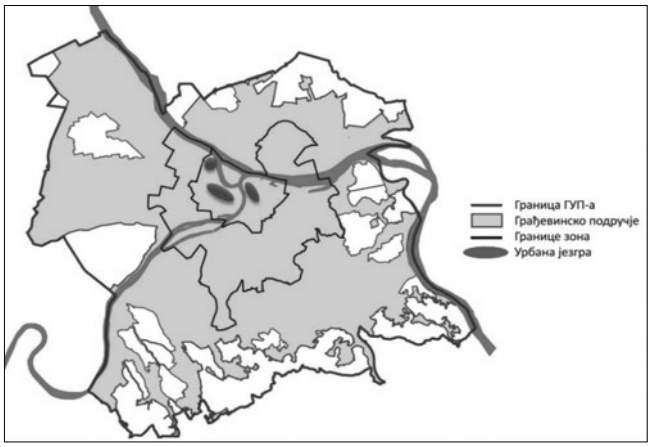

Figure 4.Spatial zones and Belgrade urban cores (Source: MUP Belgrade, 2016)

Concerning the primary transportation network the MUP of Belgrade plans the development of the tangential and ring traffic routes aimed at connecting the continuous built-up area in the periphery with the central area (Figure 5). A key element is the outer route – *the bypass highway, which is connected with the E-70 international road*, and which should be finished by 2021 (Figure 5).

Other key elements are the outer main tangents (SMT) and inner roads (UMP) planned within the continuous urban fabric around the central zone, as well as the Belgrade metro. The construction and reconstruction of 33% of the total planned length of road network (942 km) is envisaged by 2021. In suburban areas the MUP envisages an increase in the surfaces under the transport infrastructure by 39% (from the existing 2,319.7 ha to 3,216.65 ha).

The mass public transport system accounts for 52.85% of the total number of trips in Belgrade. The connections between the suburban municipalities and the city rely exclusively on bus transport, with 18% of the total number of buses (2008)[3]. The suburban rail Beovoz, with a total length of tracks of 100 km and 42 urban and suburban railway stations, accounts for 2.5% of all passengers (Bugarinović and Ristić, 2009). Since 2011 a new suburban rail BG:VOZ started between Pančevo Bridge and Batajnica (34,000 passengers daily). The MUP envisages the introduction of a light rail transit system, the improvement of the urban and suburban railway and three basic metro lines (26.84km).

[3] These data differ from those available on site of the Belgrade Transportation Public Enterprise (http://www.gsp.co.rs/statistika1.htm).

The MUP has not proposed any substantial improvement in the access to suburbs by public transportation.

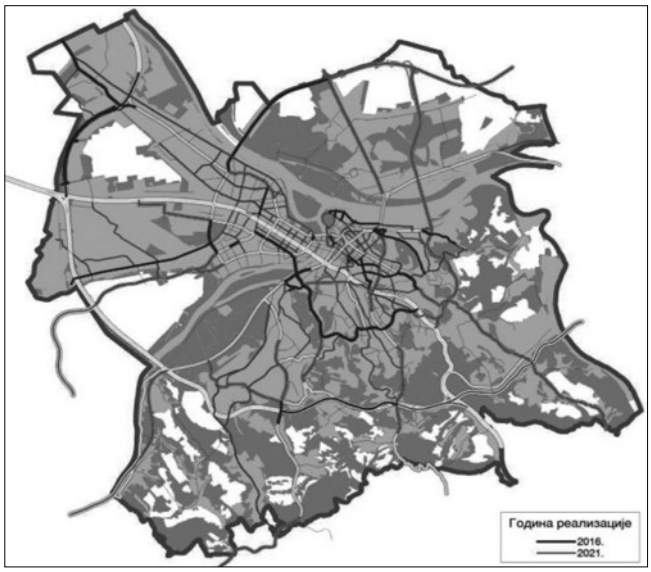

Figure 5. Expected dynamics for implementing the primary road and street network in the MUP area (Source: MUP Belgrade, 2016)

Early results of the implementation of the MUP of Belgrade 2021

In the absence of adequate systemic mechanisms and indicators for monitoring and evaluating the implementation of the MUP, we applied the method of preliminary expert evaluation in combination with available partial data, limited primary sources (statistics, cadastre), and data on projects.

The MUP is mostly implemented according to short term priorities. Implementation strategy depends largely on the adoption of a five-year development program for the city's capital infrastructure and the annual program for the development of construction land.

Measures of the city's jurisdiction support the policy of encouraging the development of propulsive business sectors, securing favourable locations and financial conditions for the development of entrepreneurship and new SMEs (as green-field investments along highways and main roads; see Zeković and Maričić, 2008). The MUP envisages further sprawl and the enlargement of existing and creation of new economic zones along highways in the peripheral zone: Upper Zemun and Batajnica, Surčin-Dobanovci, Surčin RTC/ Robno- Transportni Centar, Vrčin, the route to Mokri Lug, Pančevački rit, along Ibar road and Smederevo road, the industrial zones of Železnik, Rakovica, Kumodraž economic zone, Stojčino Brdo, Vrčin and Boleč.

Due to the global economic and financial crisis, the implementation rate of strategic directions and projects defined by the former MUP has slowed down. Nevertheless, the highest level of MUP implementation was in the field of capital infrastructure: e.g. the bridge at Ada Ciganlija on the river Sava, the bridge on the river Sava near Ostružnica with the bypass, and Pupin Bridge over the Danube, connecting Zemun and Borča. The basic idea was to improve the

accessibility of the suburbs in Posavina, Zemun, Banat, etc. Concerning the response of the market, the interests of investors were not targeted to greater use of brown-field locations in the urban tissue, mainly due to the lower land prices and arrangement in the peripheral, still undeveloped (green-field) areas on the urban fringe. As long as investors find it more appropriate to further invest in the existing green-fields in the peripheral zones (mainly for considerably lower costs), they will refrain from redirecting the key course of investment into brown-fields.

Thus, peripheral urban and suburban areas along Pan-European corridor X have attracted some major new housing and industrial developments, as well as the development of new transport, logistic and commercial zones.

Summary of the findings concerning the MUP of Belgrade (2016)

Some goals of the MUP have contradicted each other: 1) urban renewal was strongly stipulated, as well as the revitalisation of brownfields; 2) there has been no stipulation explicitly forbidding urban sprawl, but the decrease of agricultural land from 38,352 ha to 14,344 ha (from 2010 to 2021) has been planned, in addition to an increase in built urban land at the same time. Massive illegal construction is the dominant form of urban sprawl (Zeković *et al*., 2015).

Concerning suburbanisation and sprawl, the MUP has not identified them as specific issues and has not explicitly stipulated any respective measures. There has been no official document presenting the implementation of MUP provisions, especially for suburbs.

Zoning was the main instrument of the master plan to regulate the development of suburban areas, but apparently with insufficient success. One factor is that MUP zoning is not the basis for determining development fees or any fiscal instruments. The implementation of the MUP is made by elaborating planning documentation (Detailed Regulation Plans/DRPs). Approximately ¼ of the DRPs were finished by 2017, while the elaboration of ¼ of the DRPs for suburban and peripheral areas can be expected by 2025-2030. Urban zoning is not correlated to zoning for determining land development fees and property tax. Low development fees along road corridors (or free of charge for industry in the territories of 10 city municipalities since 2016) and in suburbs directly support urban sprawl and limit financing the new infrastructure. The development of infrastructure was not employed to solve the issues of suburban growth. The planned development of a transit system for mass transport communications in Belgrade was largely underestimated by the MUP.

As a result of the role of planning and its interaction with the market explained here, there are two prevailing processes on the main urban development axes: the spread of constructed tissue to the periphery and the suppressing of production and housing by services. In conditions of unconsolidated democracy, privatisation and a weak market, insufficiently developed civil society and limited public insight in procedures for planning decisions (including suburbs), the majority of actors behave in accord with the dominating norms that favour individual rather than public interest. Despite some weaknesses of this approach in the MUP (weak public control, insufficient protection of public goods), and a lack of coordination between planning and market elements, it is estimated that the role of free market discourse has prevailed in relation to planning. Planning has not sufficiently acknowledged the key market interests, mechanisms and arrangements.

CONCLUSIONS

After a transition of more than two decades, markets play a key role in the development of cities in SEE (Nedović-Budić, Z., 2001, Kovachev 2003a, 2003b; Zeković and Maričić, 2011; Nedović-Budić *et al*., 2011, Slaev and Nikiforov, 2013; Slaev and Kovachev, 2014; Zeković *et al*., 2015; Zeković and Vujošević, 2018). The current processes of growth and suburbanisation in the cities of Belgrade and Sofia are generated mainly by market forces, thus it is critical for planning to consider the action of market forces.

Answering the first research question, this paper observes that planning in the two SEE capitals has made efforts to account for the role of the market, but this is done in a very unsystematic way. As a rule, markets are examined at the phase of analysis, but market analysis is not properly/sufficiently utilised to define planning measures and policies. In answering the second research question, this research concludes that planning in Sofia and Belgrade is still far from being able to effectively cooperate with the market in order to regulate suburban development. For this purpose, planning must fulfil three major requirements. First, planning should consider how market trends and the interests of all market participants correlate with the objectives and the stipulations of the plan. Second, planning should be based on clear and relevant objectives and should develop a concise and coherent structure of measures and instruments to achieve those objectives. This paper has observed serious discrepancies between many objectives, measures, spatial solutions and instruments of implementation of the master plans of Sofia and Belgrade. Third, to cooperate efficiently with the market, planning should employ instruments of cooperation, such as zoning regulations, fees and taxes and relevant patterns of development of the primary infrastructure (Bertaud, 2003). Also, it is necessary to develop relevant forms of urban governance providing for effective public participation. The poor use of these instruments so far has been the basis of all failures of planning in Sofia and Belgrade. Therefore, the paper's findings confirm the conclusion that it is essential for planning to account for the action of the market. This is a lesson of key importance to the planners in Sofia and Belgrade.

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THE IMPACT OF A HYDROELECTRIC POWER STATION ON THE DEVELOPMENT AND MODERNIZATION OF THE BAJINA BAŠTA SETTLEMENT DURING THE SOCIALIST PERIOD

Ivana Vučetić[1], Innovation Center of the Faculty of Mechanical Engineering, Belgrade, Serbia

During the process of socialist modernization, initiated after WWII, large development projects in Serbia were the main drivers of urban transformation. Electrification and industrialization resulted in the establishment of new production modes, which defined a new socio-economic background for the development of settlements and the modification of their functional and morphological structure. The construction of the Bajina Bašta hydroelectric power station, in the middle section of the Drina River in western Serbia, was one of the development projects, and it triggered the transformation of the environment, upgrading the pre-war small town of Bajina Bašta into a new urban node, adjusted to the socialist imperatives and standards of progress.

Key words: **socialist modernization, hydroelectric power station, urban development, Bajina Bašta settlement.**

INTRODUCTION

Considering the influence of technological development on a society, the article studies the changes generated by the modernization of electricity production within the general process of modernization. In this context, electrification is considered as a basic element of modernity, which contributed the foundation of a new social(ist) order, based on new production relations. Consequently, modernization is based on industrialization, as a foundation of economic development, which also influences the process of urban growth and social change. The mechanization of production and the introduction of new jobs shifted the focus from agriculture to industry, causing increased migration from rural to urban areas, i.e. industrial centers. These changes triggered urban growth, causing modification of the existing urban structure and generating new urban areas adjusted to the increased number of inhabitants and activities. Consequently, the lifestyle was changed and the quality of life was improved.

The process of electrification includes the construction of production and distribution systems that increase the accessibility of electric power, expanding its use. Due to their complexity, these systems have a significant impact on the surrounding environment, changing its physical features and determining its further development (Loo, 2011). Electrification also affects the economic development and spatial organization of settlements as well as their social structure. Therefore, the article will focus on the development of Bajina Bašta during the process of organized electrification after WWII, as a specific period of socialist modernization that aimed at creating a modern socialist state. Its position on the right bank of the Drina river at the foothill of Mount Tara gives the basic feature of the physiognomy of the Bajina Bašta municipality and settlement, located in western Serbia, along the border with the Republic of Bosnia and Herzegovina, separated by the Drina River. The agricultural land and forests, tourism, and especially the hydroelectric potential of the Drina, are the most important factors in the regional and urban development of this area (Figure 1).

The article will also consider the role played by the construction of the Bajina Bašta hydroelectric power station in the development and modernization of the nearby town, as the first power station in Serbia that affected the local surroundings on a large scale. In order to provide a comprehensive insight into the development process, the study will present the period from the mid-19th century (when the settlement was established) to 1989, the peak of economic development, which was interrupted by the

[1] Gospodara Vučića 55, 11000 Belgrade, Serbia
ivana.vucetic14.04.10@gmail.com

upcoming civil war conflict among the territories of the former Yugoslavia. The special emphasis will be on the period of socialist urbanization, which started in 1961 when the construction of the hydroelectric power station began. The article will analyze the relationship between urban development and the construction of an important hydroelectric facility in terms of the roles of electrification and industrialization in the process of urban renewal, as well as their contribution to the economic, spatial and social modernization of the town. The article will also show that the level of industrial development can be seen by comparing the income from industry and that of agriculture. It observes urban development in relation to the quality of the built environment and urban functions, and social development in relation to demographic changes in the number of inhabitants and the structure of employment by activity.

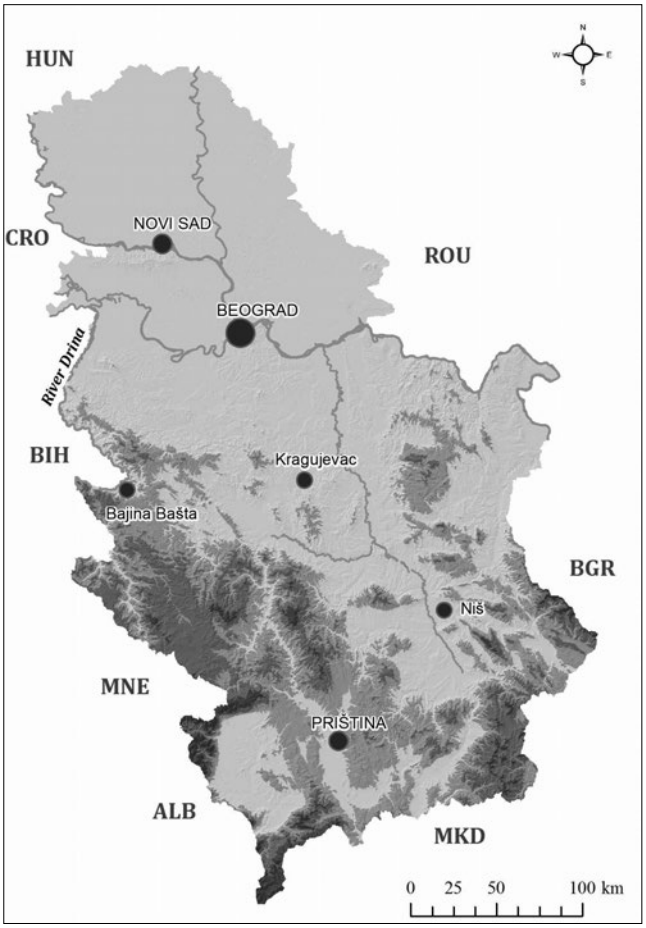

Figure 1. The position of Bajina Bašta in the region (Source: author)

THE BACKGROUND

Bearing in mind that modernism is the manifestation of the idea of modernity within a society, modernization can be interpreted as a number of different processes implementing the idea of modernity. After WWII, the idea of modernity considered a new way of life based on changed social values, which in states with undeveloped industry were related to the process of industrialization (Lefebvre, 1995). The significant transformation of East European societies, initiated after 1945, can be described as socialist modernization, based on industrialization, urbanization and social changes (Timotijević, 2012). In general, post-war societies embraced the importance of scientific knowledge and technology as a foundation of national development. The period was marked by mega-projects supported by urban planning or collectivization (Loo, 2004). Consequently, technology represented the basic driver of social change, influencing a wide range of activities 'from the material production, to culture and art' (Pokrajac, 2002). Technological changes include the innovative solutions and processes leading to general development and social transformations. The socialist regimes used technology as one of the main tools for implementing their new ideology and restructuring society. Industrial development, based on new technologies, was the main force of economic growth, and regional development was shaped by the structure of industrial production. In order to initiate industrialization it was necessary to conduct a number of actions that would support economic development, and producing energy was one of the main conditions (Timotijević, 2012). The concept of modernization in Yugoslavia, taken from the socialist ideology practiced in the USSR, was based on economic development (Gligorov, 1984). As a result, during the socialist modernization a number of large development projects were conducted in order to establish a strong system of industry, and each one of them relied on the technology of energy production and transmission.

Industrial development was closely linked to the process of urbanization, and its influence on urban transformation was especially noticeable during the period of industrial revolutions. Urban sprawl and urban development also followed industrial expansion because industrial nodes attracted the workforce. New infrastructure and services became a necessity, while urbanization started where resources, the workforce and roads were available. Industrialization also caused changes in the organization of production and consumption, influencing both the living and working environment. New urban activities imposed different spatial demands and architectural typologies, while cities became nodes of socio-technical change. If population growth is not managed, it causes urban sprawl from the free-developing and non-coordinated growth of cities (Gonzales, 2016). The incidence of informal development is present in the majority of South East European countries. It represents one of the main features of the process of urbanization from the second half of the 20th century onwards in Serbia, in which residential settlements of low or medium density emerged owing to the uncontrolled construction of single-family housing on mostly private agricultural land in suburban areas (Bajić, Petrić, Nikolić, 2016).

The effect of social values on urban development is linked with the manifestation of a certain ideology in urban space (Stupar, 2015). Industrialization in Yugoslavia started before WWII but developed after it ended. Consequently, the transformation of post-war cities began, providing a suitable setting for a new industrial society. The East European states, as well as Yugoslavia, used the model of urbanization applied in the USSR. During the first post-war years (1947-1960) the urban growth was totally subordinated to the process

of industrialization. Cities developed around industrial complexes, while factories, along with the residential areas for workers and accompanying services, became the main elements of new urban systems. The accelerating economic growth on the local level resulted in a higher living standard, especially in the domain of personal consumption and housing. Simultaneously, the capital accumulation enabled investments in other areas of national development, which established the foundation for systematic urban growth and an influx of foreign experiences in planning practice that began in the 1960s (Stupar, 2015).

BAJINA BAŠTA: FACING PROGRESS

The origins and development

The development of Bajina Bašta started in the mid-19th century, in the period marked by the liberation from the Ottomans and the establishment of an economic relationship with Western and Central Europe. These historical changes were seen in the construction sector, which was improved in the social, technical and aesthetic domains due to the development of trade and industry. The oriental influences were abandoned, and the regulation of settlements was implemented in accordance with European role models. The migration of the rural population brought the model of traditional family houses into small towns, while their residential function was gradually upgraded by public activities (Figure 2). At the end of the 19th century, collective housing was introduced, as well as new types of public buildings. The organization of the settlement was partly conducted according to plans based on two common elements – a town square and the modular system of residential quarters.

Figure 2. Historic center
(Photo credit: S. Kadijević)

In view of the historical and economic circumstance of this period, it is not surprising that the settlement of Bajina Bašta represented a mixture of different architectural influences and building methods, applied in a new urban concept (Figure 3). Private investors financed most of the urban progress, but under the framework of official plans, it was implemented by the local government. The first regulation plan (1882) defined the urban form of Bajina Bašta, establishing an orthogonal matrix with regular compact mixed-use blocks and a town square, a market and a promenade in the center. This area was the base for further urban development in a morphological sense. The complex urban tissue mostly consisted of residential and service activities, while the dominant occupation of residents was agriculture. The phase of intensive growth started between the two world wars, when economic development triggered a new influx of people. Due to infrastructural works, the town got its network of public and private lightning in 1926 (Ignjić, 1985). In 1939, the streets were paved with cobblestones and the water and sewage systems were established. WWII interrupted this development and all investments were on hold until the 1960s. The new phase of development started during the construction of Bajina Bašta hydroelectric power station in 1961.

Figure 3. Historic center
(Source: private archive of G. Kadijević)

Socialist modernization

Before WWII Yugoslavia was a country with undeveloped industry and outdated agriculture and this general condition prevented economic development (Vukčević, 1983). Energy production in Serbia[2] started at the end of the 19th century and its basic role was related to new industrial facilities (Ivanković, 1993). Electrification and industrial production were the result of private initiatives and their scale and capacity were small. After the end of WWII, the situation remained unchanged, while problems of energy production worsened. Therefore, the period of socialist modernization was considered as a chance for radical change on all levels, and industrialization was proclaimed its basic element, representing not only a method but also a strategic aim of the complex socio-economic transformation. Simultaneously, electrification was a necessary condition for overall structural change of the society and its economy. One of development targets was the establishment of an energy system based upon large-scale production facilities, which would serve as a support for the development of the industrial system anticipated by economic reform. According to the First plan of national economic development for the period 1947 to 1951, Bajina Bašta hydroelectric power station was the first one to be built. After the hydroelectric power station began production, the scale and accessibility of electric energy increased and its prices decreased, laying the foundation for the dynamic development of Yugoslav industry. In the following period, the consumption per inhabitant increased from 16 kWh in 1951 to 729 kWh in 1981 (Vukčević, 1983).

[2] In 1918 Serbia became part of The Kingdom of Yugoslavia (The Socialist Federal Republic of Yugoslavia since 1945).

Electrification linked with rapid industrialization transformed both social relationships and the urban environment. During the first period of socialist renewal from 1947 until 1960 investments were mainly focused on developing the heavy industry sector (i.e. 'the enforced growth'), thus creating a strong industrial base. The economic foundation of cities was weak – there was only one type of production driving urban development, while other activities were not so established (Timotijević, 2012). The official planning and design of settlements marked the period of 'intensive socialist urbanization', which began in the 1960s, when the investments were gradually oriented toward the improvement of urban comfort and better living conditions. During this period, the development of urban settlements was usually the side-effect of mega-projects, as in the case of Bajina Bašta.

The outcomes

Economy

After WWII, the economic development of the Municipality of Bajina Bašta was insignificant, based on small-scale production and an exchange economy. 91.4% of the inhabitants focused on outdated agriculture, while other sectors did not develop (Bučevac, 1969). The period of preparation works for Bajina Bašta hydroelectric power station marked significant economic progress for the municipality, based upon an increase in industrial production. The economic structure changed fast after the opening of the facility in 1966, which was the major driver of growth, and also an important actor in the economy and work ethics. As a result of these processes, some new production nodes were opened, focusing on industry based on wood, textile, construction materials, metal and electricity production. The intensification of production caused restructuring of the economy, i.e. industry's share of the national income increased to 40% in 1966. Meanwhile, the Bajina Bašta plant became a key factor in the social and economic development of the settlement. After the first year of its work, the gross domestic product and national income on a local level were significantly increased. The value of industrial production in 1967 increased by 130% compared to the previous year. Taking into consideration the share of Bajina Bašta plant, this value was even higher – 350%, indicating that the value of industrial production achieved in the hydroelectric power station was equal to the value produced by other sectors of industry. The local income was increased by 22%. According to data from 1968, increases in prices and living costs were moderate, the material base of the economy was stronger, investments were 20.25% higher than in 1965 and the employment rate was 35% higher, following the extension and opening of new industrial facilities (Ignjić, 1986). The data from 1989 also reveal that the industry in Bajina Bašta had a major share of the local economy (66%), which is extremely high compared to the Serbian level (47.5%) or global level (over 50%) (GRP, 2009). The share of trade was 12.7%, agriculture 7.9%, construction sector 5.1%, while other sectors did not have a significant impact on local income (GRP, 2010). The dynamic growth of industry and income, as well as the accumulation of resources, enabled more investments in activities contributing to a better quality of life.

Population

According to the 1848 census, there were 1,222 inhabitants in Bajina Bašta. The growth in investments after WWII triggered economic development, resulting in intensive migration flows from rural areas. Consequently, from 1958 until the beginning of construction in 1961, 1,707 people moved to the Bajina Bašta municipality, while the intensive urbanization that followed triggered an even higher influx (Ignjić, 1986). The number of inhabitants increased from 1,934 in 1961 to 10,000 in 1988 according to estimates (GRP, 1988). The spatial and economic development of Bajina Bašta caused a significant polarization. In this period, the area of the settlement was extended and the share of its population in the total number of municipality inhabitants increased from 4.09% to 20.36% (GRP, 1988). Furthermore, in 1988, an area covering 0.8% of the municipality was inhabited by 25.9% of the total population of the municipality, compared to 10.3% in 1961 (GRP, 2010).

Migration also influenced the working structure. New jobs were created by opening Bajina Bašta hydroelectric station and the introduction of complementary activities. During the construction of the Bajina Bašta plant, the number of employed people in the municipality was the highest – between 4,000 and 5,000 workers (Bučevac, 1969), while the first decade of its activity was marked by an increased number of people working in the industrial sector (from 335 in 1961 to 1,040 in 1971) (GRP, 2010). The share of agricultural workers significantly changed in the years to follow. During this period, the progress of industry and the economy was evident, triggering the growth of non-agricultural sectors. By 1988, the share of the agricultural population had dropped to 18.8% (GRP, 1988). In 1989, the total number of people in employment was 62% of the total number of inhabitants, 20% more than the average percentage in Serbia and almost 40% more than the average percentage in the municipality (Ignjić, 1986).

Urban structure

The settlement was transformed on two levels. The first one was the building of a new physical structure and the improvement of urban activities within the limits of the existing urban area, while the second one focused on urban expansion. Consequently, the scale of urbanization conducted during these three decades affected much more space than the processes over the previous hundered years (Figure 4). As a result, nowadays we can distinguish two urban areas – the town center, with concentrated urban activities, and the surrounding (sub)urban area, mostly residential and composed of family houses.

Town center

At the beginning of the socialist transformation, the town area consisted of the historical core with the main square and urban blocks, creating a compact space. The style of existing public and residential buildings was oriental and neoclassical**,** while contemporary buildings, mostly residential, were built in the nearby blocks. The buildings had a ground level and one more floor (usually with an attic). The matrix of the central urban area was generated from the regular orthogonal matrix of the historical core, following previous building regulations (Figure 5). The

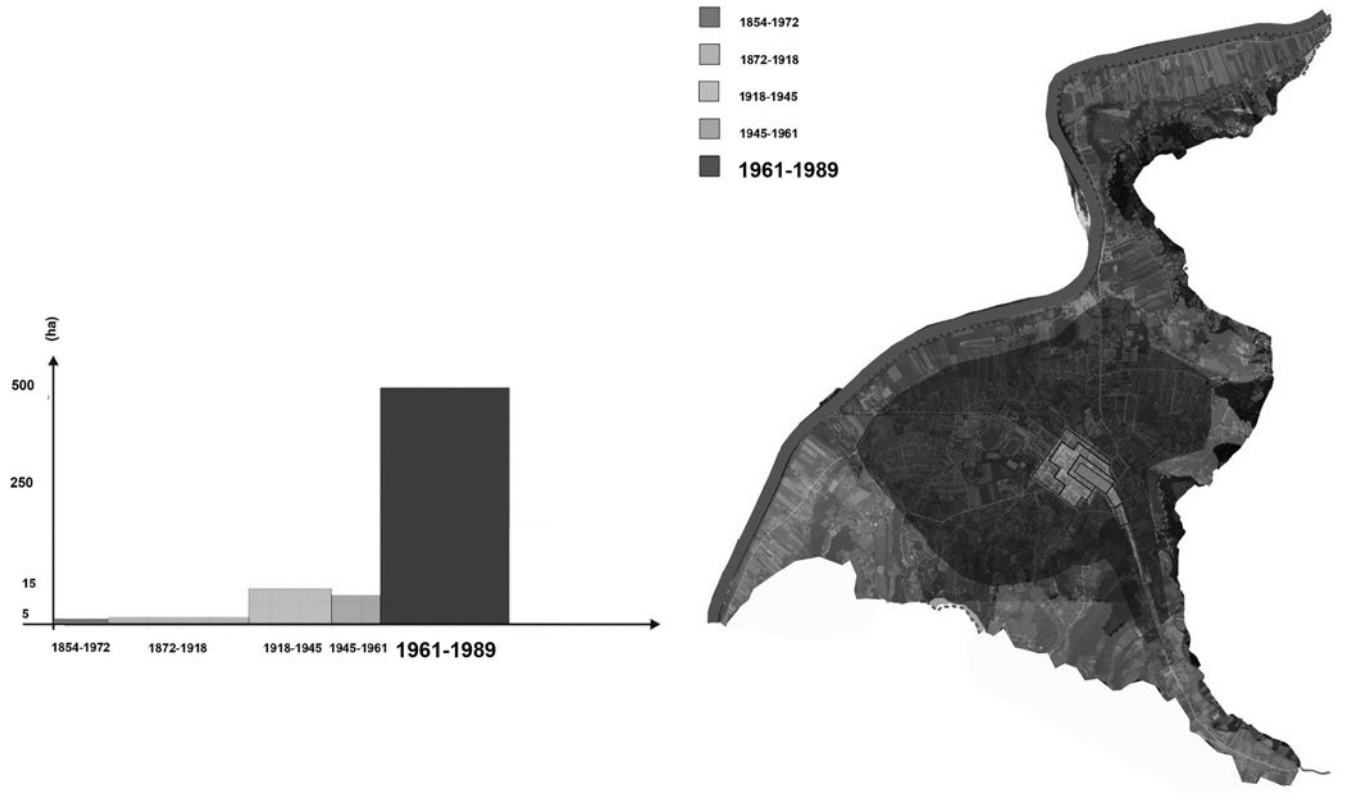

Figure 4. Spatial expansion
(Source: author)

perimeter blocks were high density. During the socialist period, the morphology of this area kept its urban features, but it was partially extended. However, the most significant change related to general urban development – new urban structures were based on the imperatives of socialist urbanization, while new activities followed the changes brought by industrialization (Figure 6). The intensive public construction of residential buildings started simultaneously with the construction works related to the hydroelectric power plant in 1961. Bajina Bašta plant financed the construction of approximately 300 flats for construction workers and professionals – future plant employees (Ostojić, 1982). The high-rise multifamily buildings included service activities (shopping, service and business facilities), which nowadays make up the central area of the residential zone (Figure 7). The extension of the central zone, initiated by this transformation, continued during the 1970s, when the Municipality of Bajina Bašta implemented the new urban development plans. For example, the development plan targeting the period from 1971 to 1975 directed the transformation of several urban elements – the renewal of parks, reconstruction of streets and public lighting and the construction of infrastructural networks and main roads. A new open green market was built, as well as a business center, new residential blocks, important public and business buildings, sports facilities (town stadium, sports hall, sport playground), a hospital and a bus station – all partially financed by Bajina Bašta hydroelectric station. Their construction defined the new central zone (consisting of the historical center, its extensions and new specialized centers), which influenced the development of the new urban tissue.

Figure 5. The matrix of the central urban area
(Source: GRP, 2010)

Figure 6. New department store.
(Photo credit: S. Kadijević)

Figure 7. New residential zone
(Source: Marković, Radović, Mijatović , 2005)

Functional urban area/ Larger urban area

Considering the planning approach, structure and the level of equipment achieved, the construction works in the larger urban zone did not have the same level as the transformation activities in the urban center. One of the main reasons was the inadequacy of the related planning documents, which were incapable of responding to a high flow of migrations to this area. The lack of appropriate planning legislation and regulation, as well as the high level of illegal (but tolerated) constructions, caused the uncontrolled growth of residential zones, due to increased demands for housing and complementary services. Consequently, new residential zones were created outside of the urban center, significantly extending the overall urban territory. Illegal housing (and its construction) also caused a lack of construction materials and the spontaneous occupation of construction land, which was especially visible in the irregular urban matrix of the areas of family housing, erected on previously agricultural land. The street profiles were narrow and incomplete due to the configuration of the surrounding area. Consequently, the street network was chaotic and inconsistent, while the houses did not follow any regulations, which is not surprising considering the fact that there were no planning documents applied in this case, but rather the construction activities simply followed the routes of main traffic corridors and roads (Figure 8).

The density of this zone was lower than in the town center. There were mostly freestanding family houses built in blocks, while the internal area of the blocks was used as agricultural land. The majority of houses had a ground floor, while some had an additional floor and attic. Spontaneously built, these houses combined elements of traditional architecture adjusted to contemporary needs and materials. They had a lower level of construction, functionality and architectural design than those in the town center (Figure 9, 10). Due to the lack of planning regulation, this zone consisted of different urban matrices, incomplete, sponateously created street networks, inadequate infrastructure (water supply systems and sewage), a lack of pedestrian routes and a high share of totally disorganized areas.

Figure 8. The matrix of the larger urban area
(Source: GRP, 2010)

Figure 9. Larger urban area
(Source: author)

Figure 10. Larger urban area
(Source: author)

Activities

The increased number of inhabitants caused numerous problems. The control of unplanned growth was difficult

and the imbalance of urban activities became obvious between the two parts of the urban structure – the central zone and the peripheral residential areas. In the town center, the dominant activities were urban services and commercial and public activities, while housing (single-family) dominated in the larger urban zone, but without sufficient service activities.

Town center

The town center represented a general gravitational node for all inhabitants. There are several sub-zones that could be distinguished – the urban core, with less housing and more service activities, and a surrounding central area, with a higher share of housing and specialized centers. The urban core was a highly concentrated zone of services, shopping, government, education, culture, religion and sports. The family and multifamily housing, combined with these activities, occupied mixed-use blocks. The larger area of the urban center had a nodal character and was situated next to the urban core, including the same set of activities. These two segments were the commercial and service center of Bajina Bašta. Due to a high share of housing, especially in the larger central area, the urban zone had the highest density of inhabitants. Family housing, combined with services and commercial activities, was more dominant in the historical part of the urban core, while multifamily houses were combined with single-family houses and services into compact urban blocks. The larger zone in the urban center was mostly composed of housing blocks (family houses), which represent a connective tissue with the larger urban area, and specialized secondary urban centers providing commercial and transportation activities, education, sports and healthcare. In general, the central area (urban core and larger central area) had a medium density of service activities, but very high social interaction conducted in both public buildings and open spaces (GRP, 2010).

Functional urban area/ Larger urban area

Family housing was the major function of the larger urban area, while most of the households had a mixed income that included agriculture. Housing was especially dominant in the zones around important traffic arteries, where it was complemented by commercial and service activities, as well as agriculture. In the border areas, housing was an additional function, combined with agriculture, small-scale production and commercial activities. The lack of planning, especially in the domain of housing, resulted in a misbalance between areas of family housing and multi-family housing. According to the 1987 census, multi-family housing represented 28% of all available types of housing. In 1988 on the metropolitan level, multi-family housing had only a small share (around 3.3%), and was situated mostly in the central zone (GRP, 1988).

Another problem between the urban center and larger urban zone was the unequal distribution of activities. The larger urban zone lacked services and according to the 1988 census, 98% of services were concentrated in the urban core (GRP, 2010). This monocentric organization of the settlement was not able to adequately respond to the growing needs of the inhabitants. Furthermore, due to the higher concentration of activities in the urban core, the spatial capacity of buildings became insufficient and service and commercial activities gradually occupied public spaces and pedestrian areas. The result of this process was a degraded urban structure, with decreased accessibility and permeability, an increased concentration of users, pedestrian and car traffic, and a lower general quality of space and activities.

CONCLUSION

During the period of socialist modernization, the development of the town Bajina Bašta was part of a significant development project focused on the improvement of the production process, as defined by the new socio-economic order. Simultaneously, the construction of Bajina Bašta hydroelectric power station had an important impact on both macro and micro levels. It indirectly influenced the development of industry, urbanization and social change, and directly contributed to investment into the town. New production nodes were opened and the income increased, as well as the number of workers and the level of investment. The number of inhabitants was also higher due to migrations, and this new condition generated new urban needs, which shaped the physical and functional structure of Bajina Bašta. As in the case of all mega projects, including the most recent ones, the planning process was focused on urban regulation, the establishment or reconstruction of infrastructural networks and the upgrading of public space (Molotch, 1976; Flyvbjerg, 2014; Dogan, Stupar, 2017). Consequently, the improvement of urban activities, building of new structures and electrification, contributed to the overall development of the social and living quality of Bajina Bašta, which transformed from being an undeveloped small town into an urban settlement based on the imperatives of socialist urbanization. However, the development itself was not strategically planned, and urban transformation did not adequatly respond to dynamic changes casued by intensive migration over a short period of time. This also caused several problems which occured in the organization of the physical and functional urban structure – e.g. a misbalance between the urban center and urban suburbs, a poor infrastructural base, a low level of urban services and the uneconomical use of spatial resources situated in the larger urban zone.

Considering the process of industrialization as the main premise of modernity promoted by socialist ideology, the transformation of Bajina Bašta, perceived on the level of urbanization and socio-technical change, was mostly focused on the urban center and its extension, i.e. the area which was already subordinated to urban regulation. Consequently, the existing urban structure was upgraded. In the other area (the larger urban zone), modernization did not result in a higher level of urbanization. Therefore, the new structure and its regulation typologically remained more rural than urban. One of the resons for this condition was the lack of planning documents and initiatives on the local level. The dychotomy within Bajina Bašta and its two urban entities was also visible on the level of urban activities, and the quality of the urban structure, living conditions and life style. It represents a testimony of a fast development, initially triggered by the construction of the hydroelectric power

station, as a symbol of socialist modernization. However, after the first phase of growth, fostered by general economic development and direct investment from the power station, the settlement became unable to absorb the increasing number of inhabitants and respond to their growing needs.

Since the settlement of Bajina Bašta is a part of the transboundary area within the Drina belt, in the future it will be the subject of new development projects and initiatives aimed at spatial and economic integration and sustainable urban development. This is confirmed by examples of projects that have been implemented in the EU and are related to trans-boundary river or mountain belts (Danube Regional Project, Regionalalp, ESDP, etc.), and which are the frameworks for formulating, harmonizing and implementing development goals. One of the basic tasks of the future development of the Bajina Bašta settlement will be to identify instruments for the integral guidance of spatial development, with indications of priorities and benefits for the development of activities. The Drina Belt should have an integrative role in the use of water, environmental protection, economic development, use and affirmation of tourist resources and traffic connections between Serbia and the Republic of Srpska, and the Federation of Bosnia and Herzegovina.

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Manuscripts must be submitted in English, and must be original, unpublished work not under consideration for publication elsewhere. Authors should submit their manuscript as an e-mail attachment to the Journal's Editorial: journal.spatium@gmail.com, Institute of Architecture and Urban & Spatial Planning of Serbia, Bulevar kralja Aleksandra 73/II, 11000 Beograd, Serbia, telephone: +381 11 3207 300, fax: +381 11 3370 203. Contact persons are: Miodrag Vujošević, Editor-in-Chief (email: misav@iaus.ac.rs) and Tanja Bajić, Technical Editor (email: tanja@iaus.ac.rs).

Clearly written, concise manuscripts should comprise:

- a concise and informative title;
- the full names and affiliations of all authors;
- the full mailing address, e-mail address, telephone and fax numbers of the corresponding author;
- a concise and informative abstract of 200 words maximum summarising the significant points of the paper, and up to five keywords following the abstract.

The size of manuscripts should be between 3,500 - 5,000 words. Please use Times New Roman font ranging from 10-12 point depending on what is the most convenient for you. Chapters should be numbered consecutively, e.g. 1. Introduction; followed by according numeration of subchapters (e.g. 1.1, 1.2, etc.). The use of footnotes or endnotes in manuscripts is not welcome. Only in case of absolute necessity, the maximum number of footnotes/endnotes per manuscript that could be tolerated is 5. Either British or American spelling is acceptable. Please pay attention in particular to consistency, i.e. do not mix different spellings. Manuscripts should be submitted as Word 97-2003 Document (.doc file).

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References

Papers should be supported by references where appropriate and set out in accordance with the Harvard style as detailed below. Papers submitted with references in the wrong style will be returned. It is the authors' responsibility to check the accuracy of references. References in the text should be cited as follows:

- one author: Lang (1994) or (Lang, 1994)
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Examples:

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- **Journal**
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