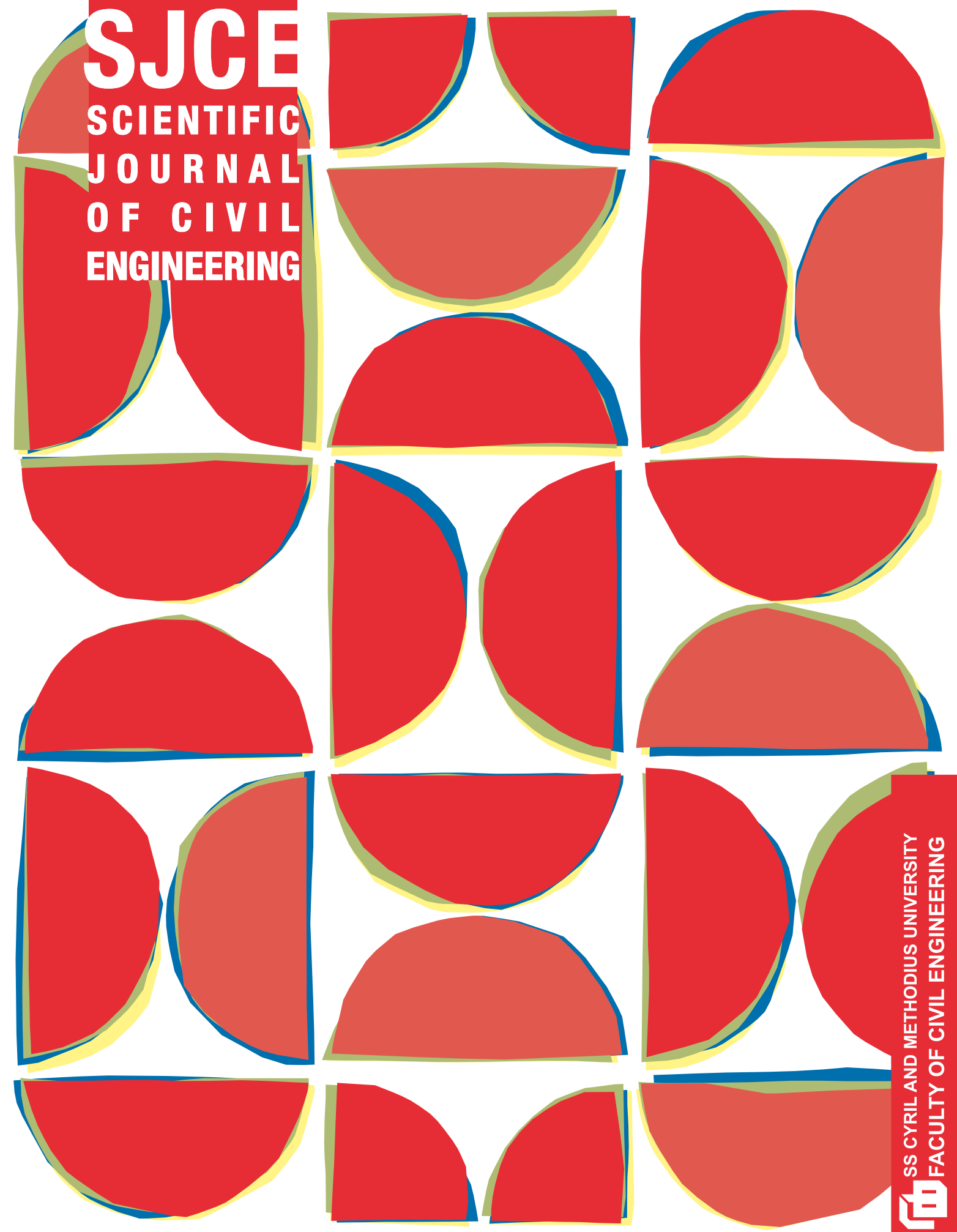


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## **EDITORIAL - Preface to Volume 10 Issue 1 of the Scientific Journal of Civil Engineering (SJCE)**

**Marijana Lazarevska EDITOR - IN - CHIEF**

Dear Readers,

**S**cientific **J**ournal of **C**ivil **E**ngineering (SJCE) is an international, peer-reviewed journal published bi-annually since December 2012. It is an open access Journal available at the web site of the Faculty of Civil Engineering in Skopje ([www.gf.ukim.edu.mk](http://www.gf.ukim.edu.mk)).

This Journal is committed to publish and disseminate high quality and novel scientific research work in the broad field of engineering sciences. SJCE is designed to advance technical knowledge and to foster innovative engineering solutions in the field of civil engineering, geotechnics, survey and geo-spatial engineering, environmental protection, construction management etc.

Our aim is to provide the best platform for the researchers to publish their work with transparency and integrity with the open-access model, and to provide a forum for original papers on theoretical and practical aspects of civil engineering and related sub-topics.

As an editor-in-chief of the Scientific Journal of Civil Engineering, it is my great pleasure to present you the First Issue of Volume 10, an open-subject issue that contains ten scientific-research papers that have passed the general review process of this journal.

These papers cover various advanced scientific topics. The first paper describes in detail the new technology for digital terrain and surface modelling applied for scanning of the entire territory of RNM. The second paper presents conclusions from the establishment of the national spatial data infrastructure in our country. The third paper explains the systematic approach of the tunnel risk management as a general concept that should include all the available information in order to obtain a quality tunnel designs. The assessment of the impact of bend type on flow characteristics is given in

the fifth paper. The sixth paper deals with the general principles of chemical soil treatment, whereby a special attention is paid to the application of lime as a chemical stabilizer. The seventh paper shows the results of the experimental research and analysed factors of influence on the shear strength of rock joints. The next two papers present two different views of the urban planning, one through the eyes of civil engineers who analyses the traffic load and the most acceptable traffic solution, and the other through the eyes of an architects who examine the aspects or urban plans that affect the changes of real estate values. The final paper points out the importance of Eurocodes as design principles and presents the results from the experimental investigations of RC elements exposed to long-term sustained loads of different intensity.

I sincerely hope that all papers published in this issue will encourage further researches on the fields.

I thank all the authors for contributing to this Issue and all the reviewers for providing detailed and timely evaluations of the submitted manuscripts.

Furthermore, I would like to express my sincere gratitude to all editor members for their excellent work, remarkable contribution, enthusiasm and support, especially during these tough times of COVID-19 pandemic. Let's not forget that tough times never last, tough people do.

Sincerely Yours,

Assoc. Prof. Dr. Marijana Lazarevska

July, 2021

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## **URBAN PLANNING AS A FACTOR IN DETERMINING AND CHANGING THE VALUE OF REAL ESTATE IN URBAN SETTLEMENTS**

The main purpose of this research was to examine the aspects of urban planning that affect the determining of real estate values and their changes, when planning the spatial development of cities and settlements. The basis for the conducted research was review and analysis of the role of urban planning and urban plans, and the significance of real estate and real estate values. Crucial for the case study were the results obtained from examining the relation between urban planning and the value of real estate and determining the aspects that influence urban planning as a factor in determining the value of real estate.

The research was conducted for the city of Skopje, as a capital and also a city based on which the urban policy of the entire country is created. The conducted case studies have been selected based on specific aspects of the urban conditions that directly affect the change of the real estate value.

The presented results showcase the significance of urban planning in the process of development planning, in terms of increasing, decreasing or changing the value of real estate and the findings can assist in making decisions within the process of creating city policies for planning, designing and managing cities and settlements.

**Keywords:** urban planning, urban plans, real estate, value of real estate

### **1. URBAN PLANING VS. REAL ESTATES**

Urban planning and real estate value are essential for the economic state and the development of cities and settlements. The correlation between them is often emphasized as important in the adoption of policies for future development in many countries, but in Macedonia it is very rarely or not clearly enough taken into consideration. Internationally, there is an extensive scientific literature dealing with this issue and the justification for certain urban interventions and

plans is examined by assessing the increase or decrease of the real estate value that would be caused by those plans. In our country, although the methodology for real estate appraisal partially covers aspects of urban planning, it still insufficiently covers and elaborates the relation between urban planning and the real estate value.

### 1.1. URBAN PLANNING AND ITS ROLE IN CREATING AND MANAGING THE DEVELOPMENT OF URBAN SETTLEMENTS

Urban planning includes the process of planning the structural and aesthetic distribution of land and buildings, in order to ensure a spacious, economic and social efficiency, health and wellbeing of inhabited places. The normative acts for this activity are urban plans that regulate the physical and spatial development of settlements, the purpose of the land and facilities, the requirements for construction of buildings and infrastructure, and thus the rights and obligations of the participants in spatial development.

Urban planning in Macedonia is a continuous process achieved by preparing, adopting and implementing urban plans, in order to provide design, humanisation of space, protection and improvement of the environment and the nature (LUP, 2020). Urban planning in our country is a regulatory system, with a hierarchy of planning documents and spatial planning, and the conditions for future development are specified from the highest planning document to the level of construction, with strict observance of the provided terms and norms.

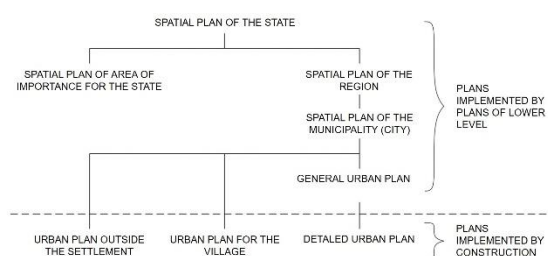


Figure 1. Hierarchical and subordinate scheme of the system of spatial and urban plans

Planning documents that regulate the space from the highest to the lowest level are: PP-Spatial plan of the Republic, GUP-General urban plan, DUP-Detailed urban plan, UPV-Urban plan for the village and UPOS-Urban

plan outside the settlement and several other types that regulate specific situations.

The provisions of spatial development are crucial for the future spatial development and construction of cities, and they refer to:

- spatial disposition,
- physical dimensions,
- purpose and manner of building, and
- land and building use.

Planning provisions that regulate the space more precisely are:

- urban boundary;
- boundary of the land-use zones;
- land-use and type of construction;
- front property line;
- boundary of the construction lot;
- build-to line;
- buildable area;
- traffic and levelling solution of primary and secondary network of streets and other traffic infrastructures;
- primary and secondary network of all utility infrastructures;
- maximal height of the buildings;
- general and specific requirements for construction, development and use of land and buildings.

The planning provisions, presented graphically, textually and numerically, define all spatial-physical parameters of the planned supra and infrastructures, as well as all the building requirements and the manners of land and building use, and thus comprise the complex of urban instruments that are practically used for planning and shaping of the space and the settlements (Grchev, 2016).

### 1.2. REAL ESTATES, THEIR VALUE AND THE METHOD OF ASSESSMENT, IN URBAN SETTLEMENTS

Real estate (English: *immovable, real estate*, German: *Immobilien*), are items that are fixed, i.e. cannot be moved from one place to another without violating their essence, so real estate is considered land and items that are mechanically fixed onto it, such as buildings, but also bridges, dams, roads, etc., and items that are organically bound to the ground, e.g. plantations and fruits until harvested.

In Macedonia, the defining and specifying the term "real estate" is treated in the laws related to real estate cadastre, property rights, property taxes and the like. According to the Law on Real Estate Cadastre, the term real estate refers to land, buildings, specific parts of buildings and other objects, as well as other

real estate that is registered in the real estate cadastre (LREC, 2013). "The methodology on evaluating the market value of real estate", prescribes that: "Real estate means residential houses (buildings for individual housing), residential buildings (buildings for collective housing), office buildings (plants, warehouses, halls and storehouses), business premises (shops), administrative buildings and administrative premises, buildings and apartments for rest and recreation and other facilities (garages, granaries, barns, stables and sheds) as well as construction land, agricultural land, forests and pastures." (MEMVRE, 2012)

Every real estate has its own value and can be subject to inheritance, sale, lease, etc., but it is also subject to tax payment, taking a loan and mortgage, etc. In order to determine its value, assessment procedures are prescribed and each country determines the basic principles and methods of assessment. The assessment can be made based on several methods, three of which are considered as main and are most often used: sales comparison approach, income approach and cost approach.

The main elements for determining the market value of a real estate are grouped in two classes:

- Basic elements for determining the market value;
- Additional elements for determining the market value.

Table 1. Basic elements for determining the market value of real estate

Basic elements for determining the market value of construction	Type of building
	Floor structure
	Roof structure
	Installation type
	Sub-floor
	Lift
	Sanitary ware
	Facade joinery (windows)
Additional elements for determining the market value of construction	Isolation and exclusivity
	Number of floors in the building
	Microlocation
	Macrolocation
	Attractiveness of the building

The basic elements that refer more to the construction aspects based on the construction type and providing physical quality of the buildings. Contrary to this, the additional elements refer to urban aspects that depend on spatial aspects and the location, the meaning and the relation of the buildings within and to the environment and other buildings and urban contents.

Given the spatial or location aspects, it is important to emphasize the significance of some of the additional elements for determining the market value of real estate. Hence, under *attractiveness* we understand increased interest for buying on a specific location, under *microlocation* we understand proximity to suppliers, health and educational centres, communication, parking space, playgrounds, sport centres etc., and under *macrolocation* is the zone in which the building is located.

When assessing the value of the buildings and the land, we consider the construction value of the buildings, as well as the location factors affecting the price of the building, characteristics depending on the wider location in relation to the city are also taken into consideration (macrolocation conditions) and location conditions of partial importance (microlocation conditions) (MEMVR, 2012). Zones for macrolocation and points for the real estate, i.e. the construction land expressed in m<sup>2</sup>, are prepared for the assessment at city level. For example, for determining the market value of real estate, the City of Skopje is divided into zones of microlocations by municipalities, which are 20, and each zone is expressed in value points.

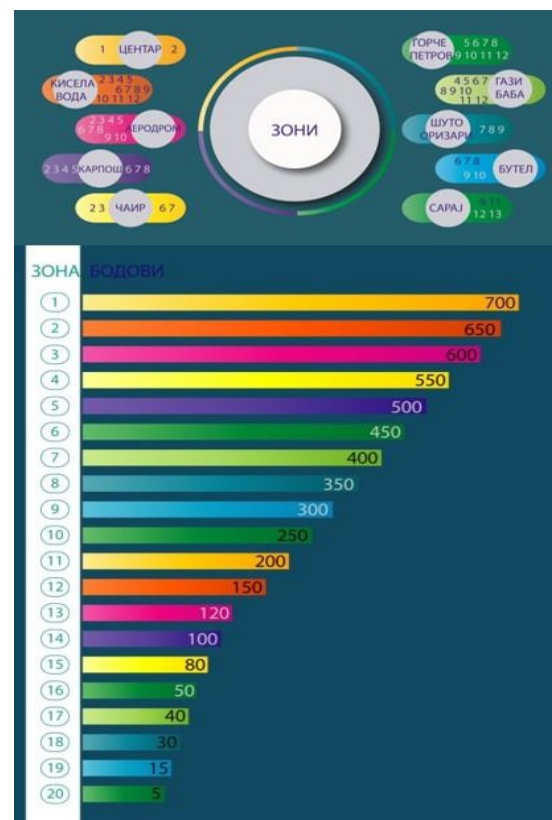


Figure 2. Zones of macrolocation in settlements in Skopje; Zones of macrolocation and points expressed in m<sup>2</sup> in Skopje

The market value of the construction land is determined based on the *Pricelist for determining the market value of construction and agricultural land*, issued by the Councils of the municipalities and the Council of the City of Skopje, pursuant to article 26 paragraph (1) from the Law on Property Tax (LP, 2004).

Table 2. Pricelist for determining the market value of construction and agricultural land issued by the city of Skopje

Construction land within the limits of the GUP of the City of Skopje and in DUP in the corresponding municipality	100 % of the price from the pricelist (factor 1).
Construction land within the limits of the GUP of the City of Skopje, and for the same no DUP was adopted by the corresponding municipality.	80% of the price from the pricelist (factor x 0.8).
Construction land that is not within the limits of the GUP of the City of Skopje, and there is an urbanism documentation (plan) for the same in the corresponding municipality with prescribed use of the building	100 % of the price from the pricelist (factor x 1).
Construction land located in an area of traffic corridor -street	50 % of the price from the pricelist (factor x 0.5).
Construction land located in an area of protected greenery, park, forest, transmission line etc.	30 % of the price from the pricelist (factor x 0.3).
If the subject of assessment is a land under a building registered in a property list, and there is an illegally constructed building on the spot that is not registered in a property list, only the value of the construction land is taken under consideration.	100 % of the price from the pricelist for construction land (factor x 1).

\*The market value of agricultural land, forests, pastures, etc., which are outside the urban plan boundary (outside the city with planning documentation), but are in the immediate vicinity of regional roads, major highways and highways, and there are nearby infrastructure facilities that increase the value of the land, then up to 50% of the determined market value of construction and agricultural land is applied.

### 1.3. URBANING PLANNING ASPECTS THAT APPEAR AS FACTORS IN DETERMINING THE REAL ESTATE VALUE

Urban plans as the main tool in providing conditions for the construction of space, i.e. urban settlements, directly affects the creation of real estate, as well as their value and attractiveness. Real estate and determining the value thereof, in turn, rely on spatial planning aspects, such as micro and macro location, availability of accompanying uses and services etc., for calculations and decisions on transactions and sales. Hence, it is important to determine the aspects of urban planning that appear as factors in creating and determining the value of real estate.

There is an extensive literature in the world that deals with the influence that spatial and urban aspects have on determining the price of real estate. Researchers' discussions go in two directions, one is which spatial (urban) factors influence the creation of real estate

and the determining of their value, and the other is how space gains quality and values driven by the creation of new values or investment in improving existing ones. Hence, the following are discussed: the real estate itself; the land and neighbourhood where they are located; distance from the centre; access to and provision of infrastructure and superstructure, utilities and services; quality of the environment, as well as about quality human communities. The research is mainly focused on investigating spatial models for calculation of impact factors and development of market modelling and monitoring tools.

In Poland, for example, the new detailed plans include an accurate calculation of the increase or decrease in value resulting from the change of zones, thus local authorities are aware of the financial consequences for this can only happen in places where public land is at least 50 present of the surface (Rechnio, 2016).

There is a noticeable interest in whether a good urban form can be capitalized on the market. If it is good, the urban form provides a higher quality of life. The monetary value of this effect shall be reflected in the price of the property as well as in other characteristics. A study examining the impacts of urban forms on property values using hedonic price analysis has been conducted (Anselin, 2002).

Hedonic price analyses are widely used to investigate the relation between urban forms and property value. The implicit marginal prices of various urban land use forms were examined by Cao and Cory (1981), taking into account the proximity of health centres, shopping malls, sports and recreation centres, proximity to transportation centres, the possibility of a secure parking space and quality infrastructural network.

In our country, the connection and the influence that urban planning and real estate have on each other is already being investigated. Pioneering research in this area is presented in the paper of Trpkovska (2017), which examines the impact of parks and urban forests on the price of residential real estate in Skopje. It uses the hedonic pricing method of multiple linear regressions that allows a detailed examination of the spatial relation between residential real estate and open green spaces (parks and urban forests). Mitev (2020), on the other hand analyses the influence of sports facilities on the prices of residential real estate in the City of Skopje that is grounded on the postulates of price



movements on the real estate market, as inseparable part of one economy.

**1.3.1 Determining the relation of urban parameters to the elements determining the real estate value**

For the needs of this research, a correlation has been established between urban planning and urban plans and real estate and the value of real estate, comparing the elements for determining the market value of real estate and the provisions of an urban plan and urban parameters.

Table 3. Correlation of the elements for determining the market value of the real estate with the urban parameters

Group of elements	Elements for determining the market value	Correlation with urban parameters
Basic	Type of building	NO
	Floor structure	NO
	Roof structure	NO
	Installation type	NO
	Sub-floor	NO
	Lift	NO
	Sanitary ware	NO
	Facade joinery (windows)	NO
	Doors	NO
Additional	Isolation and exclusivity	NO
	Number of floors in the building	YES
	Microlocation	YES
	Macrolocation	YES
	Attractiveness of the building	YES

It can be concluded that basic elements, which refer to the construction itself, have no relation to urban parameters, however additional elements are those that have a relation and should be considered when planning.

If we inspect the situation in the other direction, i.e. by looking the relation of urban parameters to the elements determining the market value of the real estate, the correlation between them can be determined.

Table 4. To correlation of the urban parameters to the elements determining the market value of the real estate

Provision/ Urban parameters	Relation to the elements determining the market value of the real estate
- Planning boundary - Limit to the planning boundary	<b>Macrolocation</b> - within the urban boundary - outside the urban boundary
- Land and building use - Land use zone - Boundary of the land use zone	<b>Macrolocation/attractiveness</b> - Zone in which the land or the building is located - Some zones are more attractive the others

	- Distance and access to other zones with activities from other accompanying content <b>Different character!</b> - Dependent on retaining or altering of the land use zone
- Construction land - Regulatory lines	<b>Different character!</b> - Dependent on whether it is located on construction land divided on lots for individual construction and use or construction land not divided on lots for general use.
- Front property line	<b>Different character!</b> - Dependent on whether the front property line remains or it shall be changed.
- Construction lot - Boundary of construction lot	<b>Macrolocation/attractiveness</b> - Zone in which the land or the building is located - Some zones are more attractive the others - Distance and access to other zones with activities from other accompanying content <b>Different character!</b> - Dependent on retaining or altering the existing cadastral parcel.
- Build-to line - Buildable area	<b>Different character!</b> - Dependent on retaining or altering the existing building - Dependent on the degree of additional construction
- Maximal height of the buildings	- <b>Number of floors of the building</b> - Dependent on the number of permitted levels <b>Different character!</b> - Dependent on the degree of additional construction
- Building coverage percentage	<b>Different character!</b> - Dependent on the degree of additional construction
- Floor-Area Ratio	<b>Different character!</b> - Dependent on the degree of additional construction
- Primary and secondary network of complete utility infrastructures	<b>Microlocation</b> - Zone which is covered or not covered with complete utility infrastructure

Based on the comparison, the key aspects of the impact of urban planning and urban plans on real estate and their value are extracted and the general aspects according to which further examination is conducted are:

- Location (macro and micro, land use zone, connectivity to other needs and attractive contents etc.)
- The scope of changes (existing/new, confirmation/cancellation, decrease/same/increase, change of land use zone, etc.)
- Equipment (unchanged/increased volume, type and quality, additional purposes and connections in the environment, etc.)
- Attractiveness (retention/change of spatial concept, retained spirit of the place/improved/disturbed etc.)

## 2. CASE STUDY - CITY OF SKOPJE

The study of examples, in order to analyse urban planning as a factor in setting and changing the real estate value is conducted for the area of the City of Skopje. The City of Skopje as a capital is a city that is developing with high intensity and where there is most intensive building. The phenomena occurring with regard to its spatial development are the incentive behind creating an urban policy in the whole country and it is reflected in other settlements.

### 2.1 METHODOLOGY

The research was conducted through:

- Selection of aspects to be considered. Several aspects have emerged from the research, but due to the scope, five key ones have been singled out.
- Collection, review and selection of documents. Used were: General urban plan of the City of Skopje (2012-2022), detailed urban plans for the areas of the selected examples, relevant material referring to the chosen examples etc.
- Analysis of individual examples and field work to check the situation.
- Synthesis of the obtained results and presentation thereof.

Publicly available data, cadastral data, GIS tools and field research were used for the research. The criterion for selection of examples is the diversity and richness of possible arguments.

### 2.2 ANALYSES OF INDIVIDUAL EXAMPLES

The analysis was conducted based on 5 separate aspects:

1. Expanding the urban construction area and changing the manner of using the surrounding land.
2. Changing the land use within the planning scope.
3. Change of cadastral lot (CL) in urban plans and defining the construction lot.
4. Layout of construction land for public use and their interdependence and mutual influence.
5. Affect of the open green spaces, as a desired quality in urban areas.

#### 2.2.1 Expanding the city construction region and change in the manner of use of the surrounding land

When planning future spatial development of settlements, in the urban plans for settlements

(GUP and DUP for Skopje and cities; UPV and UPOS) it is essential to determine the planning scope, i.e. The boundaries of the planning scope. Automatically, everything that enters within the borders becomes a construction area and subsequently the value of the land and the buildings as real estate found in that area change.

We have investigated part of the village area of Vizbegovo, Skopje, where the inclusion of agricultural land within the city directly affects the value of this land. Specific for the location is that for many years this part has not been used due to lack of infrastructure and has not been developed through a detailed urban plan. After the connection to the Bul. Slovenia, this location became attractive and the prescribed uses are M (A+B) - Mixed: A - housing and B - commercial and business use.

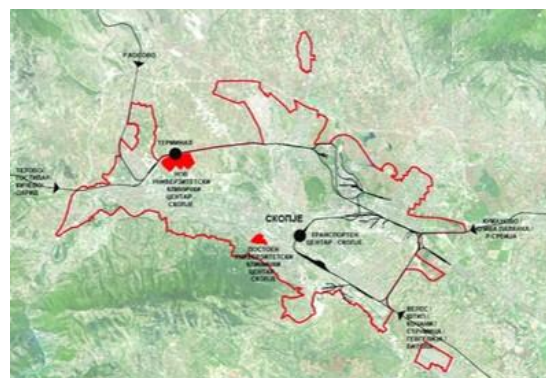


Figure 3. Limits of planning boundary of the City of Skopje - GUP of the City of Skopje 2012-2020



Figure 4. Satellite image of part of the village Vizbegovo and planned expansion of the limits of the planning boundary in the GUP of the City of Skopje Satellite 2012-2020

The implementation of the planning solutions means a change in the value of the land and the large number of illegal constructions here are in the process of or have already been legalized. The data show that the price of land in the village Vizbegovo was around 1000 MKD per m<sup>2</sup>, but with the conversion of land use into construction the price rose up to around 5000 MKD per m<sup>2</sup>.

Such a transformation has a positive effect if there is interest in using this land for construction and the corresponding planned use, and the owners can have material benefit from the sale or use for their own needs. But, otherwise it can have a negative effect, which is the land being "captured" and devastation, if there are no conditions to use it, it has an inappropriate use or the surrounding use or construction violates its primary conditions.

### **2.2.2 Change of land use within the planning boundary**

The term land use means manner of design, construction and use of construction land and buildings in accordance with the activities that are performed and take place in them. According to the Rulebook on Urban Planning (RUP, 2020), the system of usage classes is composed of six groups: A - Housing; B - Commercial and business uses; C - Public Institutions; D - Production, distribution and services; E - Greenery, sport, recreation and memorial spaces; and E - Infrastructure.

The selected example is located in the city quarter Court Palace, in the Municipality of Centre, covered by the DUP for the city area CS 08 (2011). Located in its proximity are large public buildings Macedonian Radio Television, and in it a gas station and a neglected production facility.

The General Urban Plan of Skopje (2012-2020), prescribes M (A + B) use for this location, i.e. Mixed usage: A - Housing and B - Business and commercial, and the Detailed Urban Plan prescribes for the parcels on which the deserted building is located the land use B4- business premises.

This location became extremely attractive based on to the use prescribed in the plan, but also based on the areas and floors that are allowed for construction. This multiplies the value of the land and future buildings.

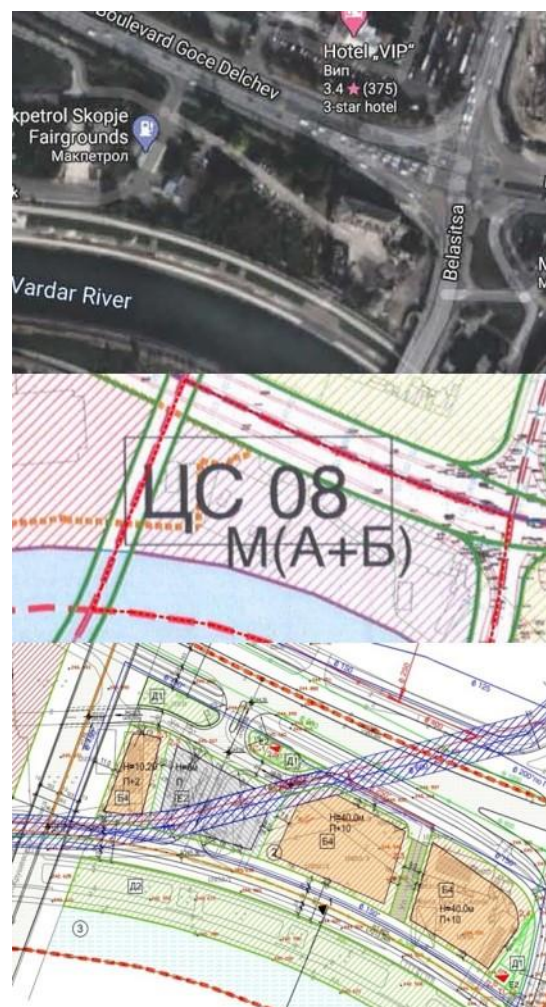


Figure 5. Satellite image of the city quarter Court Palace 2 (CS 08), excerpt from GUP Skopje 2012-2020 and DUP for CQ CS 08-Court Palace 2.

But question is why is there no construction there. The reason behind this is the fact that the location has bad access, but even more so that the investor who is interested in building is looking for other uses, namely B5 hotels. The municipality, on the other hand, considers such use to be inappropriate, given that the famous hotel Continental, which has been unused for many years is located here and that this will reduce its value. Furthermore, the local government considers that this is the right place to accommodate student facilities, due to its proximity to the University campus and the group of natural science faculties.

This disharmonisation of opportunities necessitates and requirements results in this "expensive" city land not being able to exploit its value.

### 2.2.3 Change of cadastral parcel (CP) in urban plans and defining a construction lot

In urban planning and designing urban plans, two titles or conditions of the parcel are distinguished. One is CP - cadastral parcel, the other is CL - Construction lot. *Cadastral parcel* marks the parcel in its current state and “cadastral parcel” is the main cadastral unit that is part of the land, defined with borders, and is located in one of the cadastral municipalities and it belongs to specific holder/s of the ownership right” (RCPIF; 2013). On the other hand, „*Construction lot* is the smallest unit of construction land that is formed by an urban plan and on which construction of a building is planned and/or a building is already built, where the lot is limited by the front property line and the boundaries of the construction lot and covers the land under the building and the yard or land for regular use of the building “. (LUP, 2020).

In urban planning, the main design of land is construction and its smallest spatial unit is construction lot. The following conditions must be met: to be located next to land for general use (street), and to have dimensions and shape appropriate to the purpose for which it will be used. Hence, the construction lot does not need to correspond with the cadastral parcel. In order to meet the conditions for a land to become a construction lot, cadastral parcels are often subdivided, consolidated or fragmented.

As an example of *consolidation*, we took the city quarter Novo Maalo, in municipality Centre (DUP I 01, 2019). The situation is that there are still small parcels and small houses, and due to their size and having many owners, the previous urban plans have not yet been implemented. DUP for CQ I 01-Novo maalo 1, provides for consolidation of the parcels, which enables the formation of larger construction lots allowing for more height and a large construction area. The gained height is number of floors up to GF+6, contrary to the existing ones which are GF. This is expected to attract investors who would build, and who until now had no interest in building on small parcel that allowed only for small scale of building.



Figure 6. Satellite image of part of the city quarter Novo maalo 2 (I 02), excerpt from the Detailed Urban Plan for CQ I 02- Novo maalo 2.

Such consolidation can bring more value to the land, especially due to the current great interest in building residential buildings, but on the other hand there is a problem in negotiating with many owners. Most often, construction lots are built where there are fewer owners or part of the lot is state owned, which is sold at a very low price.



Figure 7. Satellite image of part of the city quarter Rasadnik (J 14), in the municipality Kisela Voda and excerpt from DUP for CQ J 14 -Rasadnik.

In the second case – *fragmentation*, we took the example of Rasadnik - Kisela Voda. In the current state, this part still has a large area that has not been built. The same location according to DUP for CQ J- Rasadnik, municipality Kisela Voda is planned with large number of parcels and use A2- Housing in residential buildings (DUP J 14, 2019). The surface of the former plant nursery is divided into smaller construction lots and they are planned with number of floors from GF + 6 to GF+12. The land increased its value, especially since it is easy to transform it from agricultural to construction and has a smaller number of owners.

### 2.2.4 Securing and even distribution of construction land for public use

The basic functions in the city - housing, production and sports and recreation, cannot exist independently. They need the so-called accompanying functions that enable their functioning. Hence, urban planning has a special role in providing space for locating them in the city, as an activity of public interest. Namely, every residential settlement must contain: Buildings for social protection, health, trade, sport and recreation, transport. In addition, it is necessary to provide adequate infrastructure and suprastructure.

The provision of these accompanying functions is crucial for choosing where to live or work, or spending one's free time. Hence the attractiveness of certain parts of the city and thus the greater value of real estate.

As an example we can point out the attractiveness of the city quarters where all the accompanying functions are provided and are easily accessible on foot. For example, the city quarter Bunjakovec has two kindergartens, a primary school, a high school, a polyclinic, a shopping centre, two supermarkets and in the immediate vicinity a green market, a library etc. Around 12.0000 inhabitants live in the city quarter Bunjakovec, and have easy access to all the necessary accompanying functions.

However, according to current detailed urban plans, DUP Bunjakovec 1 (2012) and DUP Bunjakovec 2 (2012), having in mind the gross developed area for construction, the number of inhabitants would increase up to 30.000. Within the territory of Bunjakovec, there is currently an undeveloped area only on the parcel of former factory Treska, and at that location, the urban plan prescribes A2 housing in residential buildings, where there is a possibility to house as many as 4.000 new

inhabitants. This jeopardizes the equipment of the quarter and can drastically reduce its quality and attractiveness. The plan does not provide accompanying functions, except for commercial-business, as compatible use within the residential buildings themselves.

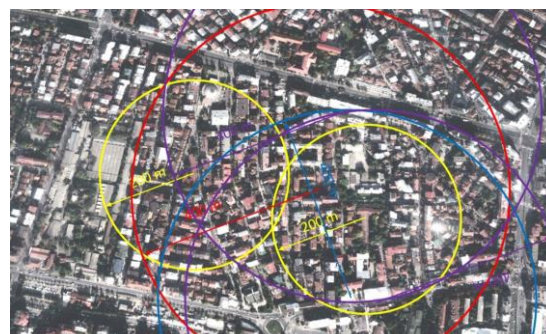


Figure 8. City quarter Bunjakovec. Access to existing functions: yellow - kindergartens 200m; red - schools 400 m; blue - emergency 400 m; violet - stores and markets 400m

From the point of view of landowners, the value of real estate increases many times over and there are conditions for great profit. But, on the other hand, the large offer of housing, and with conditions that will not meet the needs of the new residents, and will endanger the needs of the existing residents, the question is whether the real estate value shall remain high in the future.



Figure 9. DUP Bunjakovec 1 - Location factory Treska. Comparison between the ruling plan as of 2012 and the proposed plan as of 2016.

The downside is that such availability of functions attracts external users and creates congestion. But the biggest disadvantage is the provision of parking spaces. By changing the legislation in the field of urban planning and the non-compliance of urban plans with it and the situation on the ground, unfavourable conditions have been created for the provision of parking lots. Hence, the attractiveness of this area of the city has been reduced.

Furthermore, the problems coming with the additional intensive construction can be very well expected, which in turn is not followed by the provision of additional accompanying functions, but relies on the existing ones. This can affect the decline in attractiveness, and thus the value of real estate. Therefore, the recent DUP proposal provides for reserving of part of the construction area for contents of public character - kindergarten and green spaces.

### 2.2.5 Impact of the open green spaces on the real estate value

The cities in Macedonia, and especially Skopje, in recent years have become world leaders in pollution, which makes the need for green space a top priority. Citizens faced with the problem of enormously polluted air, see salvation in the use of green city oases and increasingly base their decision on where to live or work on whether there are green public spaces in the immediate vicinity. Providing new green spaces, as well as the rehabilitation of the existing ones, is crucial today in the preparation and adoption of new urban plans.



Figure 10. Satellite image of the city quarter Novo Lisice and DUP for CQ JI 01

The example of Central Park in New York is known worldwide, where the price of real estate is the highest in its immediate vicinity and the price decreases as it moves away from it (Trpkovska, 2017). In Skopje, for example, the settlements of Aerodrom and Novo Lisice are attractive, where the central part provides large green spaces.

This part of the city is further becoming attractive and coveted space for living, due to the equipping of the sport and recreational spaces along the river Vardar, city quarter JI 01 (DUP JI 01, 2014). Although the land is intended for open green spaces, the possibility to design sports fields opens the possibility for profit and real estate can provide greater value. This is an example of how even on land where it is not built or very little is built on, can have an increase of the real estate value.

### 3. CONCLUSION

The research shows that the role of urban planning should be reconsidered and the repercussions that planning solutions will have on real estate and their value must be taken into consideration when designing urban plans. Namely, the clients and developers, as well as all stakeholders involved in urban planning and the process of adopting urban plans, should take into account the relation between *urban instruments and real estate value*, which is an important economic factor, but also social and environmental one. However, when deciding or determining the methodology for assessing the value of real estate, the categories of micro and macrolocation conditions should also be incorporated or at least expanded. The current methodology does not reflect the essential impacts of urban planning.

It seems that the cooperation and integration of the two stakeholders should be further developed and expanded. The two sectors should be in constant contact and in the future an easily accessible database should be built, of course assisted by GIS technology and similar tools, which would facilitate decision-making in urban planning and development of urban settlements.

## REFERENCES

- [1] Anselin, L. (2002) "Under the hood: Issues in the specification and interpretation of spatial regression models," *Agricultural Economics*, Blackwell, 27(3), 247-267.
- [2] Cao, T. V. and D. C. Cory. (1981) "Mixed Land Uses, Land-Use Externalities, and Residential Property Values: A Re-evaluation", *Annals of Regional Science* 16: 1-24.
- [3] GUP SKOPJE (2012) General Urban Plan for City of Skopje 2012-2020, City of Skopje, Skopje.
- [4] DUP Bunjakovec 2 (2012) Detailed Urban Plan Bunjakovec 2, Municipality Centar, Skopje.
- [5] DUP Bunjakovec 1 (2012) Detailed Urban Plan Bunjakovec 1, Municipality Centar, Skopje.
- [6] DUP I 01 (2019) Detailed Urban plan for City Quarter I 01-Novo Maalo 1, Municipality Centar, Skopje.
- [7] DUP J 14 (2019) Detailed Urban plan for City Quarter J 14-Rasadnik, Municipality Kisela voda, Skopje.
- [8] DUP JI 01 (2014) Detailed Urban plan for City Quarter JI 01-, Municipality Aerodrom, Skopje.
- [9] DUP CS 08 (2011) Detailed Urban plan for City Quarter CS-Court Palace, Municipality Centar, Skopje.
- [10] Mitev, Simon. (2020) „The influence of sports facilities on the prices of residential real estate in Skopje “, Master thesis, Real estate management, Faculty of Civil Engineering, University Ss. Cyril and Methodius, Skopje.
- [11] MEMVRE (2012) „Methodology for estimating the market value of real estate “, Official Gazette od RM, 54/2012.
- [12] RCPIF (2013) „Rulebook on cadastral plans and infrastructure facilities “, Official Gazette od RM, 139/2013.
- [13] RUP (2020) „Rulebook on Urban Planning “, Official Gazette od RM, 225/2020.
- [14] Rechnio, Renata. (2016) “The Polish experience in developing House Price Index”, Meeting Paper Meeting of the Group of Experts on Consumer Price Indices – Geneva 2016, Central Statistical Office of Poland.
- [15] Trpkovska, Aneta. (2017) „Impact of parks and urban forests on the prices of residential real estate in Skopje “, Master thesis, Real estate management, Faculty of Civil Engineering, University Ss. Cyril and Methodius, Skopje.
- [16] 3KH (2013) „ Law on Real Estate Cadastre “, Official Gazette od RM, 55/2013.
- [17] LUP (2020) Law on Urban Planning, Official Gazette od RM, 32/2020.