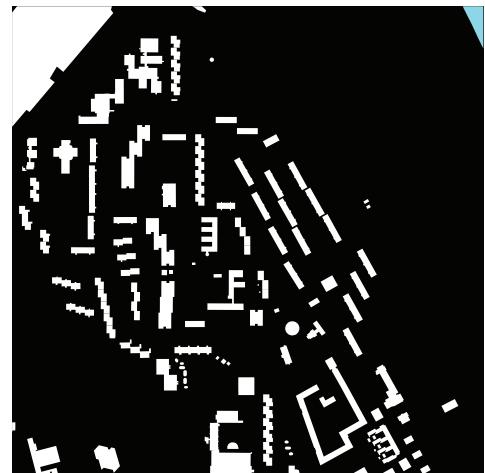


# The urban transformations of post-socialist Dunaújváros

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# The urban transformations of post-socialist Dunaújváros

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This paper deals with the urban transformation of Dunaújváros, a Hungarian city that was planned as an ideal industrial town during the country's period as a socialist republic. Within a time frame of 60 years starting from the city's foundation in 1950, the research investigates how this example of a post-socialist city was able to adapt architecturally and spatially to the new affordances brought by the change of political, economic and societal system. The parallel development of the old village and the new socialist town located next to each other allows for direct comparisons between an unplanned and a planned settlement. After a general introduction to the socialist city concept and the history and morphology of Dunaújváros, the study focuses on the development of its centres. This commences with an empirical notion of centrality that suggests the old village seems to have lost its significance today as a centre in comparison to the centre constructed during socialism. This perception is examined on the basis of spatial configurational models of different time periods, which are created from a range of historical maps. Methods of comparative study and space syntax are used for spatial analysis and are compared with empirically collected data on land use. Finally, the article discusses what tendencies of development can be drawn out from this analysis of Dunaújváros and what potentials the used methodology has for post-socialist cities and their centres in general. Through the example of Dunaújváros, the paper attempts to approach the major challenges that many post-socialist cities and their centres are facing today due to a shift from a precisely planned to an emergent state of development under new general conditions.

*Keywords:*

*Space syntax,  
Hungary, socialist  
city, symbolic and  
instrumental towns,  
public space.*

## 1. Introduction

Post-socialist cities were initially developed and then existed in laboratory-like conditions: precisely planned, highly controlled and isolated from market forces and emergent developments. Many of these cities were then 'released' at almost the same time from this state and were suddenly exposed to the same forces that had shaped grown cities. This brought about completely new general conditions for the development of these cities and new functional necessities, to which they had to adapt. The paper deals with this challenge of adapting through an exploration of the post-socialist city of Dunaújváros in Hungary.

Dunaújváros has 48,000 inhabitants and is located on the Danube, about 60km south of the capital Budapest. It serves as an interesting case

study of a post-socialist city since today it consists of two clearly defined parts: the old village that grew organically and the new town which was planned under socialism as a showcase of a socialist industrial city. This allows for direct comparisons between these two types of towns. The paper deals with the challenges that the old grown village and its centre have faced due to the construction of a new idealist socialist town right next to it during the 1950s. It focuses on the relationship between the old and the new city centre over time while major political, social and economic changes took place. Such comparisons at different moments in history should make it possible to discern developmental tendencies.

The research deals with the urban transformations that took place during Dunaújváros' transition from a socialist to a post-socialist city from the 1950s up until today. The focus of this study is public space, which played a decisive role in the socialist city. Huge public spaces with grand axes were designed to accommodate rituals that constituted an important part of life in the socialist society. A starting point is Bill Hillier's theory on symbolic and instrumental towns, which distinguishes between cities primarily planned for representational functions and cities based on trade and exchange. The first reproduces existing social structures in space; the second is much more an on-going, interlinked process of production and reproduction of social and spatial structures. Here it is speculated that while the socialist city could represent a symbolic extreme, the post-socialist city could be in the state of becoming an instrumental town. The analysis seeks to answer whether the ceremonial axes of Dunaújváros have also been part of the city's centre. Both the investigation of potential human activity and the actual distribution of commercial land use should clarify if, and in what way, the city has proven to be adaptable to the new challenges and where the centre of the city could be located in the past and present. The outcomes of these questions could be crucial for other post-socialist cities that have not yet gone through all these stages of development, providing a powerful argument for shaping the transformation of post-socialist cities in the future.

The study starts with an introduction to the principles of the socialist city and describes the transformation of the city after 1989 through existing literature in this field. The planned socialist city already differs from the organically grown city in its origin. While trade and commercial use are driving elements and functions of the growing city (Hillier, 1996, p.171), socialist cities are planned as the ideal place for the socialist society, providing equal

opportunities for everybody (French and Hamilton, 1979, p.200). After the fall of socialist regimes in Central and Eastern Europe, the introduction of land rent and privatisation led to major spatial and functional restructuring (Stanilov, 2007, p.3-17). While the clear zoning of uses and hierarchy of space was intended to serve as a defined concept of ideal society and a pre-determined concept of behaviour in space, the post-socialist city had to negotiate social life in public space anew. Whereas everyday life in the socialist city was highly organised, surveyed and controlled, the young post-socialist society was confronted with a new kind of freedom allowing for greater individuality. Barbara Engel describes this shift as a growing 'tension within the fabric of the city between planned and unplanned activities, [and] formal and informal places' until the fall of communism (Engel, 2007, p.289).

After the introduction of the methodology and data, a brief history of Dunaújváros explains the city's planning context and political and economic changes. Section 6 presents the analysis of the city, starting with a more general description and moving on to a comparative study of the city's environment and the character of the different districts based on building typologies and the distribution of public space. In the next section, space syntax analysis is used to understand the spatial transformations of the city and how centrality has shifted over time. Focus is given to the comparison between the old village and the new socialist town. The two final sections provide a concise overview of the results and discuss them in a larger context.

## **2. The planned socialist society and socialist cities**

After World War II, several countries in Central Eastern Europe (CEE), including Hungary, adopted a communist regime under the influence of the Soviet Union. The revolutionary rather than evolutionary shift from a previously capitalist to a socialist economic system was intended to allow for the

rise of a classless society. The city was meant to become the 'necessary environment for achieving the perfection of a socialist society' (French and Hamilton, 1979, p.7). Besides the restructuring of existing cities, about 1200 new towns were built in socialist countries (*ibid.*, p.6), 120 of which were in Eastern Europe and 12 in Hungary (Kerékgyártó, 2010a, p.160). Aladár Sós argues in the context of Hungarian socialist town planning that life had become too complex and therefore cities needed to be planned. While grown cities develop into a 'harmonious whole' over time, planned cities need to be 'harmonised' in advance (Weiner, 1959, p.37).

The major aims in planning a socialist city were to provide equal access to resources and avoid any social segregation by demanding the same rent from everyone. However, several authors have proven that the situation was different in reality (Szelenyi, 1983; Dangschat, 1987; Smith, 1996). Since the state was in full control of what was being built, newly built socialist cities like Dunaújváros make especially interesting case studies when trying to understand the relationship between the ideals of socialist society and the socialist city. The city was based on a 'spatial ordering of functions' as described by French and Hamilton:

'Industry and residence should be physically separated from each other by "green, or isolation, belts", yet located in sufficient proximity to each other to minimize the journey to work. Service functions should be distributed rationally, too, with daily needs met by local facilities within each residential neighbourhood, weekly requirements satisfied by establishments sited in a district service centre (usually located to serve between four and ten neighbourhoods) and less-frequent needs provided for by specialised services in the city centre.' (French and Hamilton, 1979, p.7-9)

Besides the logical organisation of uses, socialist cities also had similar concepts of how public space should be structured. Barbara Engel describes how public space was a priority compared

to private space through the example of new cities in Russia called 'Blue Cities' that were built between 1955 and 1975 (Engel, 2007, p.288). While in socialist cities public space makes up three-quarters of the total area, the ratio of public space to the total area in Western cities is 1:3 (Stanilov, 2007, p.270). Public space in capitalist cities tends to be concentrated in the centre of the city, while in socialist cities it is more dispersed (*ibid.*, p.270). Engel describes how public space was extended, reaching people's front doors by placing communal facilities in the middle of courtyards for example.

Another typical aspect of public space in 'Blue Cities' is their scale, 'reflecting superhuman power of government rather than the daily needs of the residents' (Engel, 2007, p.288). Engel refers to Rüthers when she says that 'these spaces were frequently used as a grand stage for numerous political parades, festivals, and public celebrations showcasing the advantages of the socialist system' (*ibid.*). Stanilov criticises these urban plans for providing 'undifferentiated open spaces' that needed to be 'infused [...] with ideological meaning' (Stanilov, 2007, p.271). The clear opposite for him are public spaces in Western cities 'where social interaction is supported and induced by commercial activities' (*ibid.*). This relation within the city as a place for trade dates back to its beginnings. Therefore the fact that after the fall of the socialist regimes in Central and Eastern European countries the market fought its way back to the public space seems a logical consequence.

The aforementioned literature suggests that socialist spaces were planned rather for ritual and organised uses than for everyday life. It was further mentioned that scale is the decisive spatial characteristic that renders these spaces more appropriate for exceptional festivities. Certain functions of public space like trade were centrally suppressed. The discussion leaves the question open as to whether it is only scale that makes spaces more representa-

tive and inappropriate for everyday life. Are these spaces also able to accommodate the uses of the post-socialist city?

### 3. Post-socialist society and post-socialist cities

Numerous publications in recent years try to track socialist cities' transformations since 1989, and point out similarities in urban developments of Eastern European countries. Ways of measuring continuities and reformations often rely on demographic or economic data. However, publications on transformations in this region dealing with 'changes in urban form and structure' have been rare, as Stanilov states (Stanilov, 2007, p.3). The reasons he cites for this phenomenon are twofold: economic and political issues were seen as crucial for social reforms, while urban form was viewed rather as a consequence of these factors. Secondly, transformations in urban form take a long time (*ibid.*, p.4).

New requirements and uses reshaped the urban landscape in several ways, introducing elements of the capitalist city. At the same time, post-socialist cities were not simply westernised since these cities could not be rebuilt (*ibid.*). Stanilov identifies two determinant factors which lead to similar restructuring of urban spaces and uses in former socialist cities: the 'privatisation of assets' and the 'introduction of land rent' (*ibid.*, p.73). The former socialist city centres were the places where most of the administrative and commercial functions were located. These places became especially attractive for investors. Therefore rents drastically rose and forced residents and other uses to leave the centre and settle at the city's periphery. Many post-socialist city centres were transformed into central business districts that contained mainly commercial and less residential uses (*ibid.*, p.76). Uses requiring larger spaces like new industries or hypermarkets took the chance to compensate the lack of retail in the city centre (Tsenkova and Nedović-Budić, 2006), settling at the city's periphery.

Stanilov's investigations are made from a planning point of view. He strongly relates urban form to economics and deals with the political and administrative aspects of urban transformation. In general, the literature has shown that the transformations of socialist cities could be mapped through the study of redistribution of functions and their relation to economic and demographic data. However, the literature seems to lack a consistent study of the relationship between the spatial transformations and the accommodation of new functions on different scales.

### 4. Research methods, data and theories

The following analysis focuses on the spatial and social transformations of Dunaújváros and their relation from the beginning of the new city in 1951 up to today, 2012. It starts with a general description of the city's political and economic development and recalls its turbulent planning history. The following section describes the different building periods, their building typologies and their types of built and un-built space.

Public space is then represented and analysed through a series of maps that were drawn on the basis of a selected historic set (c.1959, 1964, 1974, 1983), which were produced by the National Cartography Corporation (Kartográfiai Vállalat, Budapest) and provided by the local library in Dunaújváros. The latest city map from 2010 was provided by the Office for Planning and Environmental Protection of Dunaújváros (Főépítészi és Környezetvédelmi Osztály) and complemented by cross-checking with 'Google Maps'. The years 1959, 1974, 1983 and 2012 have been selected as stages of greater building development and major changes in the city's fabric.

In order to analyse the aforementioned relationship between space and society, the theories and methods of space syntax are used. Space syntax considers space not as the 'background', but as

'intrinsic' to human activity (Hillier and Vaughan, 2007, p.208). It is a constant negotiation between spatial and social features that make the city an evolutionary process. Space syntax theory has a 'configurational' approach to space. It understands the city as a system of spaces that are highly related to each other (*ibid.*). The configuration of the urban grid has an effect on the distribution of co-presence and movement based on the fact that some spaces are more 'privileged' for movement. This phenomenon is called 'natural movement' in space syntax theory (Hiller et al., 1993). It can be measured by *integration* on a global and local level, which indicates the potential of a space for being a destination; and it can be measured by *choice* on a global and local level, which conveys the potential of a space as a route for through-movement (*ibid.*). Both values are based on a set of different measurements of distance and accessibility, which ultimately predict movement and encounters based on probabilities.

The following means of spatial representation are used in order to make the mentioned measurements possible. Space can be split up into 'convex spaces', in which 'all points can see all others' (Hanson and Conroy Dalton, 2007, p.206), also described as the 'fattest' and 'fewest' spaces (Hillier and Hanson, 1984, p.17). An axial map consists of the longest and fewest straight lines that are necessary to pass through all convex spaces (*ibid.*, 1984, p.17). This study also uses segment maps, which are derived from the axial model and give a more detailed representation of the spatial structure.

The historic axial and segment maps of Dunaújváros are generated with a method developed by Paulo Pinho and Vitor Oliveira (Pinho and Oliveira, 2009), whereby the present-day map is adapted to earlier stages in history. Geographical information system software (QGIS) is used for the reconstruction of these maps. The analysis attempts to describe the city's transformation and

how it adapted to political, social and economic changes. The presence of the old grown village and the planned socialist city allows direct comparisons between two types of geometry, rooted in different social, economic and political periods.

Axial and segment analyses are used to address two questions: was the centre of the newly created city only the symbolic centre or did it also function as a centre; and how did the centre of the old town change and relate to the new part of the city? For this investigation, the study uses the terms of Bill Hillier who distinguishes between two types of spaces: symbolic spaces representing an existing social structure; and instrumental spaces that generate new social structure. 'Social reproduction, [...] requires symbolic forms of space, social production instrumental forms of space' (Hillier, 1996, p.177). These types of spaces can be found in two kinds of towns: ones 'which act as centres for the processes by which society produces its existence by making, distributing and exchanging goods, and those which act as centres for governing institutions, regulating bureaucracies and dominant ceremonial forms, and through which society reproduces its essential structures' (*ibid.*, p.171). Frederico de Holanda studied an extreme example of a city dominated by institutional functions, the planned city of Brasilia. Here he uses the term 'formality to refer to social orders which present strong insulation of agents and/or practices in space as well as in time, marked social asymmetries, ultimately strong authority' and contrasts it with the term 'urbanity to refer to societies with marked interchange ability of social roles, negotiation, equality' (de Holanda, 1997, p.08.3.). According to Hillier's theory, the introduction of trade after the change of regime could suggest a shift from the symbolic to an instrumental city.

## 5. Historical background of Dunaújváros

In the course of Hungary's first five-year plan (1950-

1955) the new communist government decided to establish a new city for the steel industry, despite lacking the necessary natural resources and having to import them from the Soviet Union. A site south of the old village of Dunapentele was chosen (Erdős and Pongrácz, 2000). The loess ground, a porous and friable soil that had previously been used for cultivation, was unsuitable for building and caused a lot of problems with major landslides in the 1960s (Kerékgyártó, 2010a, p.160). As a consequence, the embankment of the Danube was reinforced and a building ban along the Danube was later introduced.

Being one of 12 new towns built in Hungary during its time of socialist government, Dunaújváros was planned as the ideal city as it was conceived during the brief Stalinist period and according to the aforementioned principles of socialist cities. During this period, modernism, which had been also established as an architectural movement in Hungary during the 1920s, was considered 'middle-class, unprogressive formalism'<sup>1</sup> (Zólyom, 2010, p.160). The classicist style of socialist realism as a countermovement to constructivism and modernism (Åman, 1992) reintroduced a smaller, more human scale with an axial arrangement of perimeter blocks of not more than four storeys and monumental public buildings. The building materials were traditional and high craftsmanship was used (Kerékgyártó, 2010b, p.108).

The architect Tibor Weiner, who had studied at the Bauhaus in Germany, was commissioned to develop the master plan for Sztálinváros and became city architect of Dunaújváros, which he remained until his death in 1965. His writings give an impression of how his plans modulated between the strong political ideologies and his planning ideals (Weiner, 1959; Zólyom, 2010, p.159, 160). In the course of these political disputes over architecture style, the plans for the city centre and its main square had to be revised 20 times and were only partly realised in a simplified version after his death by another

architect. The plans for the whole city also needed numerous revisions due to underestimated immigration. While the city was first planned in 1950 to house 25,000 people, by 1952 there were already 40,000 inhabitants. Job opportunities and good quality flats were the city's magnet. The different periods of the city's expansion are still easily noticeable today, as also described in section 6.1.

During the 1970s and 1980s, the first adaptations of the planned city occurred in parallel to an easing of centrally planned economy in Hungary. The lack of services and shops was met with transformations of residential spaces to host these functions and with the building of supermarkets and the first shopping centres on green corridors that were originally meant to be kept free. After 1989 these changes intensified and accelerated with huge supermarkets being built both in the centre and on the city's periphery.

After the change of the political regime and the economic system in 1989, reorganisation of the economic sectors started later compared to other Hungarian cities due to the continuing operation of the steel factory as the main employer (Varga, 2012, p.26). A major growth in unemployment was only noticeable from 2001; however, the opening of a tyre factory north of Dunaújváros again increased job opportunities in 2007 (*ibid.*, p.26). The population peaked during the 1980s with 60,000 inhabitants. Especially during this time, empty plots in the district Újváros filled up with single-family houses. Today the city is enclosed from all four sides by political borders to the north, Danube east, industry south, and the Highway 6 and M6 running from Budapest to Croatia to the west, making major growth impossible. Since the second half of the 1990s the population has steadily declined, also due to ageing (Figure 1).

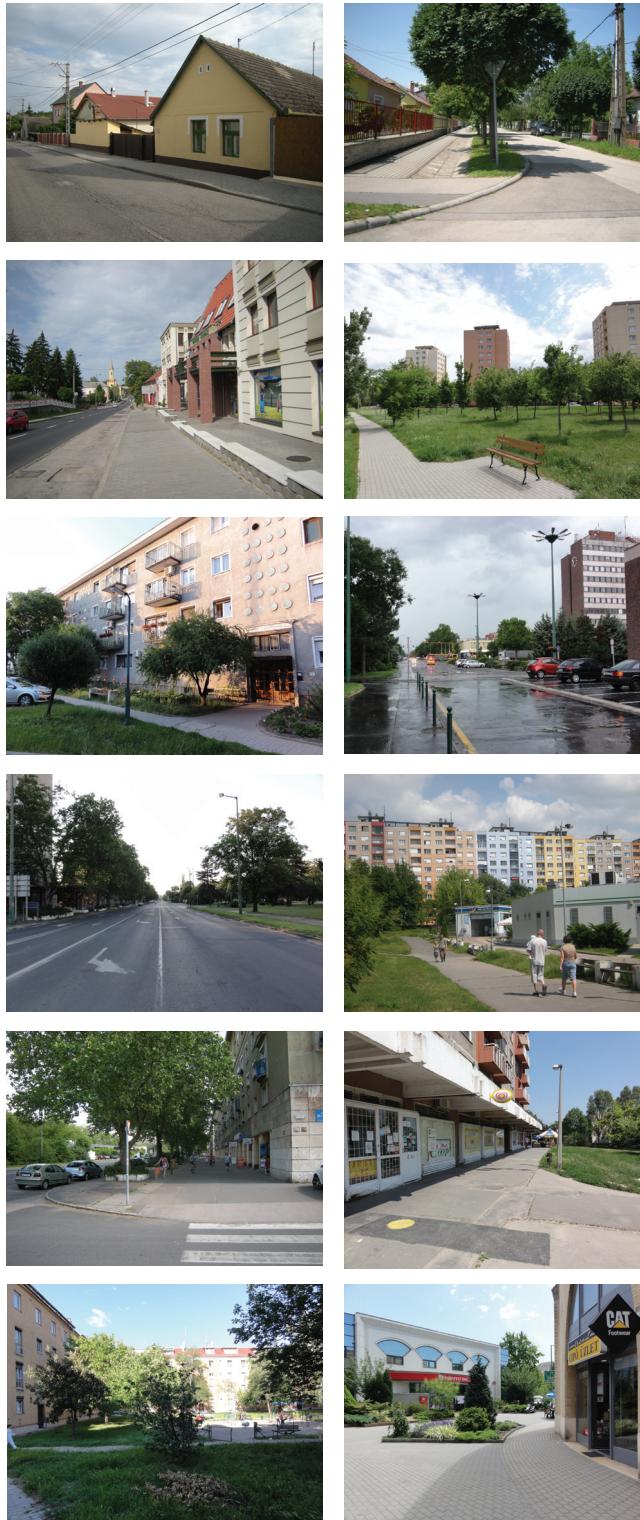
Today, everyday life in Dunaújváros continues to be dominated by the steel factory, with rushes of people moving through the city every eight hours at

**Notes:**

<sup>1</sup> Original: 'bürgerlich-reaktionären Formalismus'. Translation by the author.

**Figure 1:**

Photos showing parts of the city built in different chronological periods (ordered chronologically from top left to bottom right).



the change of shift. Numerous empty ground floor spaces are witnesses to change. Vasmű út with its decorated buildings that used to be the main destination for young families on Sundays (Horváth, 2004) seems to have lost importance, whereas other areas of the city are vibrant. The following analysis aims to study these new phenomena through the notion and characteristics of centrality.

## 6. Analysis

### 6.1. General description of Dunaújváros' settlement layout

The city's spatial layout is strongly influenced by topography. While the old town was built almost at the same level as the river Danube, the newly planned parts of the city were erected on a plateau which rests about 50m above the river. The valleys running through the city are also visible as gaps in the settlement layout, which separate different areas (Figures 2 and 3). Major traffic routes follow these valleys and connect the different areas with each other. The segments on these routes seem to have a low frequency of street junctions and therefore long segment lengths. This shows how the topographical difference seems to have a major impact on the accessibility of the town's different parts (Figure 3). At the same time, the topographical height difference creates a visual relation between the old part of the town, called Óváros 'down there' and the high rises of the socialist part of the town 'up there'.

The different building periods of Dunaújváros are still clearly visible in the different districts of the city today. Strongly influenced by changing architectural styles, each period has a distinct building typology, which is also visible in the buildings' footprints (Gábor et al., 2007). In addition, hardly anything has been demolished since 1951. The contemporary map shows the different building periods in a colour range and the industrial areas

in grey (Figure 2). The oldest remaining buildings in Óváros are detached houses with private gardens. The earliest period of planned housing is characterised by I-, L- or U-shaped blocks of flats with a maximum of four storeys. Smaller patches of single-family houses were constructed as well for the new city's very first inhabitants, the builders. While the first buildings were made with bricks and traditional building methods, the building construction during the 1960s and 1970s was dominated by up to 10-storey pre-fabricated concrete slab-buildings intended to address the shortage in housing. The last major social housing development was built during the 1980s. Building activities after 1989 were dominated by privately built single-family houses with regular gridiron patterns of land plots. Apart from residential buildings, shopping centres and new factories at the city's outskirts added a larger scale of building footprints to Dunaújváros. Besides the different building typologies, open and public spaces also exhibit characteristics tied to their history since they seem to have distinct geometrical patterns.

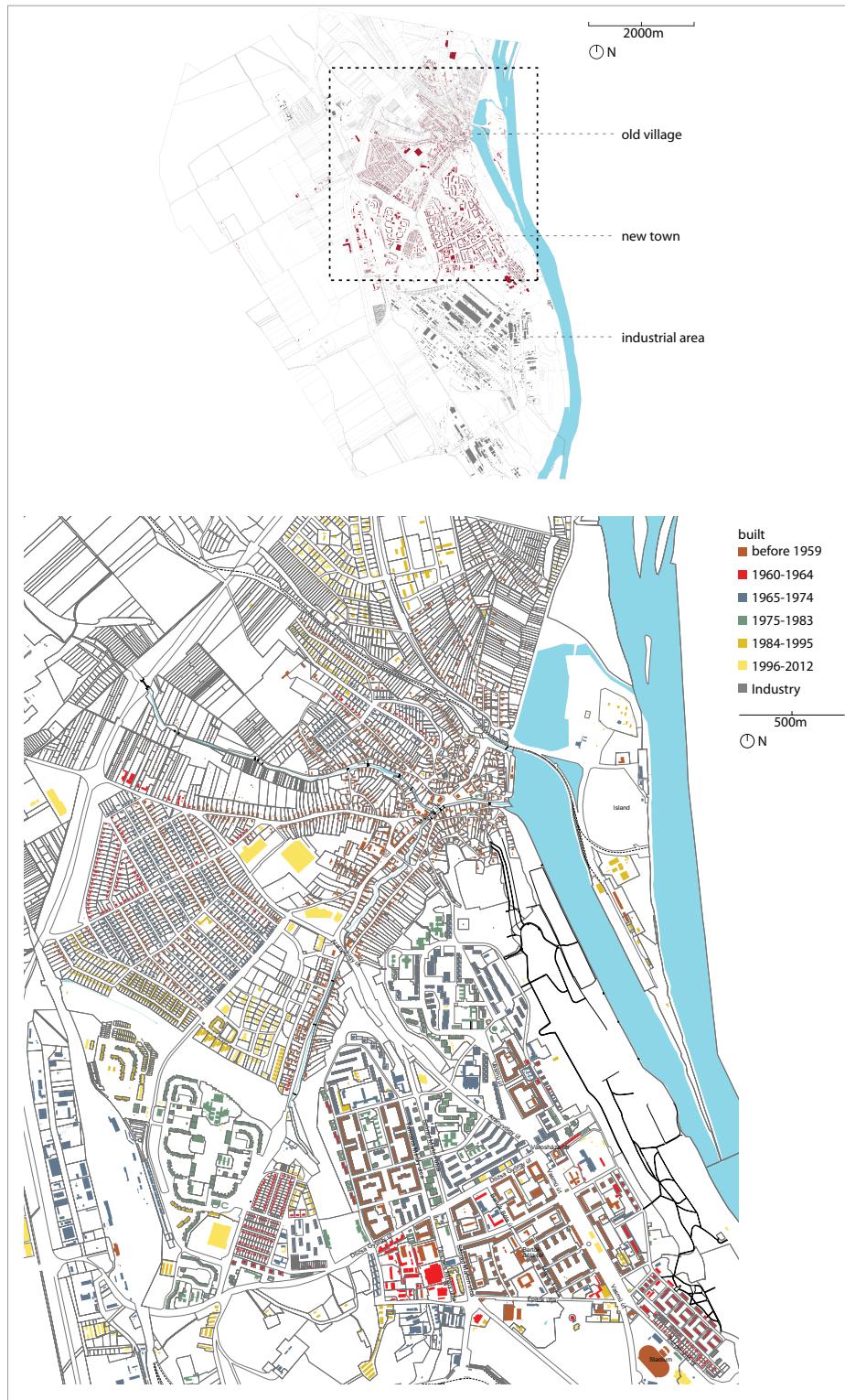
### 6.2. Open and public space

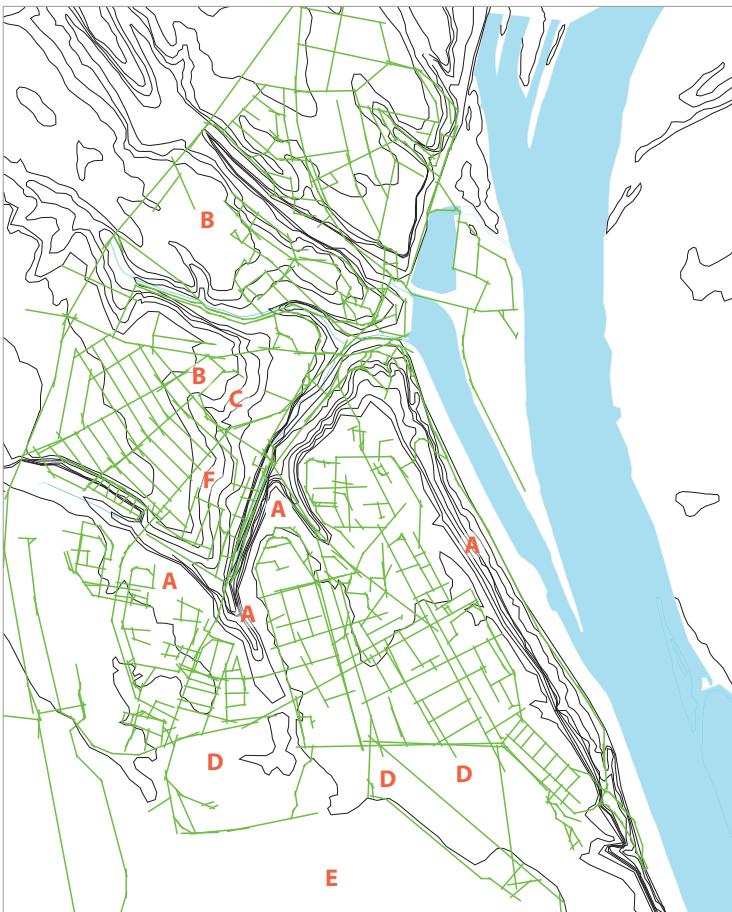
The distribution and pattern of built and un-built space, as shown in the black and white map (Figure 5), splits the city into two parts: the northern half appears to consist of small building footprints in a rather unordered agglomeration; the southern part features larger building footprints with rather geometrical and repetitive patterns of organisation. The middle part in the west is a mixture of relatively small building footprints with more ordered distribution.

The second black and white map (Figure 6) shows public space as black, and private space as white. The black areas in the northern part of the city consist of clearly defined streets, forming rather linear public spaces; whereas in the southern, planned part of the city, public spaces appear to be both linear and convex (Figures 7 and 8). In

**Figure 2:**

*Overview of the city  
showing different build-  
ing periods.*





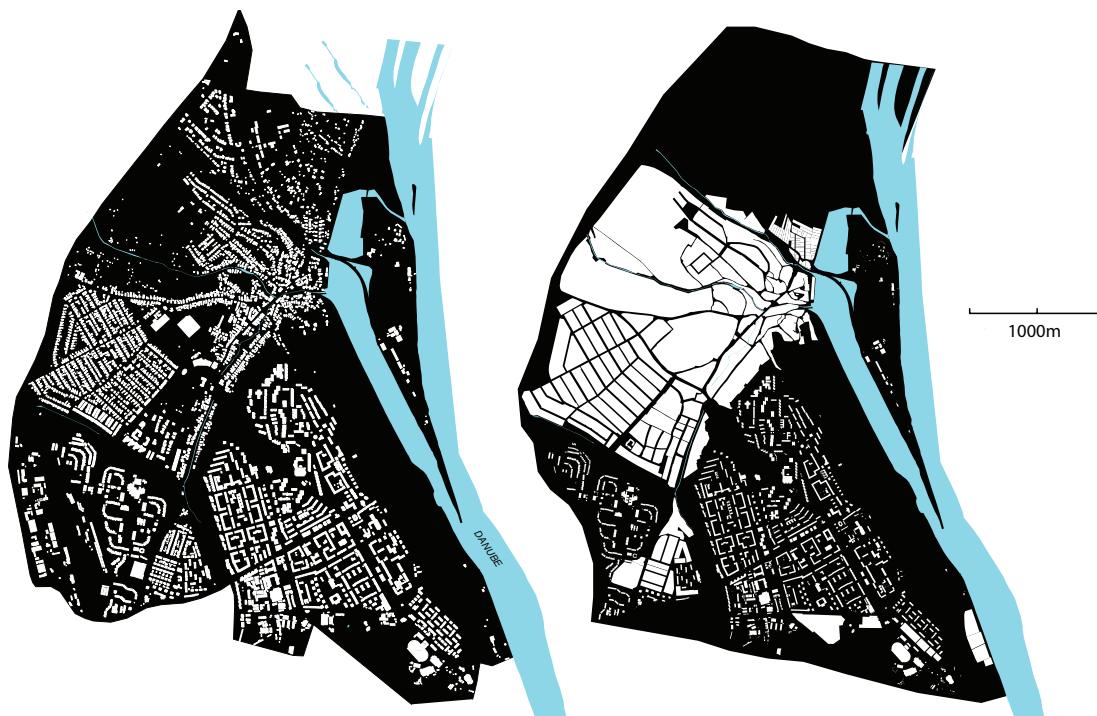
**Figure 3:**

Topography lines  
overlaid with axial lines  
(green) on vehicular  
streets. Letters mark  
major disruptions in the  
urban grid.



**Figure 4:**

One of the aforementioned  
green valleys.

**Figure 5:**

Map showing the built and unbuilt area in Dunaújváros.

**Figure 6:**

Map representing the private (white) and public (black) area in the city of Dunaújváros.

**Figure 7:**

Linear public spaces.

**Figure 8:**

Linear and convex spaces.

**Figure 9:**

Buildings as 'islands'.

District	Private Space	Public Space
Óváros	79.88%	20.12%
Újtelep	78.31%	21.69%
Kertváros	45.44%	54.56%
Belváros	21.11%	78.89%
Béke	19.60%	80.40%
Technikum	19.57%	80.43%
Barátság	18.21%	81.79%
Dózsa	17.45%	82.55%
Romai	16.84%	83.16%
Felsö-Dunapart	14.91%	85.09%

**Table 1:**

Percentage of private and public area for the districts of Dunaújváros.

districts such as *Romai*, northern *Dózsa* and northern *Technikum*, buildings seem to ‘float’ in public space as islands (Figure 9). A closer comparison of the percentages represented by public and private space reveals remarkable differences between the various areas and therefore also between the different building phases of the city (Table 1). The relationship of about 80% private and 20% public space is reversed in the southern parts of the city. Only the district of *Kertváros* shows a different relationship due to varying building typologies. This inspection reveals a break in the relation of public and private space between the northern and southern parts of the city, and between the parts that were built during communism and before and after this period.

### 6.3. Axial map

Due to the high variation of building typologies and the relation of public and private space, a method of drawing an axial map needs to be found that is appropriate for all parts of the city in order to enable comparisons between them. In rather linear public spaces such as in *Óváros* or *Újtelep*, the axial line represents the relation between the block and the street. In other districts such as *Belváros* or *Technikum*, public space penetrates the blocks. These

open spaces are either public squares with hard surfaces or more or less maintained green areas. Similar to landscapes, these areas offer the pedestrian a ‘unique freedom of choice’ (Hanson and Conroy Dalton, 2007, p.209) and afford a greater degree of decision-making regarding the basis on which the axial line should be defined. Julianne Hanson and Ruth Conroy Dalton summarise the studies that have been made on axial models of landscapes concerning issues of the ‘relationship between visibility (what can be seen), accessibility (where people can go) and observed use and movement (where people actually are, considered in terms of static occupancy of space as well as through-movement)’ (*ibid.*, p.209).

Two axial maps were created and compared with each other. One is an all lines axial map that was generated automatically by the software Depthmap (Turner, 2001). It shows ‘what can be seen’ without taking topography into account. The other was created manually, based on both accessibility and observed use. Here trees or steep topography are considered obstacles to accessibility. The comparison of the analysis of integration particularly shows that the map based only on visibility creates main routes of movement that are not used in real-

**Figure 10:**

Dunaújváros: Axial map split into vehicular routes (left), pedestrian routes (middle) and social trails (right).



ity. The manually created map represents the used ways of movement and is therefore closer to the everyday use of spaces than an axial model that is only based on visibility. Therefore the manually created map is used for further analysis.

The axial model is layered into vehicular routes, pedestrian routes and so-called 'social trails' that represent unplanned routes (*ibid.*, p.219) (Figure 10). The vehicular layer provides information about the blocks and reveals strong discontinuities in the urban grid. Major topographical height differences, as mentioned earlier, the industrial site in the south, the two cemeteries and new shopping centres situated on large blocks create these gaps (Figure 3). The pedestrian pathways are mainly concentrated in the parts planned under socialism. Their lines

appear to be shorter than the vehicular lines. They are less paved and can be used more freely due to the absence of cars.

#### **6.4. Segment analysis - the spatial development of Dunaújváros and its centre (1959-2012)**

City planner Tibor Weiner emphasised the difference between 'planning' and 'development' (translation by the author). Planning should create a framework for later development which is not predictable (Weiner, 1959, p.40). Consequently, he identified the way an area is accessed as one of the 'main-things' in planning a city (*ibid.*, p. 41). Dózsa György út and Vasmű út were meant to be the two important ceremonial axes of the socialist city and were often used for parades and other festivi-

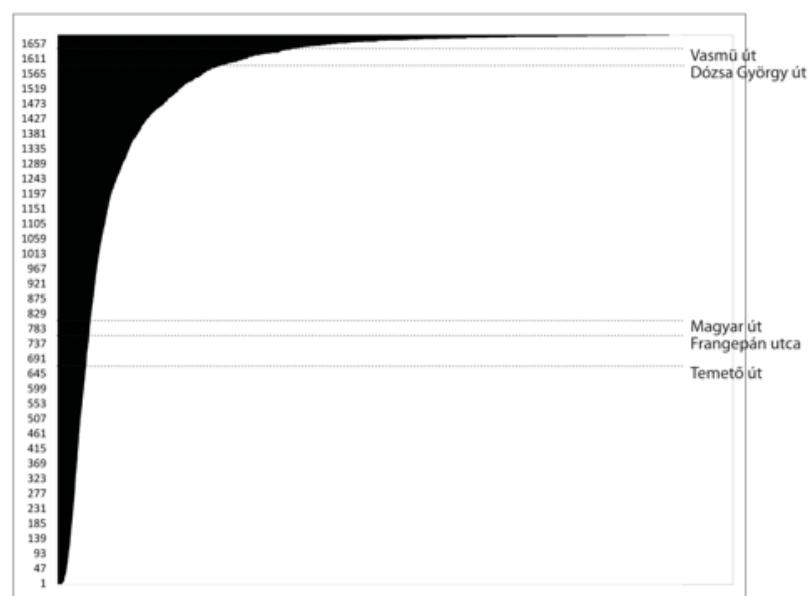
ties. Their crossing defines the city's main square, where the town hall is located. According to the theory of symbolic and instrumental spaces, these axes should be isolated from other parts of the city rather than connecting them (Hillier, 1996, p.176). The following segment analysis attempts to discover if these segments were indeed symbolic spaces or if Weiner's plan was able to accommodate the kind of development he had mentioned.

Figure 11 shows the two ceremonial axes among the longest axial lines in Dunaújváros. They both run through almost the whole town - similar to Hillier's description of Brasília's main axis. In contrast, the local high streets of the old village have much shorter axial lines (Figure 12). Global and local integration values in 1959 issue Vasmű út with a high significance in forming a global and a local centre. Dósza György út has high values on the local scale. This suggests that these streets were not only symbolic, but also instrumental spaces. The study of integration values over time allows for identifying potential centres at different points in



**Figure 11:**

Dunaújváros: Map showing the longest axial lines (thick).



**Figure 12:**

Longest axial lines.

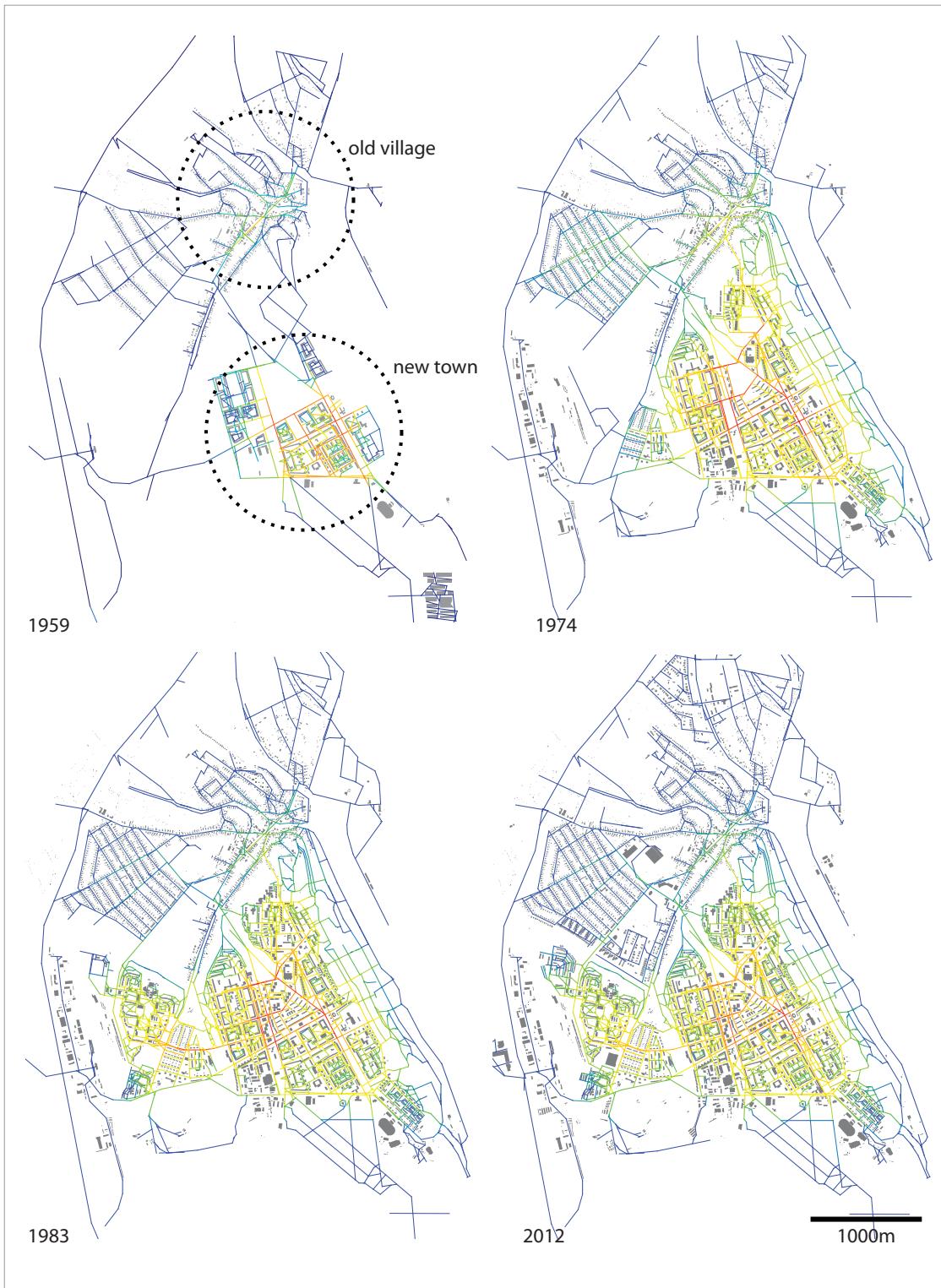
**Figure 13:**

Dunaújváros: Segment map showing the measure of angular integration calculated for radius  $n$ .



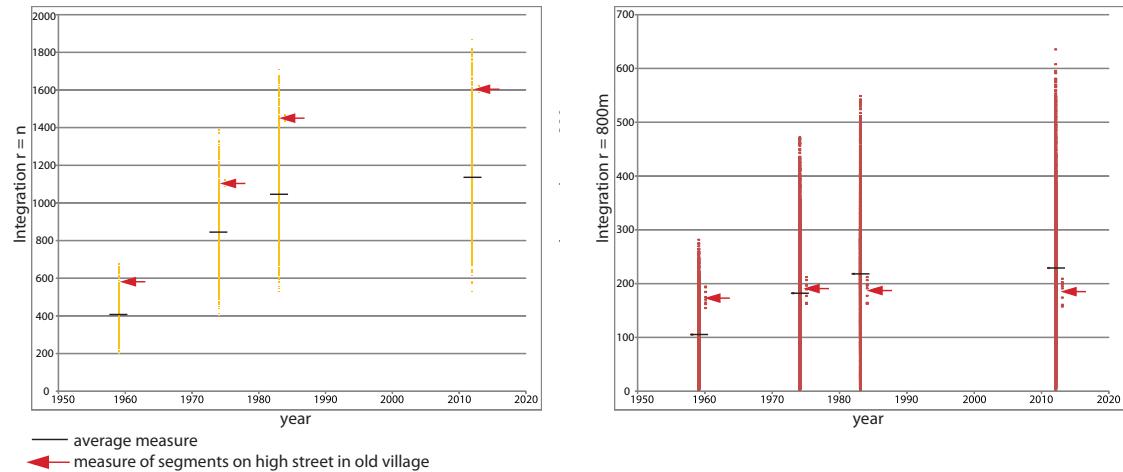
**Figure 14:**

Dunaújváros: Segment map showing the measure of angular integration calculated for radius 800m.



**Figure 15:**

*Segment analysis,  
Integration radius n.*



history. Global integration shows that the old and the new town were rather well connected with each other in 1959 (Figure 13). Locally they seem to have formed two sub-centres (Figure 14). In 1974 the local integration cores appear closer to each other. Global integration in the old village starts to drop continuously until 2012, when this process seems to be slightly reversed. Figure 15 shows the total growth of integration values. It is evident that the values of the old village do not grow as much as all other values. On the local level, the chart shows that even though the whole range of integration values are becoming higher, the integration values of the high street remain the same. The maps also show through their colour range that today the old part of the town seems to have lost its status as a sub-centre. This transformation highlights how the new part of the town gained significance and separated itself from the old village. The higher local integration values of the segments close to the junction of Vasmű út and Dózsa György út suggest that this area is now a local centre, evidenced by a high density of commercial land uses in these segments (Figure 17). However, the first buildings right next

to the junction still have administrative or cultural functions, for example the town hall, museums and the cinema.

The following map (Figure 16) shows the axial lines that were added to the city between 1983 and 2012, essentially after the fall of communism. It depicts the development that happened following the introduction of land rent, privatisation of land and the loss of the central institution in city planning. Apart from new lines added in peripheral areas, a few lines were also added in the post-socialist city centre. This densification can be explained as part of the process of a new centre's creation.

According to Arnis Siksna, urban centres consist of smaller building blocks and therefore denser grids to afford better accessibility and create more street frontage for commercial use (Siksna, 1997, p.19-33). Hillier explains this phenomenon on the basis of movement. The theory of 'natural movement' states that the 'configuration of the urban grid itself is the main generator of patterns of movement' (Hillier et al., 1993, p.29). These patterns of movement have an impact on the distribution of land use, which acts as an attractor and therefore a multiplier

by generating more movement. According to the theory of cities being 'movement economies' (Hillier, 1996), increased movement creates pressure on the urban grid, which adapts by intensification. Consequently, Hillier describes the development of centres as a process based on these two theories (Hillier, 1999, p.107).

Grid intensification in Dunaújváros had the potential to happen, where greater space was available. The former green corridors in both Dózsa György út and Vasmü út were used as building land. However, it must be noted that the new lines in Vasmü út were mainly created through new pedestrian pathways in the green corridor. The green corridor in Dózsa György út was paved and new pedestrian lines added due to new office and retail buildings. The use of many ground floor spaces shifted from housing to shops (Figure 19). As a consequence, it could be stated that the centre has been able to adapt to new affordances.

### **6.5. Land use and the transformation of the ground floor**

The development of retail in Dunaújváros was a shift from centrally organised land use to its emergent distribution following the introduction of a market economy. While during the communist era shops were not dependent on profit, attracting customers became an economic necessity for surviving during the era that followed. Choice measure is an indicator for potential through-movement, a human activity that is usually advantageous for commercial uses. The two maps (Figures 17 and 18) show 10% of segments with the highest global and local choice values. The tendency can be seen for commercial uses in the part of the city planned during socialism to be located along segments with high local choice values. In two cases, shops are situated along segments that are parallel to a segment with a relatively high local choice value. These parallel segments sometimes cross the same convex space,



**Figure 16:**

Dunaújváros: Segment model showing lines added between 1983 and 2012 as pink.

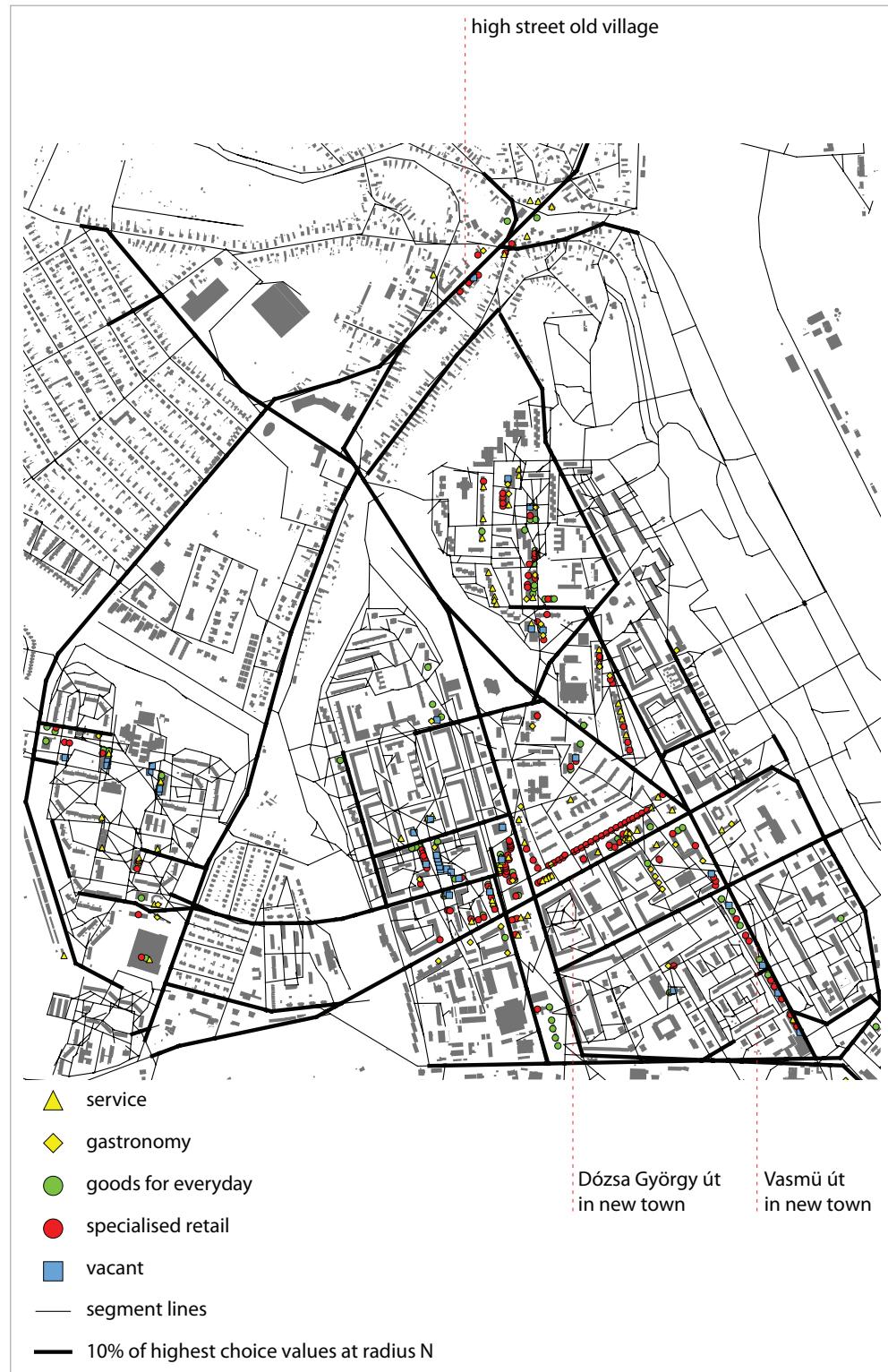
but while one line of segments is mainly used by vehicular traffic, the other is mostly or solely used by pedestrians. This situation can also be found along Dózsa György út, where new shops and banks were built on the former green strip. The retail here mostly specialises in clothing, but electronics shops, opticians and tobacconists can also be found.

The majority of segments with many shops seem to have high global and local choice values. However, in a few cases there is no significance conferred by low global choice. A striking example is the shopping street in the north of the new town, which has a high number of shops. The fact that this only appears to be relevant on a local level makes sense since the street is a pedestrian walkway.

The main street in the old village features high global choice and low local choice values. Interestingly, the shops on this street are highly specialised

**Figure 17:**

Dunaújváros: Map showing segment lines with 10% highest global choice values (represented as thick lines) and commercial land uses.



**Figure 18:**

Dunaújváros: Map showing segment lines with 10% highest local choice values (represented as thick lines) and commercial land uses.

in selling equipment for craftsmen and fishermen, or in being connected to the tyre factory north of Dunaújváros. People might be willing to travel further for such shops. However, shops for everyday goods are scarce. This specialisation in Óváros underlines the notion that the old village no longer works as a proper local centre. There is only one instance in the

south of the new town where shops are located next to highly globally integrated segments. This is the market that serves the whole city with fresh food.

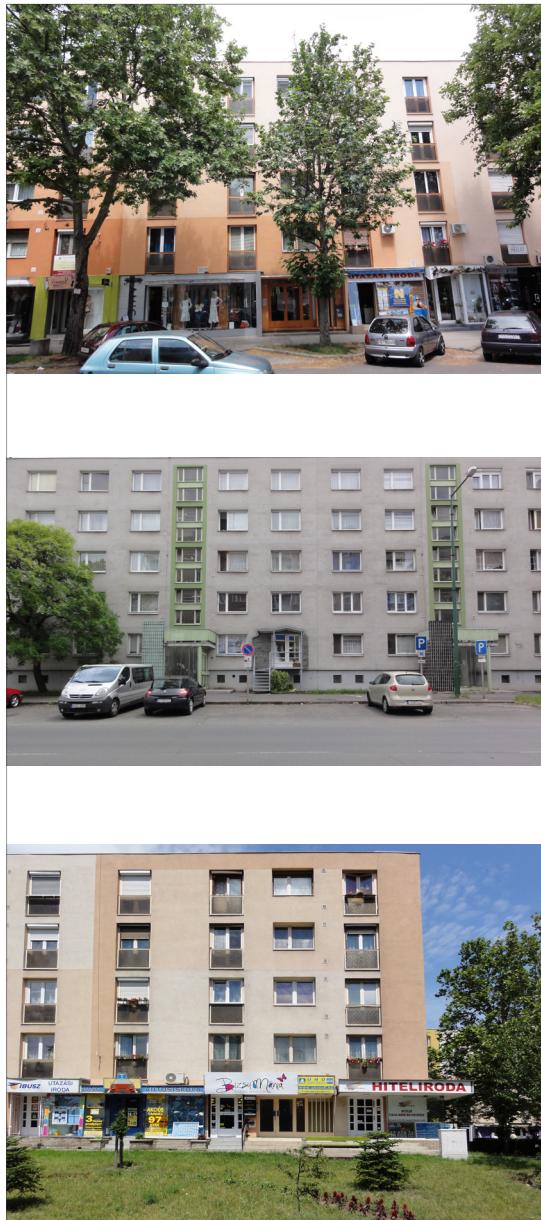
Clustering of vacant shops and restaurants can be seen in some cases. Interestingly, some degree can be also found along segments with high local choice values. One such example is located in Vasmu ut and contains some of the first shops that opened in the new city under communism. In spite of very similar global and local choice values in Dósza György út and Vasmü út, it was Dósza György út that attracted a lot of new retail. The reason for this is not obvious. However, one explanation could be the better adaptability of the slab buildings from the 1970s compared to the solid brick buildings of the 1950s. Numerous conversions of ground floor spaces from flats into shops and services testify to this (Figure 19). The clustering of vacant shops could also be related to economic or business factors, since these shops were initially publically run and owned, and probably could not adapt to the new rules of the open market as quickly as the newly opened shops.

## 7. Results

The paper dealt with the challenges that the old and the new centre of Dunaújváros have been facing since the 1950s. It attempted to analyse the impact of the new centre on the relevance of the old centre as a local magnet and how the centres developed due to the changing circumstances. The spatial analysis of Dunaújváros demonstrated how the old village and the new socialist town have become more and more separated from each other during the course of the city's spatial transformation. The disconnection of these two parts of the town seems to have also been reinforced by the natural topography of the city. Besides, it was also a political and ideological intention during communism to lower the importance of the old village and to point out its backwardness in comparison with the

**Figure 19:**

Converted ground floor.



'modern' new town. This ran in parallel with the loss of Óváros' significance as a local centre. Kayvan Karimi observed a similar phenomenon in Iranian historic cities, where the introduction of new urban grids caused shifts of centrality away from the old city centres (Karimi, 1998).

From the beginning, the symbolic axes of the city also had a high instrumental role in that they were well integrated in the urban grid. This characteristic even increased over time. A number of segments constituting the two longest axial lines developed into an integral part of a local and global centre. A comparison with the distribution of land use showed that these spaces were also more adaptable than the high street of the old village, for example. One of the advantages seemed to be the wide public space of the new town, which allowed for densification at points where high integration afforded the development of a centre. This also showed that in spite of large supermarkets at the edge of the city, the post-socialist centre could also accommodate new commercial uses and develop into a shopping street with its own character. At the same time, the old village lost its significance as a local centre while continuing to act as a global route, suffering from little human activity and considerable traffic that hindered development. The study therefore seems to suggest that the new town has proved more adaptable than the old village.

However, inconsistencies in the distribution of land use suggest that developments might still be too recent, having not yet reached a short-term final state, which could mean they are still in the process of transformation. The situation in Vasmű út could be an example of this, exhibiting similar conditions to Dózsa György út around the junction but still suffering from vacant ground floor spaces.

## 8. Discussion

As Stanilov has already pointed out, the research indicates the desirability of observing such devel-

opments over a longer time span in order to better understand patterns of development. It also raised the question of what resistances to change exist, if streets with similar potential for human movement have different densities of commercial land use. It would also be useful to study more examples of socialist and post-socialist cities and to collect a larger number of results in order to be able to delve further into the logic of socialist and post-socialist cities. Such understanding could help to define potential urban developments without harming old centres. At the same time, the integration of the old centres is not always possible - as seen in Dunaújváros. Here the old village could also gain a new function and importance as something other than a local commercial centre.

The recent transition from communism to capitalism and from central planning to a more distributed structure of planning forces enables an exploration of the same city within a short timespan under very different circumstantial conditions. Dunaújváros is just one of numerous possible case studies that offer the opportunity for a direct comparison between organically grown and geometrically planned cities. It is also one of many examples where the old city centre is suffering anew because of large developments on the city's outskirts. The methodological approach used in this study could pinpoint how urban growth might have an effect on the historic nucleus of post-socialist cities. It also offers the possibility to create a robust evidence base for planning by enabling a prognosis on the effects of certain urban interventions. This has now become especially crucial as the first side effects of land having been extensively sold off by cities are starting to appear. Additionally, this is a powerful tool because it is not just the city that is undergoing major transformations, but also planning policy that needs to acquire new strategies.

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