THE 'MODERN CITY': URBAN TISSUE TYPOLOGY (Limitations of Caniggian and Conzenian practice and the new typology)

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Summary: *The present study aims to define a new urban typology, and to present a typological analysis of the modern city and the urban fabric through examples and contexts in the Austro-Hungarian cities. The development of an appropriate morphological methodology is the starting point of the studies, which is based on practices of Conzen and Caniggia, since the Italian school and the English school urban morphological practice do not fully satisfy the object and the purpose of the investigation. Via innovative re-interpretation of these practices can be formed the tipo-morphological analysis used in the study of the dualist cities.*

Keywords: *typology, modern city, urban tissue, dual monarchy*

1. INTRODUCTION

The urban development of Austria-Hungary took a new direction, partly because of the state-regulated city development (in case of the capitals, Vienna and Budapest), but also the emerging economic development in the Hungarian territories and economic alignment by that time had a strong impact on the urbanization processes. New ways in the evolution of the urban fabric of the Hungarian Kingdom and some parts of the Austrian Empire influenced by the economic changes and distinct functions within the settlements and by the landscape features. Even if the phenomenon of the typo-morphological approach is already defined by the Italian school of urban morphology: the term was devised by Italian architect Carlo Aymonino in the 1960s due to the reflection on the controversy between building typologies and urban morphology [1], in our case the definition does not fully cover the meaning and methodology of the typo-morphological research. The practice of urban morphology was created by three schools, among which the English and the Italian school of urban morphology stand out, while the French school took over the Italian practice and adapted it. The methodological focus of the current study includes the Conzenian urban morphology (English school) and the Caniggian approach (Italian school) due to the finding of the applicable typology on the studied cities. Generalized information about city development is not sufficient since the Hungarian towns went through a specific evolution during the study period, partially following the Western trends of city-development. Taking these characteristics into

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account we cannot adopt fully either the Conzenian approach of urban morphology or the Canniggian way of seeing the cities. The proposed typo-morphological analysis system follows the Conzenian cognitive approach, with a combination of Caniggia's research methodology (understanding the built form through the historical process of shaping cities), and negates the doctrine by Benevolo which is that each city is unique. The subject of the research is the typo-morphological analysis of Austro-Hungarian cities and to evolve a new typology, current research focuses on the Hungarian-related cities, but takes the cities of the Austrian Empire into account as well. The typo-morphology might demonstrate that the 'modern city' of the Kingdom of Hungary, as the member state of the Austro-Hungarian Monarchy was founded during the studied period (1867-1918), as one of the previously proved hypotheses refers: the modern townscape and structure of the cities in the Austro-Hungarian Empire has emerged in the period between about 1867 and 1918. A historical background research [2] showed, that the modernization processes of the Monarchy (development of the railway and railway stations, public transport, infrastructure) took place in the cities almost at the same time (+/- 10 years) regardless of the city's size, number of inhabitants, their function in the role in the Monarchy. It can be observed that in the territory of the Monarchy an intense modernization process took place, and one of the accompanying events was the realignment and modernization of the transport, routs, street-network. The water supply and sewage water systems, gas and electricity lines, street networks, pavements, public transport are built of heterogeneous elements in order to complete the complex interactive, closely related based urban infrastructure system, that was created during the dual monarchy. The modern urban infrastructure exerted complex effects in the settlements. The modernization activities influenced the city's development, acceleration of urbanization, the functional urban modernization, the development of new types of urban functions and economical transformation. Cognitive and attitudinal changes have contributed by causing inception of the "modern city" idea.

2. METHODOLOGY – LIMITATION OF THE CANIGGIAN AND CONZENIAN URBAN MORPHOLOGY

"Towns have a life history. Their development together with the cultural history of the region in which they lie, is written deeply into the outline and fabric of their built-up areas" [3]

In case of the city's urban fabric and typological analysis, especially the practice of the Italian school can be (partly) followed. Partly because Muratori's approach and later Caniggia's practice does not necessarily conform to the typo-morphological analysis of the dualist towns.

Muratori in his work and in his morphological practice and studies focused on the typology via four scales (building - district - city - territory) due to the understanding of the shaping directions of building fabrics, urban organism and territories [4]. Later on Caniggia developed the theories of Muratori with focus on the typo-morphology (based on the relationship between building type and city form), and about to understand the built form by examining the historical process of its formation. In case of the dualist cities, if we consider the Cannigian approach, the historical processes took a great part in

the morphological urban development, however, Canigia could take the spatial correlation of built objects (co-presence) into account, in our case it is possible only in two-dimension (not building level-hierarchy, just on the level of the urban tissue), the other aspect is the temporal correlation (derivation) [5], that could fit into our methodology. The components in case of the spatial correlation are: elements, structures of elements, systems of structures and organisms of systems [6], that can be applied generally to individual buildings (not in our case) and to towns (our case). Hierarchy (town): 1. elements: buildings, 2. structure of elements: organization/group of buildings (urban tissue), 3. system of structures: combination of tissues (districts). 4. Organism/nucleus of the towns and cities. Muratori, Caniggia and Maffei referred to the principle of aggregation as the very basic phenomena for the hierarchy of elements. The typological process has been formed by the modifications of the built form according to the changing economic and social, sometimes political conditions.

Caniggia considered the development of the cities as a dynamic model, which responds to the changes in society and perceived as a three-dimensional projection. In case of the study of the dualist cities where the examination outlines a specified period of time there are some anomalies, since not all of the forms and elements of the past can be evaluated and seen nowadays. The development of the city and its typology can be examined as a static model primarily in two-dimension, because of the limited availability of sufficient data.

In case of the analysis, the clear identifications of the element are significant: according to Caniggia the street tissue as a simple tissue is a combination of all the elements in the hierarchy identified; according to Conzen the street tissue is a specific combination of buildings, plots and streets (could be identified as a plan unit). Caniggia's and Maffei's simple tissue = Conzenian plan unit that includes only two-dimensional plan characteristics. The combination of simple/street tissues occurs more complex tissues (urban tissues), that is in case of Caniggia and Maffei the urban tissue is formed by at least three mutually connected streets. Some aspects of the identified features of the urban form cannot be respected in the case of the Austro-Hungarian cities: physical form (+), function (-/+), idea of the building/form (-), act of construction (-), cultural process of derivation and/or development/change (+).

Beside to the Caniggian urban typology/morphology, the Conzenian approach is applicable with limitation to the analysis and typology of the dualist cities, since the goal of Conzen's town-plan analysis is to trace the character of the towns via their elements and development through time. In his study [7], he is dealing with general aspects of the urban morphological analysis (site, function, townscape, social and economic context, development), among those he differentiates the town plan, land utilization pattern and building fabric within the townscape. The more important subdivision is related with the town plan (streets-their street system, the plots-their plot pattern, and the building arrangement within these patterns), that is in the case of the dualist cities is the most important source of the typology. The already mentioned urban tissue (Caniggia, Maffei), plan-unit (Conzen) is a diverse combination of streets, plots, and block-plans. Furthermore, Conzen's morphological approach is based on the morphological periods, as those are urban manifestations of diverse social and cultural history. His evolutionary approach is about to describe the present structure by examining the historical development [8]. In this way structural changes (morphological development) of the city can be traced objectively as a result of its development.

According to Conzen also the characteristics and morphological periods of dualist towns can be identified via its physical organization and historical order of the built environment and spatial system, since each period is recognizable and can be seen via historical layering. Morphological regions or townscape units are areas of homogeneous urban form (building and plan type) [9].

According to the Conzenian urban morphology the limitations of his practice in case of the dualist urban tissue typology and typology of the cities from this period should be outlined. When we discuss these cities, then we consider a topic of discussion of those towns which went through a significant development in this period and got modern urban characteristics (modern city: see below in the Introduction). The transformation of the cities was influenced as well as increased by the growing economy as partly result of the industrial revolution and partly result of the Austro-Hungarian compromise (1867), by the progressive urbanization and by the changes of the social and political power, and by some personal ambitions. The study of these towns partly rejects: function/land use (can't be studied), housing typology and buildings: façade analysis and typology (mass-voids relations, material, structure), plan/layout typology (important in case of the townscape analysis, but in the overall method it has less relevance since data are not always available). The fringe belt analysis (Conzen) has to be modified and adopted to our case, since the study cannot deal with the functions and the land use, but a brief analysis of the inner fringe belt (especially in case of the towns with Medieval origin) and middle fringe belt formation shows the development character of the town.

The integrated and developed morphological research consist several aspects/elements (plot; streets-street systems; and their more complex form: urban tissue; fringe belt; morphological region/townscape) due to the creation of the urban tissue typology and their more complex form, the city typology.

Plot analysis gives an idea about the evolution of the plot and its shape, it is correlating with the streets (simple tissue) that should be analysed according to the plot and street form relations and building lines, since each street has its unique character and structure, the study of the streets has multiplied effect and result, also in the urban tissue typology, but in the townscape analyses as well.

The identified and outlined urban tissues refer to the 'urban block' (urban block in our case not only a single block/area surrounded by streets, but a territory, that consists some block elements and in this was established a continuous special existence) and its elements (buildings, streets, plots and their relationships and systems). Within a block the relationship between the plots and the road ought to be studied, and also how the individual homogeneous areas relate to the neighbouring areas. Taking these and previous analyses into account the urban tissue typology can be formed. In the establishment of the method the lack of sufficient detailed maps (lacking such details like buildings and blocks) gives cause for concern. It prohibits the determination of an urban tissue. The new method could resolve anomaly. In this case the primary sources are those maps, where every urban element of the city can be found. The urban tissues could be outlined by using these maps. The comparison with other less detailed maps could determine the structural changes in the town. In the city's development of a certain era changes of the street network play a significant role: important to determine the typical street network schema of a certain period. The new typology was developed by merging, restructuring Caniggian and Conzenian methods and adapted to the current

circumstances. Their own practice was added to the method, and as a result an analysis of dualist cities could be made.

3. (TYPO)-MORPHOLOGICAL ANALYSES: HOW TO DEAL WITH LIMITED DATA TO DETECT THE URBAN TISSUE TYPES

Preliminary studies [10] pointed out that the modernization processes (electricity, water-supply and sewage water system, roads regulation, establishment of public transport/tram lines) occurred between the second half of the 19th century and the first quarter of the 20th century. Therefore, this period is considered as the modernization period of cities in the studied territory, as development of modern towns. The city street grid of historic towns refers to the direction of development; thus we can determine the evolution of towns in a selected territory as well. During the research of dualist cities, the biggest problem was caused mainly by the lack of detailed maps. Determination of urban tissues requires identification of roads, then buildings - plots - plot series and in this way to determine urban tissue.

ROADS AND ROAD NETWORK: in this case those roads within the city should be distinguished which are leading out from the city, and directly or indirectly are connected-to another settlement (A). It is necessary to determine those paths which serve communication within the city (B). A separate category of roads is those which had undergone changes over the review period regardless of their rank (C).

The most common street network features: 1. extensive paved surfaces and parking areas; 2. orthogonal road system and fragmented, partially connected courtyards; 3. orthogonal road system with widening, rail tracks and adjacent areas, courtyards, green areas; 4. linear street areas with widening at road junctions, open courtyards, linked green areas; 5. medieval, irregular roads with some smaller squares.

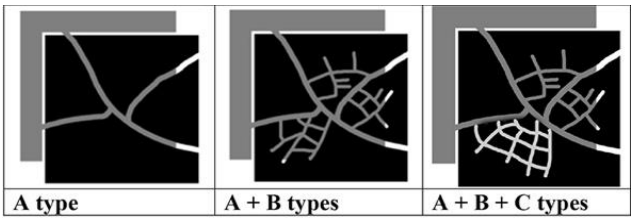

Figure 1. Roads

Based on the street network changes the direction and the character of the city's development can be observed. In the given period The city's development character could indicate three types concerning the road network:

A: The original road network does not change, only supplemented by new areas and new road network (construction-related)

B: The original road network is undergoing structural changes, but retained some of the original patterns (Penetrating structure). Structural changes are regulation of roads (widening, line-regulation), opening new routes in the original town structure (avenues, boulevards).

C: almost all of the original road network is undergoing structural changes (new structure). The driving force of the changes may be different (natural disaster, large-scale regulation, changes in the socio-political status).

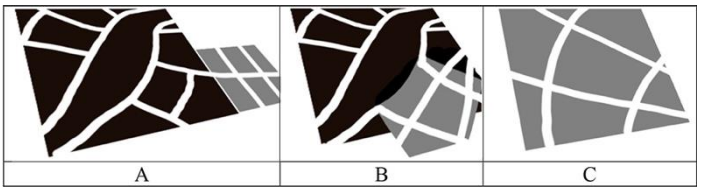

Figure 2. Structures

PLOTS AND PLOT SERIES: changes in the road structure influence the division of plot shapes as well. Number of plots form plot series, which can be called as urban block. The blocks make up the city's urban tissue, thus indirectly can define the urban tissue metamorphosis via street network changes. In the case of dualist cities, detail map (on buildings - plots level) is not always sufficient in each examined period (maps between about 1850 and 1920, supplemented with maps of around 1800). Most of the maps are available only on plot series level. In this case, determination of the road network is necessary and the use of at least one map in plot - building level. This map determines the urban tissue variations. Structural changes in the city itself and changes in the urban fabric can be detected by comparing and layering maps. The differences assume the changes that can be defined thereby.

Figure 3. Plot series (Košice: Pallas 1895, CAK 1868 Homolka)

BUILDINGS: Built environment is an important indicator in the urban tissue determination. Buildings are placed on low rank with regard to the hierarchy of the urban forms and formations, since they are less constant compared to the road network and the city structure. However, the development of the road network has strong influence on the buildings, and on the image of the city itself as well. The townscape changes can be followed as specific imprints of a certain time period. In case of the dualist cities similar townscape characters have evolved. The period before the Austro-Hungarian compromise (1867) is still dominated by the tendency like the cityscape and the built environment was determined by the natural landscape character (building material, style). At this period, a certain degree of universalisation was started, which mingled with the local character/elements and the original built environment.

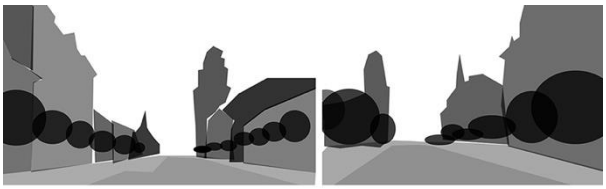

Figure 4. Townscape

URBAN TISSUE: The purpose of the study is to define, outline and analyse the urban tissue. The definition does not exclusively take place only in visual way with application of patterns and schemas, written analysis plays an important role. The description complies with the unified criteria. In addition to the visual presentation in the descriptive section the followings are going to be summarized: built environment, green spaces and water features and their relationship with buildings and streets, terrain, road geometry and structure, nature of the connections in the city.
Based on previous studies [11] the river can significantly affect the town structure. Schematically, those formations that are possible in the cities can be presented. The river is considered to be the urban tissue border. The development of the cities on the right and the left side of the river is often not harmonious (case of Bratislava, Szeged, Arad, Novi Sad, Senta, Košice). The schematic drawings show the combinations of the urban tissues:
E: River corridor (various percentage of sealed surfaces, rhythm and value of the built environment; high proportion of water areas, streets are following the line of the river).
Ea: Waterside green spaces (low percentage of sealed areas; high percentage of water areas and vegetation).
Eb: Riverside prestige areas (various rhythm of the built environment; buildings from the period of the Dual Monarchy; rental palaces/next to each other, single buildings in joint plots).

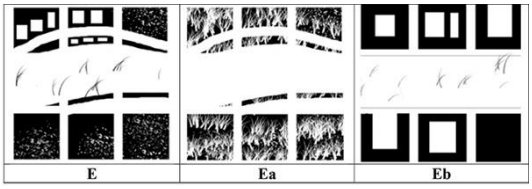

Figure 5. Urban tissue combinations

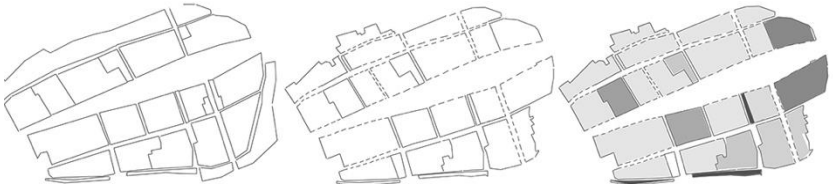

Figure 6. Urban tissue analysis

4. CONCLUSIONS

The primary objective of the study is to demonstrate those practical and theoretical limitations that prevent the methods of Caniggia and Conzen from taking it over completely. A proposed methodology returns to the basics of the urban morphology and sees the town as a collage. The city is not only considered as static fabric, but also takes the significant factors into account that influenced the development. Considering the time period, we could speak about universal urban evolution, but in any case, it has to be taken into account that the developmental period of the dualist cities between 1867 and 1918 resulted in different, but systematically appearing urban tissues in towns of Austria-Hungary. It negates the doctrine that each city is unique (Benevolo), establishing rather that each city can be seen as a collage of different urban tissue types, the organization of which creates a specific urban type and image.

The town structure and urban tissue of the cities in Austria-Hungary are divided into these main and sub-categories: the categorisation is semi-specific, and taking into account the most widely used tissue samples and patterns, which exhibit a certain level of universality [12]:

Aa: Historic city centre (perimeter block structure and historic buildings, not exclusively from the period of the Dual Monarchy; high percentage of sealed surfaces; more spacious squares and well developed public spaces; street network: either regulated or medieval or mix, usually lower percentage of the green areas).

Ab. Perimeter block development on sloping or plain terrain (perimeter block structure, most of the surfaces are sealed, elevations in the terrain structure (the streets are following the terrain features), small differences in elevation (diagonal or geometrical street network) low amount of vegetation structure (trees and grassland dominates, sometimes smaller parks and inter courtyards).

Ac: Castle and surrounding (elevations in the terrain; the castle dominates on the area; higher percentage of vegetation; under the castle densely built areas usually with winding streets).

B. Urban expansion areas (heterogeneous building structure; lower percentage of the surface is sealed; higher proportion of green areas (gardens, yards); the street network is usually grid like in case of new settlements/railway, around firms, no squares, regulated geometrical street network).

Ba. Urban expansion areas and old village centres (different types of built structures: residential and agricultural buildings; moderate building density; remaining the old, organically developed village street network or strictly regulated streets and plots).

C. Low density development on sloping terrain (terrain with very varied elevation; villas and single houses with big private garden estates; variations between perimeter block development with a higher amount of vegetation in the inner courtyards and single villas)

D. Urban fringe areas (low - density residential areas and parks, with low building heights, usually planned settling).

E: River corridor (various percentage of sealed surfaces, rhythm and value of the built environment; high proportion of water areas, streets are following the line of the river).

Ea. Waterside green spaces (low percentage of sealed areas; high percentage of water areas and vegetation).

Eb. Riverside prestige areas (various rhythm of the built environment; buildings from the period of the Dual Monarchy; rental palaces/next to each other, single buildings in joint plots).
F: Wooded hills (low building density; high amount of forest and overall vegetation; high variations in altitude; low rate of the street network, streets are following the altitudinal changes).
The cities in the studied territory and period could be distinguished and typified by combination of urban tissues and their dominance in the urban structure. In addition to the urban fabric by determining road structure, the new typology could be established, which defines the cities in the Austro-Hungarian Monarchy.

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MODERAN GRAD: TIPOLOGIJA GRADSKOG TKIVA (Ograničenja prakse Kanidže i Konzena i nova tipologija)

Rezime: *Definisanje nove urbane tipologije je cilj ove studije, i da predstavi tipološku analizu savremenog grada i urbanog tkiva kroz primere i konteksta u gradovima Austro-Ugarske Monarhije. Razvoj odgovarajuće morfološke metodologije je polazna tačka istraživanja, koji se zasniva na praksi Konzena i Kanidža, pošto urbana morfoloska praksa italijanske i engleske škole ne zadovoljavaju u potpunosti predmet i svrhu istrage. Preko inovativne re-interpretacije ovih postupaka može se formirati tipo-morfološka analiza koja se koristi u proučavanju dualističkih gradova.*

Ključne reči: *tipologija, moderan grad, urbano tkivo, dualizam*