

THE INTEGRATED URBAN MORPHOLOGY METHOD AND THE URBAN MORPHOLOGY MATRIX

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Summary: The study is going to describe the methods applicable to define the urban types in historic Hungary (1867-1918) and make possible the categorization of their urban tissues. The methods have been developed by the author since there were no suitable modes for morphological research of towns from the era. The urban tissue types can be determined by the integrated urban morphology method; the urban morphology matrix is closely related to the integrated method and it defines a higher degree of typology, the urban typology.

Keywords: urban tissue, typology, methodology

1. INTRODUCTION

The urban tissue typology itself has a complex manner in the field of urban morphology and urban typology as well. The cohesion of the urban tissue and urban typology is evident, but it has to be explained since the juxtaposition of various urban forms does not essentially create coherent urban tissue patterns that could be the base of urban tissue typology. Establishment of a taxonomy of towns and urban tissue typology in the period and territory of Austria-Hungary is important and crucial because the typology has not been established yet, thus there is a possibility to bring it into practical use and to evaluate the results of urban development and urban evolution by an integrated morphological approach.

The research and the urban determination taxonomy deals with the territory of Historic Hungary as a whole between 1867 and 1918, therefore it makes possible the uniform evaluation and demonstration of results of urban development and amelioration. Post-agreement (Ausgleich, 1867) Austria-Hungary achieved a relatively unified approach to urbanization and industrialization, yet faced significant concurrences in the resulting urban tissue, that remained in different parts of the Imperial territory. The aim of the analyses and designation is to systemize the new urban tissue types developed as result of progressive urbanization and define the urban types of the dual-monarchy with the further organization and combination of the urban tissue types.

Being conscious of the nature of the town's heterogeneous tissue, which hardly allows the creation of a unified system that accurately determines the town as an entity, thus

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makes possible to create a typological system that can define a settlement and group towns by matrix of variables in the territory, the decision was made to incorporate within the study an analysis of urban tissues and their correlation to prove that via functional circumscription of urban tissues, the classification of heterogeneous urban fabric/typological system can be formed.

The typo-morphology demonstrates that the 'modern town' 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 states: the modern townscape and structure of most of the towns in the Austro-Hungarian Empire emerged in the period between about 1867 and 1918. The purpose of the study of the taxonomy is to systemize the new urban tissue types, whose development was influenced by the progressive urbanization, and by the further organization and combination of these types define a new urban typology.

The research aims to create a system via urban analyses: major and distinctive characteristics of the towns (observed on maps or on-site) with reference to the urban morphological features as well, although on-site research and study of each dualist town separately cannot be achieved. Based on the given criteria, a more effective comparison methodology can be reached, and specific context of urban typology designation can be done without the necessity to link theoretical research (maps) with practical studies (on-site research).

The complex task is practically divided into three parts: 1. Evolving the research methodology, 2. Finding the solution of the data anomalies, 3. Determining the typological matrix system of the urban tissues and towns.

2. TYPOLOGICAL STUDIES

Typological studies of the towns in the territory of this research show clear results until the Austro- Hungarian agreement (1867): the towns in areas of low and high relief had easily distinguished townscape and urban structure division. However, the evolution of urban types later became individuated, due to multiplier effects of compromise and the industrial revolution. The modern town emerged, but it was yet unspecified in its diversity according to urban tissue types and urban type.

The purpose of the typology is the taxonomic classification of urban forms (and combinations thereof) based on common, mainly physical characteristics according to determined categories. The individual features form the patterns (elements), and through a combination of these elements, the urban system (a network of streets, urban fabric, town) can be determined.

The diversity of the post-industrial urban development of the subject towns is among the research problems to be addressed. In addition to the complex variability of the patterns, the biggest problem was caused by the lack of detailed maps. Determination of urban tissues requires identification of roads, plots, plot series, and buildings. Based on the street network changes the direction and the character of the town's development can be observed. Changes in the road structure influence the division of plot shapes as well. Numbers of plots form plot series, which can be called urban blocks.

The blocks make up the town's urban tissue, thus indirectly can define the urban tissue metamorphosis via street network changes. In the case of the K. und K. (Imperial and

Royal) towns, detailed maps (on the buildings and plots level) are not always sufficient for each of the examined periods (maps between about 1850 and 1920, supplemented with maps before 1850).

Most of the available maps are only on a plot series level. In this case, determination of the road network schema is necessary and the use of at least one map at a plot - building detailed level, since that map determines the urban tissue variations. Structural changes in the town and changes in the urban fabric can be detected by comparing and layering maps: primary sources are those maps where every urban element of the town can be found. The urban tissue can be outlined using detailed maps, and by on-site research or studying the list of buildings which were built during the research period and their locations. The built environment is an important indicator of urban tissue determination: buildings are placed on the lowest rank with regard to the hierarchy of the urban forms and formations since they are less constant compared to the road network and the town structure. However, the development of the road network has a strong influence on the buildings, and on the image of the town as well.

Among the research problems of this dissertation, one of the most significant was to find or establish a research methodology that could fit to the purpose of urban tissue typology and urban typology, taking into consideration the limitations of sufficient data and the variability of morphological (urban, geographical, hydrographical) features in the research territory. Establishment a new integrated methodology was required since the studied methodologies could not serve the investigation purposes fully and can be adapted to the research with limitations. The integrated methodology, besides the urban forms, has to take into account those historical events, that had influence over shaping the built environment.

3. METHODOLOGICAL BACKGROUND

The methodological background was created by examination of urban morphological studies that raised new research issues. When a typological/morphological analysis is concerned, then generally demographics, geographic location, building height, and special historical structures dominate. In general, in European towns, the urban characteristics can be exactly distinguished, while in the historical towns of the former Austria-Hungary, especially in the towns of the former Historic Hungary, numerous overlaps of the different historical structures combined with strong local character can be found.

The meaning of the expression 'morphology', which can be identified as a perception of the nature of the urban forms as it is, is most significantly the discipline studying the morphological properties within an urbanized territory. The urban fabric/urban tissue and morphology of a town can be defined by the study of the urban (built and spatial) environment formation: it is determined by the built manifestations, their gradual development, and the interaction between various components of the urban fabric (streets, squares and green spaces, public spaces).

The basic principles of morphology could be defined in a sociological context by typified patterns, but mostly it could be described as technical schemas and forms. The theoretical aspects of the typo-morphology (in our case) are the town's spatial/geographic characteristics, as well as the historical and the architectural

components. As a science, it deals with the urban spatial structure, the distinctive character of the urbanized areas, and an analysis of the development processes that studies the physical characteristics of the urban fabric at different levels of the urban structure.

Typological parallels, i.e. parallel types of the territory, refer to the unifying (urban) planning principles of the era and to the structural transformations dictated by the process of urbanization and urban embellishment actions. These structural transformations represent the urban heritage nowadays. The town-planning principles partially took into account the natural features. Application of these principles created characteristically similar urban structures in the research period and territory, which matched to or superseded the specific urban tissues of the previous eras.

4. METHODOLOGIES

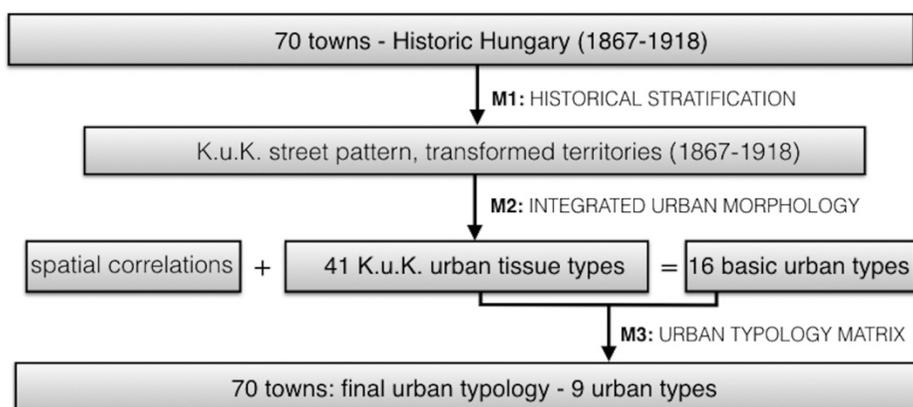


Figure 1. Methodological combinations and results

4.1 HISTORICAL STRATIFICATION

The principle of historical stratification is used in the analyses of urban structural changes following their evolution over time. The process can be carried out by layering town maps between ~1850 and ~1920 and by layering different period types and styles (architecture, urban forms, combinations). The areas where significant changes have taken place during the period of the Dual Monarchy can be outlined by layering these maps.

4.2 INTEGRATED URBAN MORPHOLOGY METHOD

The examination of the progressive urbanization of the intensively growing towns in the Historic Hungary between 1867 and 1918, as a part of the Austro-Hungarian Empire requires a new type of typology, that is partially based on the (typo)morphological

analysis of [1], whose practice relies on land use, plot structure and street network patterns; through the comparison of historical maps the urban morphological patterns can be defined [2]. The methodological focus of the current study includes the Conzenian urban morphology (English school) and the Caniggian approach (Italian school) based on establishing the applicable typology for the studied towns. Neither the Conzenian approach of urban morphology nor the Canniggian way of seeing the towns can be fully adopted.

Moudon states: “typo-morphology offers a working definition of space and building type (...) its relationship to the city, and to the society in which it takes place” [3]. Thus, the examination of the historical towns of the former K. und K., typological analysis partly focuses on [1] practice (land use and structure - plot series, street network patterns, via comparison/overlapping of historical maps creating morphological patterns and identifying morphological periods).

It makes it challenging to properly analyze the relationship between forms and historical events, therefore, the most appropriate research method, the so-called integrated urban morphological methodology is based on and formed by the moderate combination and modification of the methodologies of both Conzen and Caniggia.

The urban tissue [4] or 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. 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 a homogeneous urban form (building and plan type). In order to establish the urban tissue typology of the former K. und K. towns within the framework of the English and the Italian morphological school, and later to determine the urban typology, it is important to create an integrated and developed research practice.

In case of the monarchist towns, if we consider the Caniggian approach, historical processes played a large part in the urban morphological development. To evaluate the inherited townscape and spatial pattern, besides the typo-morphological approach, the assessment has to take into account the principles of the Conzenian hierarchy (Conzen 2004). Hierarchy (town): 1. Elements: buildings, 2. Structure of elements: organization/group of buildings (urban tissue), 3. The system of structures: a combination of tissues (districts). 4. Organism/nucleus of the towns and towns.

The transformation of the towns was influenced and amplified by the growing economy, partly as a result of the industrial revolution and partly as a result of the Austro-Hungarian agreement (1867), through progressive urbanization and by changes in the social and political power structures, and by some personal ambitions.

The study of these towns partly rejects the following (according to the Caniggian and Conzenian practice): function/land use (cannot 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 integrated and developed morphological research practice consists 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 urban typology.

Plot analysis gives an idea about the evolution of the plot and its shape, it correlates 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.

Determination of urban tissues requires the identification of roads, then buildings, plots and then plot series, and in this way, the urban tissue can be determined. Plots and plot series: changes in the road structure influence the division of plot shapes as well. A number of plots form plot series, which can be called urban block. The blocks make up the town's urban tissue, thus indirectly can define the urban tissue metamorphosis via street network changes.

The 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 town structure. However, the development of the road network has a strong influence on the buildings, and on the image of the town itself as well.

The steps of urban tissue analyses, according to the urban morphology and the integrated method starts with (1.) the street network determination, followed by (2.) the analyses of plots and buildings (shapes, relations between plots - buildings and to the street network), (3.) plot series (shapes, relation to street network) and additional spaces (open spaces, green spaces adapted to the blocks), the urban tissue (urban pattern) is completed by the (4.) green and open spaces.

1. The street network/system refers to the structural changes of the time period. Identification of the urban network schemas (simple tissue) is important in terms of the further studies and urban tissue determination. The simple tissue is determined by examination of those areas in different towns on maps and plans that went through structural changes in the research period.
2. Analysis of plots and buildings: the nature of relations of plots and buildings to each other, their relations to the street front (shape of plots, construction, buildings with/without internal courtyard, development in unbroken rows, the floor plan of the buildings, etc.)
3. Plot series (blocks): shapes, relationship between the blocks and street network, open spaces and green areas (green areas are going to have high importance in the urban typology)
4. Green spaces in the town (parks, alleys): location, conditions. The analysis of points 2 through 4 are visually and textually not presented by the examination, as the results of these are manifested in different urban tissues.
5. The urban tissue catalog is based on the determination of similar pattern clusters that can be found in the towns. The determination of the urban tissue is based on the previous points 1 through 4.

Type	Figure	Description
A-B types: See among the pre-compromise urban tissue types		
(Ca)		Almost completely regular plot series created by regular plots, but variable in sizes. The plot series are enclosed by regular streets. In the parcels free standing building (rarely more buildings) is placed. Detached houses are set back from the street line. The spacious building plots are mostly corner plots, the urban block is established by one-two (maximum 4-5) plots. Regarding to the functions, these buildings are mostly public buildings, palaces or villas. Extensive green area or park around the free-standing building is also typical.
Towns: Banská Bystrica, SK; Budapest, HU; Bratislava, SK; Banská Štiavnica, SK; Kremnica, SK; Sibiu, RO; Pančevo, RS; Kežmarok, SK; Modra, SK; Svätý Jur, SK; Skalica, SK; Levoča, SK; Kaposvár, HU; Zrenjanin, RS; Nitra, SK; Prešov, SK; Arad, RO; Munkachevo, UA; Novi Sad, RS; Oradea, RO; Dej, RO; Székesfehérvár, HU; Cluj Napoca, RO; Szombathely, HU; Sopron, HU; Bratislava, SK; Pécs, HU; Târgu Mureș, RO; Bistrița, RO; Satu Mare, RO; Hódmezővásárhely, HU; Gherla, RO; Sombor, RS; Győr, HU; Esztergom, HU; Szolnok, HU; Debrecen, HU; Budapest, HU;		

Figure 2. Urban tissue type (sample)

4.3 URBAN TYPOLOGY MATRIX

The urban typology (town types) in the period of Austria-Hungary (1867-1918) can be outlined through the formation of a matrix system of characteristics and driving forces, via definition, description and combination of urban tissue types defined by the different features and combination of urban forms, taking into account the dominant urban tissue types. Establishment of urban typology has to take into account the location of railroad systems in the town, as well as the position of the town center, and the relationships according to the urban tissues: 1. Urban tissue type and the center, 2. Urban tissue type and the green areas, 3. Urban tissue type and the river/lake (sea), 4. Spatial correlation between urban tissue types and the main roads/railway (the greatest impact has the railway lines and the radial streets, that function like urban axes). Spatial correlations between urban tissue types and town center, as one of the determination conditions along with the inner-urban relationships between the railway lines, green areas, and water surfaces, have great importance in the urban typology. According to the analyses of this research, the spatial correlations between the urban fabric (pre- and post-compromise) and the town center can determine the direction and type of urban development in the research period and territory. The combination of urban tissue types, relations and dominance of certain urban tissue types can accurately define the urban type. The localization of the pre- and post-compromise (1867) urban tissue types and street network (historical stratification) is crucial for the establishment of the urban typology. In the urban typology matrix, the suppositional basic urban types should be distinguished, since these types possess unique urban fabric dominance, based on their characteristics (basic types do not reflect individual cases; their classification occurred according to similar/identical and urban tissue types and combinations, taking into account the structural evolution as well). In the urban typology matrix, the suppositional basic urban types have to be distinguished at first. The suppositional urban types did not necessarily keep the original, pre-compromise urban fabric, thus regulations, entire transformation, or expansion could act as determinative of classification.

A higher level of urban typology addresses the complex urban types, whose cases were created through the combination of basic types and urban tissue types. The urban typology can be determined by the whole-part (town- urban tissue) and part-whole (urban tissue-town) methodology: the town is determined by urban tissue combinations and inner-town relationships or the urban tissue types can be distinguished by urban analyses (resolution of the town into urban forms).

Flowchart of the urban typology matrix: (1.) Combination of various historical urban tissues and dualist urban tissues constitute the suppositional basic urban types. (2.) The combined urban type can be created by combination of suppositional basic urban types or (3.) the combined type could be determined by combination of suppositional basic urban type (types) and urban tissue types (these type or types could be historical or dualist types, their mutual characteristic, that these do not determine basic types).

5. CONCLUSION

The urban tissue analyses of the towns are based not only on urban forms but also point out the urban tissue characteristics on basis of supporting archival documents and historical analysis and indicate the urban type as well. The dualist urban tissue types cover the urban agglomeration from the suburbs to the central core, also taking into account the green areas (inner yards, courtyards, patios) in the classification.

The taxonomy of suppositional basic urban type was based on the unique and clear urban tissue combination and urban structure.

A higher level of urban typology is the complex urban types, these cases were created by the combination of basic types and urban tissue types. The urban typology can be determined by the whole-part (town-urban tissue) and part-whole (urban tissue-town) methodology: the town is determined by urban tissue combinations and inner-town relationships or the urban tissue types can be distinguished by urban analyses (resolution of the town into urban forms). The presumed combined types can be defined by combinations of basic types or combination of basic types and urban tissue types. Within the group of combined types, determination of subgroups is a necessity, however, the determination of urban tissue combinations and design features assumed sufficient flexibility since the wide variability of urban structures can be found in the territory, according to the urban tissue dominance and urban fabric combinations.

The final urban taxonomy is integrating both of the basic urban types and combined types into the typology, and the determination of the combined types interspersed into the final typology.

The study negates the doctrine that each town is unique (Benevolo), establishing rather that each town can be seen as a collage of different urban tissue types, the organization of which creates a specific urban type and image. A "collage nature" of each town allowed to examine the forms of urban areas, and the whole structure has been read as a whole. The research period is a very interesting and complex era of the world history: the study of the towns not only explores the urban types, but also discovers the new urban conditions created within the settlements. It points out the (not just territorial) unity-creating nature of the period between 1867 and 1918, indirectly refers to the appearance of urban forms, and signifies the dominant urban development forces via urban tissue types. The modern image of the town was created and the built heritage, the

inherited town structure represents a valuable inheritance of the contemporary towns and defines the townscape.

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INTEGRISANI METOD URBANE MORFOLOGIJE I URBANA MORFOLOŠKA MATRICA

Rezime: Studija će opisati metode koje se primenjuju za definisanje urbanih tipova u Kraljevini Ugarskoj (1867-1918) i omogućavaju kategorizaciju njihovih urbanih tkiva. Metode je razvio autor jer nije bilo odgovarajućih načina za morfološka istraživanja gradova iz tog doba. Tipovi urbanih tkiva se mogu odrediti metodom integrisane urbane morfologije; urbana morfološka matrica je povezana sa integriranom metodom i definiše viši stepen tipologije, urbanističku tipologiju.

Ključne reči: urbano tkivo, tipologija, metodologija