TRANSFORMATION AND ADAPTABILITY OF THE SPATIAL DISTRIBUTION OF DIFFERENT TYPES OF HOUSES ON THE URBAN CONCEPT IN CITIES FROM 19\textsuperscript{TH} CENTURY IN MACEDONIA

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Abstract: The spatial layout of the houses of the 19th century, their transformation and adaptability, directly participate in the historic spatial planning of cities from the 19th century. In the process of the settlement formation, different models of houses are applied to specific urban cores, where the bulk structure of housing facilities directly affects the shape of the city. Characteristic are several models of urban houses, with different access; open concept using open porches on the ground floor combined with the yard, or concept of the closed facilities, where the dimensions are set of the building and the yard. The choice of construction materials creates a spatial and volumetric concept, which directly affects the urban form of the city. Forming certain found of street networks, public spaces and neighborhood centers, creates a specific character and structure of the urban content in the cities. In that way directly with the chosen model of a house, the placement in terms of the urban concept, oriented on a steep hill towards a watercourse or lake, creates the whole concept of urban settlement. The existence of a number of factors, which originate from the form of a house, construction system, adaptation of the space to the human anthropometry, the applied materials from the environment, with natural color variations that carry other specific elements, directly affect the ability for transformation of the form of the house to the principles of the urban form of the city from 19 century. The transformation and adaptability of the house from the 19th century, created some impact from the single buildings on the overall image of the city.

Keywords: house, space, transformation, urban, adaptability, alley, yard

Introduction

The cities of the 19th century in Macedonia have a certain urban structure, based on the history throughout the centuries, which developed in the spatial concept in certain historical frameworks. The size of the cities ranged from five thousand (Kratovo, Kriva Palanka, Berovo) to some ten thousand inhabitants (Bitola, Skopje, Veles). The urban spatial concept contained the Bazaar as a driver of economic functioning of the city. In the bazaar were mostly individual shops, the center of the market, administrative buildings and all contents that were vital for urban tissue. With the increase of the economic potential of the population, the development of the urban bourgeoisie, the cities were increasing the areas, with settlement in suburban areas, formed over time urban settlements, with certain infrastructure (Чипан, 1978). The adaptability to the type and capacity of the houses for their transformation, are expressed by increasing the surface, adjustment of the porch to the initial forms, to the most demanding complex spatial objects. The position of objects in certain parts of the city depending on the urban treatment, is experiencing a certain transformation in the direction of
approaching the heart of the city, as a result of expansion of the city, certain neighborhoods are transforming from suburban to the central city core. The construction of the buildings enables certain transformation of the spatial sizes, and therefore of the forms of volumes, within the urban fabric and direction of the changes that are necessary according to their changing status.

The diversity in the application of spatial concept of the houses vertically and horizontally has been practiced with certain form and style features that corresponded with the status of the user. The urban concept of the road network is formed despite the impact of the form of housing facilities and of the required infrastructure and its proper functioning. The shape of the alley or street is based on the implementation of its construction materials, the way of vital functioning of the ground, in different climatic conditions, the adjustment to other urban spaces (squares, neighborhood centers and other types of collective areas of the city). The result is a harmonious system of movement throughout the road network, which is derived from their practical implementation, like communication and public spaces that meet their elementary function in a similar form of organic structures taken or accepted from the experience and attitude towards nature. In this way we are confirming the legitimacy of the choice of form in the urban access of any street that is coming from the very needs of users, through a long period of time. The existence of a rich history throughout several centuries, the cities show a sense of satisfying all physical and social needs of the individuals (Kojic B. 1978).

The model of a house derived from spatial pattern of two different concepts, the Mediterranean spatial concept and Byzantine tradition. There is impact from the different concept of organization of Muslim and Christian families. That shows the concept's opening of the Christian house to the outside space, which is opposite to the closed yard of the Muslim concept of using the space. From this it becomes evident the irregular area of the winding streets, the volumes of houses springing up everywhere and the structure that adapts to the image of the city landscape at different levels, with interesting effects. All this is the result of a comprehensive analysis of space on the location of the buildings, carefully selected location for construction, where the relationship towards nature and neighboring buildings is respected and are formed by certain qualities of respect for the environment.

Analysis of the adaptability of different types of 19th century houses in Macedonia

Although it cannot be strictly defined a certain typology of spatial concepts in residential buildings, according to some components we can define certain types of commonly applied models. The criteria for typological analysis can be based on the height of buildings, constructive materials, spatial concept and the urban setting towards the city.
According to the height of the buildings and their spatial representation of certain rooms, we can single out a few basic models, although we cannot precisely speak of some typical schemes, due to the diversity of the solutions in the different conditions of the location. Mostly are built ground buildings, and later with first floor, as most solutions are the houses of three, four and five levels, in the most mature phase of spatial structures in the 19th century.

- **Ground buildings** are characteristic of the initial stages of development of houses, especially in suburban locations where in the first period was transferred the module construction of the village settlements. The facilities consisted of several rooms that were related to open space (porch or veranda). The yard was a modest area to meet basic needs, which now in the city there is no need of a garden or similar purpose. Satisfying the need for frequent transformation of space, which means adding new facilities or partition of the existing once, was easily achievable (Kratovo, Berovo- Fig.1.).

- In the most common case is used the model with **ground and first floor**, which corresponded to the needs of an average family. This pattern was most widely used by developers during the development of cities, and adapted to the economic possibilities of the average Macedonian family from the same period. According to the spatial scheme the ground floor had limited opportunities for transformation of the space, as opposed to the upper floor where there was occasional transformation of the premises, because of the separation and formation of separate family unit from one of the members in the community (Struga, Skopje, Tetovo).

- The buildings developed in **several levels**, three four or five levels, presented spatial conception with high spatial, structural and aesthetic values. The fact of the existence of construction with several levels, at least to a level set in relation to the neighboring facility, meant providing better view, towards the lake (Ohrid) or overlooking the city (Veles, Kratovo, Fig.2.). These houses developed on several levels, created more opportunities for transforming space or adding new elements that were presented by European houses at the same period.

Regarding the choice of material for the constructive system the differences are variable in terms of size of the objects and the region of the location of the neighborhood. The constructive system was connected with the local way of construction, the availability of the materials used in the area and other. The variations in terms of the construction
systems are very small. Significant were the effects passed through the craft families that have worked in other areas and transporting certain building experiences.

Certainly in some cities was formed a recognizable concept, which with specific elements was different from the traditional method of applying the stone wall on the ground floor and a wooden skeletal structure of the floor. In Krusevo townhouse from the 19th century, the stone was applied along the entire height of the building except the front facade, in which was applied wooden skeletal construction with mud plaster, with defined role of the decoration. In Ohrid, Veles, Kratovo the house has light construction on the upper floor, dominated by the volumes of the upper floor, which enable the building of four additional levels (Ohrid). In the neighbourhoods of the eastern part of Macedonia (Berovo, Strumica), and in the central parts (Veles), dominated the houses where in the entire height is applied the wooden skeletal structure system. In Krusevo townhouse from the 19th century, the stone was applied along system, up to four levels (Grabrijan D. 1986).

The choice of materials for implementation has an important role in shaping the spatial concept of the house, and also the possibility of volumetric transformation, which directly operated on the concept of the urban image of the city. In this way the constructive system directly affected the typology and spatial concept of residential architecture.

The spatial concept of certain types of houses that have been locally defined as a module of a traditional residential building is important factor influencing the ability of adaptation of the facilities to the urban core. Spatial concept with strictly defined character arising from long-term adjustment to the concept of family needs, limits the possibility of its transformation and adaptation to other elements (streets, squares surface etc.), from the urban structure of the city.

Meanwhile the basic concept of the object is adapted to the practical needs of the user, to urban standards of the urban core, the spatial concept, the structure and the image of the city. In this way the spatial system of the house which has been proved successful and harmonious, adapted to the site conditions, to the neighbor, neighborhood concept that was developed through the concept of the houses across multiple generations with emphasis on socialization of the population. According to the spatial concept of the houses in Ohrid, Struga, it evolved in height, forming narrow alleys and adjusting to the steep hilly configuration, with views to the
There is similar concept in Veles where is achieved spacious view towards the city, with steep and dense terrain, and narrow and steep streets (Fig.4.D.). Through the open porches is achieved spaciousness of the house and its adaptation to the urban image of the city. The relationship of the internal space, is with balcony and the environment, with view to the city landscape.

- In Kratovo house prevails the adjustment of the spaciousness of the house to the already established urban network of the urban core, to riverbeds, which are bridged by bridges. In the symbiosis between river basins, bridges and towers the house complements the urban landscape. According to spaciousness and height (maximum three levels), the house is set mostly in a row, oriented to the street. The spaciousness is possible toward the back yard, i.e., the riverbed, while the street from the front is formed by flat surfaces and small verandas (Fig.4.C.).

- Krusevo house has a specific closed concept as a facility, toward the yard, as well as to the urban concept of the city. Spatial composition of Krusevo house, which does not need additional adaptability to the environment or her need for increased functionality, the buildings participate visually in definin the silhouette of the city. Houses in Krusevo has a defined spatial conception which is rarely changed in the entire time of its existence.

Positioning the city

The orientation of the house in relation to the overall image of the surroundings or to the whole picture of the city in different cities have different defined image. The buildings are oriented towards a neighborhood center, or to the street. According to the location of the city, if the schedule of the houses are placed on one side of the riverbed (Kratovo) or on both sides of the river (Kratovo, Veles) or lake (Ohrid) forming the basic concept of the urban character of the city. The orientation of the house has a secondary importance, after the line of sight and the direction to the dominant natural geographical landscape (river, lake, etc.). Following the basic concept of the settlement, it is necessary to respect the basic urban principles, while the possibility of transformation of the spatial concept of the house is always open, and has influence as an individual case, which fits into the overall picture of the city. We can highlight the adaptability of these buildings, to new urban content that in pursuing the urban contemporary movements are adapting to the changing new concept (Cerasi M.1986).
In the urban network of Kratovo, there is a situation of setting the buildings in a sequence which is dictated by the position of watercourses, thus obtained continuous silhouette of houses with urban network (Fig.4.A). In urban concept organized as in Veles we get urban street network with free-form adapted to the terrain, in the old already established, developed concept of the city (Fig.4.D).

![Image](https://via.placeholder.com/150)

The influence of the house on the spatial concept of the city in the 19th century

The spaciousness of the house according to the scope of use of the space has rationality, multi-purpose, multi-functionality, unlike the street or alley that is using its structure and minimalism in terms of useful space. The street according to its needs has dimension, depending on the intensity of pedestrian traffic and schooling, width of 2.3 to 5.5 m. In this way the space is streamlined with minimal dimensions of streets that are shaped with the stone walls of the surrounding yards; while optimally are satisfied all human needs. The concept of urban network complements the architectural - spatial concept of the house, which is adapted to the human needs.

The compliance of the approach of these two segments in the urban system of the city from the 19th century, speaks of the existence of a modern approach to the shaping of cities, with a human dimension, which at the same time builds harmonious panorama of the city. The human concept of inner space is transferred to the space and function of the alley, through harmonious dimensioned gate, paving stone, which from the street is related to the direction of the yard, and in the reverse direction. The transformation from public to private space is realized exactly on these boundary lines, where with the closed area of the gates and surrounding walls we are getting isolated private space. The concept of spatial solutions of the house, the ground floor with a useful space-porch is connected to the yard; its size will depend on the needs of the family. The ratio of useful area and the yard in a town house in different regions has certain variations that are directly dependent on the concept of the house. For example, in Kratovo, Veles, Tetovo, we have spatial solution in the ground floor by adjusting the dimensions of the porch (open space), to the spatial concept of indoor spaces (small chamber, house, storage etc.). In this way the spaces are flexible and adaptive, the transformation of the space and its
adaptability in an individual case. Usually the porch and the garden have an irregular geometric shape and there is no clear distinction between them. For other types of houses, usually closed type (Krusevo, Debar, Ohrid, Struga), the yard has strictly defined dimension that is beyond the closed- separate spatial concept of the house, mostly because of the strict regime of the road network where each section of it has strictly defined function.

In the upper floor is applied system of shaping the spatial contents, which in a certain way, through elements of communication are developing the contents- room, loggia and so on. The builder wanted to get some proper spatial and volumetric structure straightening the irregular shapes from the ground plan in regular and correct shape on the first floor. This concept is characteristic for a group of facilities types where we have diversity in the transformed ground shapes, into straight shapes of the upper floor (Veles, Kratovo, etc.). In this way the tendency to transform the spatial system in the correct geometric form creates conditions for oriel (bay windows) and extensions to the surface of the streets, where we get some creative composition. The objects with strictly defined line on all levels, without major concessions (Krusevo, Debar, Bitola, etc.), the volumetric form creates fewer opportunities for the transformation of the spatial form of the house, and unnecessary adaptability and wastefulness of the facility toward the structure of the city's urban matrix. In this urban concept the cubicle volumes are creating the impression of separate lots, monolithic cubes, which are placed in the space of the yard and equally act, without apparent influence, in the transformation and adaptation of the houses in the urban image of the city (Tomasella P.2003).

Applying the already mentioned urban elements (alley, courtyard room, loggia), their harmonious structural embeddedness, we get a functional unit, from differently applied modules forming the free open and closed spaces, which form a harmonious composition of spatial areas and Volumetric cubes of elements of the house.

Conclusions

According to the urban growth of the city from the 19th century in Macedonia, we can conclude several major influences on its form and transformations that affected the urban image of the city.

- **The close location of the parcels** for residential buildings was set by the field decline. The creativity in the synthesis of the different uses of spaces, as a whole dominates the ground floor with an extremely economical use of space. The ground level contains basements (poor, basement), porch, winter room, stairs etc. Due to the high elevation of the ground floor, the deck floor contains some facilities, winter room, utillity rooms and so on.
- **Due to the closed family life in the community and the safety of the home and yard, in line with the fence was built high stone wall. It was created a dense network of streets, alleys, which were with small width with trade cars and pedestrian movement.**
- The second level and the other floors (in buildings with three or four levels, Ohrid) was realized by increasing the useful area, using the oriel (bay windows). Usually the bay volumes were part of the living
room or porch room. In this way was enriched the volume diversity with additional geometric forms and structures of the residential buildings, which formed a dynamic urban and spatial image of the city.

- The use of correct and incorrect inclinations of roof surfaces complement the structural diversity, through the application of building materials, ceramides with reddish coloration, etc.
- The transformation of the space was possible in different periods according to the family needs, where the larger rooms were reorganized, balcony rooms, porch etc.
- Adaptability of the construction system, which is based on its constant transformation, is creating conditions for changing the spatial composition, as needed. In this way the concept of visual image is constantly changing.

The existence of a large number of factors, which originate from the form of the house, its construction system, the adaptation of the space to the human anthropometry, the environmentally applied materials from the environment, with natural color variations that carry other specific elements, directly affect the ability for transformation of the form of the house to the principles of the urban form of the city from the 19th century.

All these mentioned factors influenced the continuous transformation of the urban context, its development and adaptation of certain modern directions of modern life, especially under the influence of the residential architecture and way of life of European cities of the 19th and early 20th century.

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