The In-between space: Lessons from vernacular architecture in North Macedonia

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Abstract. The basic principles of architecture are founded on the simple need for providing shelter from climate events. In the natural environment, man was searching for more comfort and preferences to adapt the environment to his presence, instead of adjusting to it. This process of evolution and the fast pace of technological rise in the past century resulted in man occupying the natural space for easier sharing conditions within society. Nevertheless, society is sharing this space with nature and architecture is producing something that becomes part of the environment itself. Can we share the built environment with nature? Instead of controlling and occupying the space, how do we connect, interact? What is the right way of prevention without designing obstacles? In vernacular architecture in many places in the world, the semi-outdoor space is an example of transition between the inside and the outside, between the nature and the building. The aim of this paper is to analyse the characteristics of the in-between space in the vernacular architecture and clarify its responses to climate and social conditions for the purpose of realizing the possibilities of sharing the space between the human and the natural environment. The research method conceives of recognizing architectural patterns in case studies of traditional houses in North Macedonia, which analysis shows few essential parameters, i.e. size, shape, enclosure/edges, orientation, use/occupancy, linkages, layers, cycles… By labelling and making cross-references, the connection between the environmental and social influence on the architectural elements is identified. The observed results promote one way of managing how we can make beautiful architecture by learning from the past.

1. Introduction

1.1. Background and purpose

The well-being of people is inseparable from the state of nature and the environment - that is, the connection between human and nature is complex and must be nurtured constantly. The built environment, which represents complete human control of this relationship, sometimes disrupts the balance and leads to a disconnection. By occupying the natural space for the creation of its own comfort, society sometimes contradicts, creating its own discomfort. The vernacular architecture of the past based its principles on adapting to the environment. Now, people are using cutting edge technologies to adjust the environment to themselves. In this way, the influence of the built environment develops into a problem which requires a better understanding of people’s connection with nature.

In this critical period when climate change turns into crisis, the imperative is finding a long-term sustainable answer for some problems of the built environment. Looking into the climate responsive...
design of vernacular architecture is one path for finding solution that is not depending on wasting resources or creating side-issues. The sometimes breakthrough technologies as the production of solar panels are now being questioned in terms of creation of toxic waste and emission of greenhouse gasses \[1\]. The high-rise building structures developing in the cities with their size and shape are the most important factor in the urban heat island mechanism \[2\]. Instead of investing in questionable outcomes, changing the focus into learning from design techniques that were developed based on the natural conditions can be a new way of creating a sustainable built environment.

The idea of how the environment is affecting the human life, especially with the creation of his dwelling has been studied by the science of ekistics \[3\]. Doxiadis, the inventor of the ekistics principles, believed that understanding the interaction between humans and their environment is of crucial importance to avoid chaos. In this paper, the subject of the house is the suggested point of focus, represented in examples of vernacular architecture. The aim is understanding the connection of the built environment to nature through the flexible boundaries (Fig.1), analysing the characteristics of the in-between space and clarify its responses to climate context.

\[Figure\ 1.\ \text{Hypothesis diagram: In-between space is an example of how built environment is sharing space with nature. Nordberg-Shultz is defining the boundaries of the built space as floor, wall and ceiling; and landscape’s as ground, horizon and sky [4]. Here, the boundaries are variating: wall is sometimes switched with horizon, making the volume simultaneously part of the house and part of the landscape.}\]

1.2. \textit{North Macedonia and the in-between space in the Macedonian traditional house}

Proposed location for conducting the research is a small developing country on the Balkan Peninsula, with a turbulent history in the cultural growth, yet very beneficial climate and geographical composition. The history of the human settlement on this area goes back to the prehistoric times, with Neolithic dwellings on the lake \[5\], ancient cities of the Greek and Byzantine era \[6\], and oriental knowledge influences by the Ottoman Empire. The bio-climatic chart is positioned between the moderate Continental and mild Mediterranean climate \[7\]. As a land with capacities of mountain ranges, and still not very far from the sea, the vernacular architecture here can be a product of the direct combination of various local climate and social conditions.

In Macedonian traditional houses, the in-between space is called chardak and it is defined as the upper floor (usually) semi-outdoor space, where many of the daily life activities are held \[8\]. Depending on the social structure of the place and its micro-location, this space involves functions from housework and sleeping in the summer, to wedding celebrations and representation of the status of the family. It is connecting the house to the nature, considered as inside and outside, and its spatial characteristics are defined by the micro-climate and social standard.

However, the contemporary situation in housing architecture in North Macedonia points to disconnection from nature and the economic circumstances have resulted in design errors and structural improvisations in the name of comfort. The in-between space is usually becoming just another room designed without consideration of the barriers and its connections to the outside. Not only this provides unbalance in critical times when climate events are vigorous, it also affects well-being and it is sometimes a direct threat to the safety of people.

2. \textit{Method of study}

2.1. \textit{Framework}

This paper, oriented on the in-between space element, conceive of recognizing architectural design patterns of boundaries in case-studies of traditional houses in North Macedonia. The examples of the late 19th and early 20th century are examined, as the style and approach in the architecture have determined some specific guidelines. Since most of the houses of this period are no longer existing,
sources for the examples are found in previous books and studies of the vernacular architecture in this country. Grabrijan, which is author of one of the most famous books about the Macedonian house [9], have conducted field research which resulted with collection of drawings and photographs considered a treasure with high historical and further research value. Analysing its spatial characteristics he suggests that with the transition from oriental to modern European, this traditional house might influenced master modernists, like Le Corbusier. From the examined houses for this paper, it is recognisable that the influence of the social factor and the daily life have formed a standard type of spatial structure for the human dwelling across the country. By determining the characteristics of the typical in-between space and comparing them with case studies from different locations, this paper is showing development and variations when standard is placed into context. In the next chapter, four selected case studies from different locations are compared and valued according to adapting their spatial characteristics developed from a standard type of organisation in the house from this period, being adjusted to local climate and environment conditions. Since the construction of the building is determined by creating the obstacles to the surroundings, the flexible boundary is considered as most important parameter in valuing the in-between space. The tendency of the found parameter is theoretically proposed as a sustainable solution in designing modern houses.

2.2. Nucleus as a standard spatial structure
In his book “The Creative Spirit of the Macedonian House” [10], Petar Mulichkoski is discovering the genesis of the house in North Macedonia, according to its surroundings. He refers at the nucleus as a standard spatial structure for the Macedonian house of the 19th century. The uses and their positions in the built space are the ones that are simplest, thus most common. As the environment changes (altitude, climate characteristics, social parameters), the structure changes too (boundaries, material, position, size), and it becomes more complex and distinct. The variations can be looked at as results of man’s will to adapt, to share and to link with its natural surroundings, without hurting his comfort or well-being.

2.3. Spatial characteristics of the In-between space in the Nucleus
The definition of the parameters for analysis is conducted by prioritizing guidelines of the spatial construction of the nucleus. The explanations are used as base for the comparison with the case studies.

- Position/Use: The standard house has 2 levels. The first level touching the ground is used for keeping live stock or for craftsmanship (workspace and selling), together with a cellar. In the floorplans (Fig.2), the use of the space is referred as “work”. These rooms are connected only via the porch, which is also the linkage to the upper floor. A staircase is leading to the chardak – the in-between space. The rooms connected to the chardak are for the house daily life (cooking, eating, sleeping, housework, leisure), hence this space is in-between the “home” and the “work”. As the porch on the ground is more connected to the outside and the rooms used for “work” only, it is not considered as in-between space. Chardak is the space between the inside and the outside, the private and the public, and by sometimes copying the functions of the inside space, it is completing the image of the inseparable connection between people and natural environment.

![Figure 2. Floor plans, isometry and boundaries of the in-between space in the Nucleus](image-url)
• Boundaries/Material/Size: The in-between space in the nucleus is with a regular rectangle shape, almost the same size as an inside room (Fig.2). Two sides are defined by the structural (stone) walls, and the other two are open to the surroundings. The barrier there is a wooden fence, and the view is framed with the wooden construction supporting the roof. The cover is a complement part of the roof of the house and the floor is wooden. Ceiling and floor are not considered in evaluating the boundary as they are not changing their characteristics (flexibility). The wall boundaries are divided in 3 groups: Invisible (Horizon), Variable (Wooden wall, fence or openings) and Stable (Structural). Afterwards, they are defined as flexible and inflexible. In the standard example, the flexible boundaries are more than half of the complete area.

2.4. Selection of the case-studies
The examples which are part of the analysis, are taken in account out of a number of houses found in the referenced books and previous studies [8] [9] [10] [11] [12]. 3 determining factors (1 environmental and 2 spatial) are taken in consideration when choosing the examples for examination:

- The location of each case-study must have variation in the altitude and micro-climate characteristics (Tab.1);
- The building must contain an in-between space known as chardak (always on an upper floor);
- The building must consist of 2 or more levels (for the possibility of possessing a chardak).

The similarity to the shape of the nucleus model is given as standard to be followed for selecting the 4 case studies.

| Place | Altitude  | Köppen climate classification | Characteristics         |
|-------|-----------|------------------------------|-------------------------|
| 1     | Ohrid     | 695 m                        | Csb / Cfb               | Mediterranean / Oceanic |
| 2     | Galichnik | 1500 m                       | Dfb / Dfc               | Continental / Subarctic |
| 3     | Kratovo   | 600 m                        | Cfb                     | Oceanic                 |
| 4     | Strumica  | 230 m                        | Cfa                     | Subtropical             |

3. Comparison analysis of the case-studies

3.1. Ohrid
Ohrid is a city situated next to a lake, inhabited since the prehistoric times with pike dwellings. The main occupation in the past was fishing, making the image of the houses unique in comparison with the other cities in North Macedonia. This city is known for having 365 churches, making it a Jerusalem of the Balkan. The house in Ohrid (Fig.3) is usually narrow and tall, adjusting to the rocky hill on the side of the lake. Because of the “law of good neighbouring”, each house was built to have a view of the water horizon, and the rule was that no other house can obstruct that view. Because the main occupation of the habitants was fishing, the building needed to be tall with a space with double height for cleaning and drying the fishing nets.

Figure 3. Examples of mid- and upper-level floor plans of examined houses in Ohrid
In the case-study of Ohrid selected by considering the similarities to the Nucleus (Fig.4), a house with 3 levels is shown, with a floor between the porch on the ground, and chardak spreading on two levels. There is differentiation in the boundaries, where only one side is open to the landscape and the material is adjusted to the climate – instead of small wooden fence, there is a wooden wall with windows that are completely open in warm periods, and closed when the weather is cold. The flexibility is still 50%.

Figure 4. Floor plans, isometry and boundaries of the in-between space in house in Ohrid

3.2. Galichnik

Galichnik is a village located on the slopes of the Bistra Mountain. It was populated by the Mijaks tribe, who were famous for their masonry and carpenter skills (especially used in seasonal work all over the Ottoman Empire). It has well-preserved traditional architecture and is famous for its surrounding countryside and nature reserve. The nature’s resources were used by shepherds, and producing milk products is still very popular in this region. That is why the houses tend to be made with a space for conserving and keeping the food from spoiling. The material used for building was mostly stone, which helped in creating space where the temperature can be controlled. In the examples in Fig. 5, most of the houses are following the standard spatial type.

In the case-study of Galichnik selected by considering the similarities to the Nucleus (Fig.6), the terrain is the vertical connection between the levels, so now the chardak is the in-between space only between the rooms and the landscape. Yet, here again, it doesn’t lose its spatial use or size. The main obstacle is again a wooden wall with window openings, and in compare with the small fence from the nucleus it gives a much smaller connection to the landscape; however in comparison to the stone structure walls that the building is made of, this in-between space linkage to the outside is still of great importance and value, and much more flexible. Not being able to control to temperature easily as in the stone wall rooms, and the visual connection to the mountains and the valleys of the surrounding gave a pleasurable relationship for the habitants with the nature.

Figure 5. Examples of upper-level floor plans of examined houses in Galichnik

Figure 6. Floor plans, isometry and boundaries of the in-between space in house in Galichnik
3.3. Kratovo
Kratovo is situated in the crater of an extinct volcano. With half Christian and half Muslim population in the 19th century, the image of this small town is filled with various architecture landmarks – most popular: stone towers and bridges. The examples (Fig.7) are showing many varying forms of the in-between space and its adaptation to the context. One important characteristic is that the slope of the terrain usually allows connection to the chardak from the ground level via staircase and from the upper level via the terrain (similar to the house in Galichnik).

![Figure 7. Examples of mid- and upper-level floor plans of examined houses in Kratovo](image)

The case-study of Kratovo selected by considering the similarities to the Nucleus (Fig.8) provides interesting development. The in-between space have very similar spatial characteristics with the nucleus; the size, shape, and even the openings on 2 sides where the barrier is only a wooden fence combined with wooden structure from the roof. Except in this example, the other two sides are wooden walls with opening, considered also as flexible as they can be changed and adjusted for the season. The flexibility of the barrier in the house in Kratovo is with the highest percentage in the examined cases.

![Figure 8. Floor plans, isometry and boundaries of the in-between space in house in Kratovo](image)

3.4. Strumica
Strumica is located in the south-east near to Struma River valley and the architecture here is mostly influenced by the warm weather. It has history since the ancient period being positioned on the road between the East and the West, and was always populated because of the good agricultural conditions. Since the environment was the primary resource for people’s life, therefore the houses were well connected to their surroundings. The examples following the parameters (Fig.9) are tending to be bigger in size, with a larger space used for the chardak.

![Figure 9. Examples of upper-level floor plans of examined houses in Strumica](image)
In the case-study of Strumica selected by considering the similarities to the Nucleus (Fig.10), the in-between space is situated on almost one half of the upper floor, following the long façade. The size of the chardak is bigger than the room, and the space is during the whole year for many different activities. The space is opened on 3 sides, with attention of the wind flows as well as the view to the environment. The flexibility is continued with the construction of wooden wall with openings on the remaining side.

The conclusion of the analysis in chapter 3 is that there is tendency of creating connection to the nature in the built space by providing at least 50% of flexible boundary in the in-between space, as a solution for using the merits of the climate conditions and still providing shelter in the needed season.

4. Idea solutions for transformation of the built environment

The lessons learned from the in-between space analysis could contribute for both global and local sustainable design goals.

4.1. In-between space as SBE tool

The global challenge of disconnection between human and nature because of the issues of built environment can be effectively answered with long-term sustainable solutions. The flexible boundary tendencies from vernacular architecture are recognized as possible framework for future design.

- Technological trends: It is preconceived that digitalization and using smart technologies can facilitate environmental benefits, yet the sustainability of this processes is not inherited. By using cutting edge technologies to improve our comfort, houses are designed even more dependable on the scarce resources of the planet. Using passive solar energy and light with the help of a spatial element connected with nature, is a practise shown in the case studies. Implementing flexible boundaries as guidelines for adaptation, with deeper analysis and simulations of the environment when designing a house, should prevail the convenient solution of using technical support to control the comfort of the indoor space.

- Urban heat island (UHI): The problem of UHI is connected mainly with the built environment, especially with its size and shape. Surfaces decreasing the albedo are helping in buildings heat storage mechanism, affecting the cause of the increased temperatures in urban areas with high-rise buildings. Designing flexible boundary when developing the building environment, can be a sustainable solution for controlling the UHI process (Fig.11).
4.2. Retrieving the in-between space in houses of North Macedonia

The trend for chasing greater comfort in price of disturbing connection with nature has been influencing architecture decisions for the modern Macedonian houses, too. The new designs are usually changing the proportion, size and function of the chardak, by incorporating balcony with much smaller area and less possibilities for activities. In cases of renovations, the first space looked as opportunity for providing extra room is enveloping the in-between space with mostly inflexible boundary. By being a developing country, this has affected not only the well-being of the people, but also the structural safety of the buildings. The suggested retrieving of the space shared with nature from inside the house, could bring great deal of improvement by easily creating sustainable built environment.

5. Conclusion

In the past human’s connection to the natural environment was more direct in many ways, and that is reflected in the way vernacular architecture uses local resources for building materials, and the spatial structure of the houses is guided by the climate and surroundings. That is shown in the importance given to the in-between space and adapting the typical spatial characteristics to the climate conditions is clearly observed in the examples of its flexible boundaries. Today, technology is a great merit for providing comfort in the modern lifestyle, however, it is affecting the built environment and the control people are having versus nature. By promoting values collected from the lessons of the past, the developing cities would be more sustainable because of their porosity - incorporating in-between spaces with flexible boundaries. Also, the smaller building volumes could influence a reasonable consumption of energy and capacity for using local materials for construction. The analysis of this research is showing that the space created from the daily life in the society can be easily adapted to the natural environment by adjusting our boundaries and replacing them with connections.

6. References

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