

## FRAGMENTATION IN MACEDONIAN TRADITIONAL ARCHITECTURE IN RELATION TO THE WOOD AS A STRUCTURAL ELEMENT

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### ABSTRACT

Intricate concepts of spatial organization characterize the traditional Macedonian architecture of the 19<sup>th</sup> century. The limitations imposed by specific materials and technological constraints during that era stimulated the development of intelligent and versatile spatial models. Among the defining features of that architecture is the intricate use of wood as a primary constructional element. This research seeks to investigate the qualities of fragmentation of the form and their practical application.

The study will commence by defining the concept of fragmentation as a fundamental aspect of architectural expression. It will then systematically analyze its physical and formal properties from various aspects such: materials, spatial structure, construction, grouping of window openings. It will also analyze aspects of human experience and perception, evident through: perception and experience, identity, functionality. The study will examine approximately 200 houses from this period.

**Key words:** fragmentation, rhythmic formations, spatial configuration, traditional architecture.

### INTRODUCTION

In the context of Macedonian traditional architecture, fragmentation emerges as a profound articulation of spatial dynamics and structural aesthetics, deeply intertwined with the use of wood as a primary building material. This paper explores how wood, with its inherent properties and structural capabilities, shapes and influences the fragmentation of architectural forms in Macedonian traditional buildings.

The wood as a structural material not only reflects practical responses to environmental and cultural contexts but also imbues these structures with a distinctive visual and spatial language. By examining the role of wood in the fragmentation of architectural volumes, this study explores into how its use facilitates flexibility, adaptability, and aesthetic richness in spatial design. Moreover, it investigates how its presence influences the relationship between interior and exterior spaces, creating dynamic interplays that enhance human experience and interaction with the built environment.

Through an exploration of specific examples and typologies within Macedonian architecture, this paper aims to clarify the nuanced ways in which fragmentation, facilitated by wood as a structural element, contributes to the enduring cultural significance and architectural identity of the region. By critically examining these relationships, we uncover not only the technical competence of traditional builders but also the symbolic and cultural dimensions embedded within architectural forms.

### METHODS

This study employs a comprehensive approach to explore the role of wood as a structural element in shaping fragmentation within Macedonian traditional architecture. The research

integrates historical analysis, primary and secondary data collection, and theoretical examination of architectural principles. Historical analysis utilizes archival sources and scholarly literature to trace the historical evolution of architectural practices, identifying patterns and innovations. Field observations provide firsthand insights into existing architectural examples. Normative method evaluates recurrent architectural features and construction techniques, establishing standards within traditional building practices. By integrating these methods, we gain a comprehensive understanding of how wooden construction influences the fragmentation of architectural forms in Macedonian traditional architecture, thus bridging empirical data with theoretical frameworks.

## FRAGMENTATION

The spatial configuration of traditional Macedonian architecture is primarily based on a compositional system of elementary square or rectangular spatial units (rooms) with a central character. Although the ground floor spaces are often irregularly shaped due to contextual restrictions, they aim to become rectangular, being arranged in an orthogonal structure on the upper floors, achieved through cantilever projections. This flexibility is largely facilitated by the use of wood as a structural element, allowing for adaptable and versatile construction methods.

The room is the primary living unit, accommodating various functions: living room, dining room, guest room, bedroom, etc. It strives for a square form, as a result of anthropomorphic selection in choosing the most suitable shape. It appears with typical dimensions that often recur, with rare exceptions, as elaborated in the research by Hadzieva Aleksievska (1985), where repetitive dimensions have been identified with the following values:

$(5 \times 6)AR = (3.8 \times 4.5)$  meters,  $(6 \times 6)AR = (4.5 \times 4.5)$  meters,  $(5 \times 5)AR = (3.8 \times 3.8)$  meters,  $(4 \times 5)AR = (3.0 \times 3.8)$  meters,  $(6 \times 7)AR = (4.5 \times 5.3)$  meters and  $(5 \times 7)AR = (3.8 \times 5.3)$  meters.

Alternatively, deviations from whole arshin (AR) units occur as a result of specific programmatic requirements, site conditions, and conflicts arising from the dimensioning approach – axial or tangential:

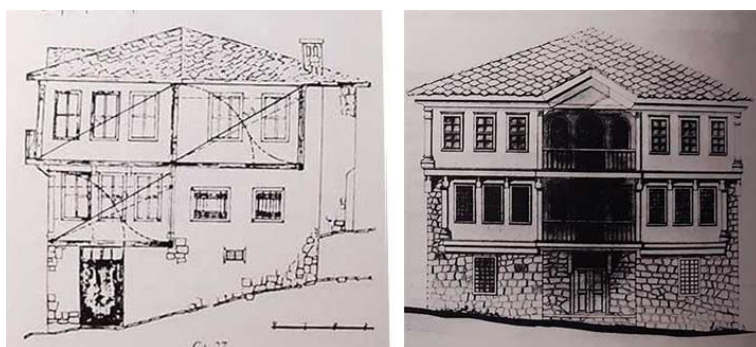
$(5.5 \times 6)AR = (4.2 \times 4.5)$  meters,  $(5.25 \times 6)AR = (4.0 \times 4.5)$  meters,  $(4.5 \times 5.5)AR = (3.4 \times 4.2)$  meters,  $(5.5 \times 5.5)AR = (4.2 \times 4.2)$  meters.

In the research conducted by Hadzieva Aleksievska, the measurements are presented in the traditional ‘arshin’ measure unit (AR). Considering that the most commonly used arshin unit in Macedonian architecture is approximately 76 centimeters, the dimensions are converted in meters accordingly.

In the spatial design of traditional Macedonian architecture, the communicative space also plays a vital role beyond being a mere corridor that connects primary living areas. Instead, it evolves into a central gathering area around which these spaces are arranged. While facilitating movement and access to other rooms, the communicative space also becomes a destination in itself, encouraging social interaction and connection. The architecture exhibits a clear differentiation between open and enclosed spaces, with fluid elements like porches, chardaks, and staircases, referred to as transitory spaces, according to Dusan Grabrijan (1986) on one hand, and well-defined, enclosed rooms on the other. These rooms, with similar dimensions and flexible functions, are strategically positioned in relation to the communicative space. This design concept is based on a dichotomy, emphasizing the contrast between private and social

realms, and resulting in a harmonious composition of enclosed volumes and open areas with various interconnections.

“Designing from the outside in, as well as the inside out, creates necessary tensions, which help make architecture. Since the inside is different from the outside, the wall – the point of change – becomes an architectural event. Architecture occurs at the meeting of interior and exterior forces of use and space. These interior and environmental forces are both general and particular, generic and circumstantial. Architecture as the wall between the inside and the outside becomes the spatial record of this resolution and its drama” (Venturi, 1966). Such tension in Macedonian architecture is usually resolved through the fragmentation of structures, breaking up large volumes into smaller, visually interesting components, which is a key aspect of architectural expression. This fragmentation primarily reflects the duality of the vertical and horizontal division of the house, resulting from functional zoning both horizontally and vertically (Fig. 1). Balancing these contradictions presents a challenge for structural stability while simultaneously influencing the overall visual expression. Horizontals and verticals operating together introduce the principle of balanced oppositions and tensions, with the vertical expressing a force which is of primary significance – gravitational pull, and the horizontal contributing a primary sensation – a supporting flatness; the two together produce a deeply satisfying resolved feeling, perhaps because they symbolize the human experience of absolute balance, of standing erect on level ground (Baker, 1996).

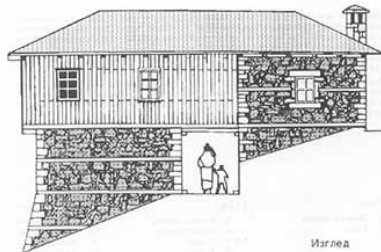


**Figure 1: Functional arrangement by horizontal and vertical elements at houses in Krushevo – image from Voljinjec and Hadzieva Aleksievska, (1982)**

The influence on the expression of traditional Macedonian architecture from the 19<sup>th</sup> century, resulting from the changes due to the altered social and political circumstances in the Ottoman Empire, imposed open tendencies of the house towards the outside world. This led to freer and more fragmented forms of buildings, a trend more strongly expressed in regions with milder climatic conditions. The level of openness and fragmentation varies across different regions. In the town of Veles, a particularly distinct fragmentation appears in its architecture, characterized by specific features from that period: the direct connection of the house to the street, a general aspiration for spatial freedom expressed by a strongly fragmented spatial structure, and the spatial and functional differentiation of the chardak with an aspiration for secession, achieved through the creation of a belvedere chardak, known as the 'tronj' (Voljinjec and Hadzieva Aleksievska, 1988).

In a physical sense, the fragmentation of form in Macedonian traditional architecture is expressed as a rhythmic formation and volumetric differentiation of space, manifested through various aspects:

- From the aspect of materials, fragmentation is correlated with the level of their technological availability and properties. The variety of materials (stone, wood, plaster, glass) and their methods of processing create a contrasting image in terms of texture, color, reflectivity, and transparency.
- The articulation and highlighting of the horizontal lines result from the clear distinction between the floors, expressed through the diversity of materials such as stone and wood. In many cases, the diversity of materials also implies a vertical division. (Fig. 2 and Fig. 3). This type of fragmentation is most obvious in its elementary form within the architecture of 'Miyaks' in the 'Reka' region, characterized by a clear distinction between stone and wooden structures. The wooden structure, light, thin, and permeable, appears as a distinct cubic fragment integrated into the monolithic formal expression of the objects. (Fig. 4). We could relate this distinction to the tectonic logic derived from the cascading rise of the stone walls in accordance with the terrain's topography. On the other hand, there is a tendency towards light construction, transparency, and permeability enabled by the wooden structural system, thus evolving from the Byzantine houses' principle of an open solarium into closed constructions known as chardak. It is a principle of vernacular architecture to build upon the traditions of Byzantine stone buildings by incorporating wood as a functional element. At this elementary level, one could notice the conceptual similarity between the traditional Macedonian house and the Byzantine house.



**Figure 2: Distinct fragmentation through diverse materials – a house in Galichnik – image from Brezoski (1993)**

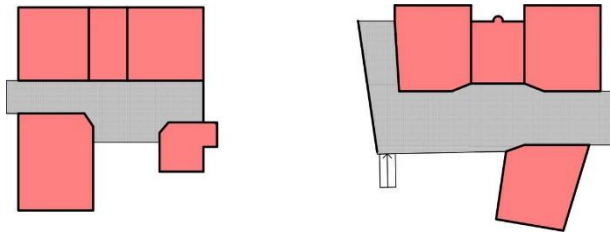


**Figure 3: Distinct fragmentation through diverse materials and forms – a house in Galichnik – image from Brezoski (1993)**



**Figure 4: Monolithic expression by stone and timber framing – the house of Gjorgji Pulevski in Galichnik – image from Brezoski (1993)**

- In terms of spatial structure, primary volumetrics, and plasticity, fragmentation primarily serves to distinguish functional zones within the house. It originates initially from the division of open and closed spaces, and additionally from the subdivision of the building into separate rooms, which can strongly influence the expression of the facade. Particularly noteworthy are the examples in the town of Veles, subdivided into individual rooms or groups of rooms, each with strongly emphasized forms as positive spaces – islands dispersed throughout the open layout of the chardak. This configuration results in a complex arrangement of the chardak, characterized by spatial penetrations and rich views over the surroundings. (Fig. 5).



**Figure 5: Positive spaces-islands dispersed throughout the open layout of the chardak at houses in Veles**

- The fragmentation of form in Macedonian architecture is achieved through additive and subtractive transformations of the basic volumetry, resulting in diverse shapes of different parts of the building – architectural elements that contribute to changes in the overall volumetry. Additive transformation is achieved through the use of cantilevers and protrusions, while subtractive transformation is achieved through the incorporation of open porches, chardaks, facade recesses, and similar elements. The contrast between open and closed spaces is further emphasised by the cubic definition of closed, cantilevered projections against open, recessed 'empty' spaces. This creates a tense, meandering structure between internal spaces that protrude outward and external spaces that penetrate inward, resulting in a dynamic interplay of interior and exterior energy. The cantilevered projections, such as open spaces like chardaks, especially when they appear as penetrating elements pierced through the monolithic structure of the building, possess complexity due to the simultaneous flow of internal and external dynamics through a single element.

- A distinct type of fragmentation is the echelon shaping of the plan, which results from the configuration of the site or the particular spatial development of the object. (Fig. 6). A common type involves echelon arrangement of two or more cantilevered cubic shapes in a sequential series, stemming from the irregularity of the ground floor plan and the orthogonal arrangement of upper floor rooms. This creates a diagonal relationship with the ground floor walls, emphasizing a dramatic contrast between orthogonal and diagonal structural elements. (Fig. 7). The echelon arrangement of cantilevered volumes imparts angular properties to the rooms, despite their non-angular positioning, often enhancing natural lighting and providing two or three-sided views from within. This design approach also creates a distinctive external aesthetic expression.

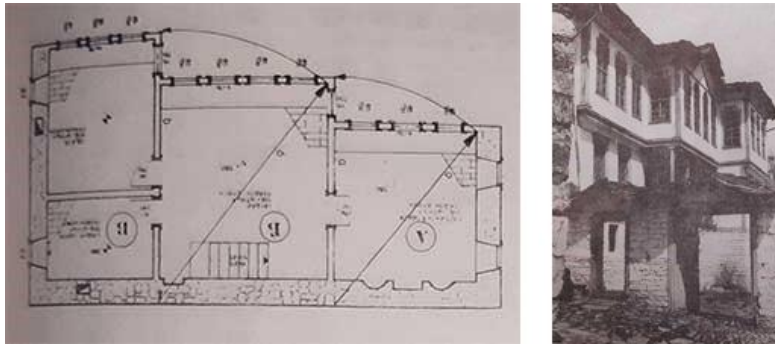


Figure 6: Fragmentation expressed through the echeloned shaping of the base at a house in Krushevo – image from Voljinjec and Hadzieva Aleksievska, (1982)



Figure 7: Fragmentation expressed as a dramatic contrast between orthogonal and diagonal structures at houses in Veles (left) and Stip (right) – images from Grabrijan, (1986)

- Fragmentation also often occurs in the form of uneven height levels, where besides physical differences, open spaces are symbolically differentiated into various spatial domains with distinct significance. (Fig. 8). The visibility of floor construction beams on the facade expresses the vertical division of the building.

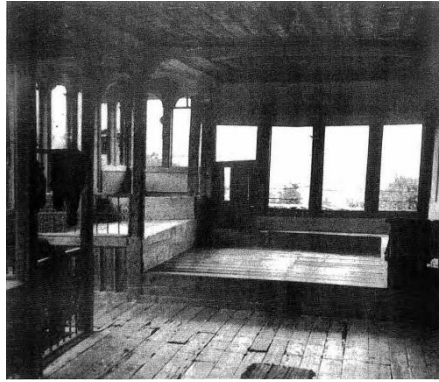


Figure 8: Chardak as a complex system of elevated floors in Debar – images from Grabrijan, (1986)

- All these aspects accentuate the spatial articulation in a three-dimensional form, where the shape of the house is not simple or uniform, but rich and varied, emphasizing stereometric over frontal expressiveness.
- From a constructive standpoint, the fragmentation in traditional Macedonian architecture refers to how wood, as a building material, influences the spatial layout primarily through its load-bearing features. Specifically, wood plays a crucial role in allowing for suitable spans where the vertical load-bearing elements such as pillars visibly accentuate the spatial fragmentation across different construction zones, visually dividing the building and imparting a structural, constructivist aesthetic (Fig. 9 and Fig. 10). This aspect manifests directly or indirectly as a tool of fragmentation. The structural integrity provided by wood also indirectly influences the fragmentation that pertains to the primary volumetric composition of the object. According to Constantinos Doxiadis (1963), we should not be afraid of having similarity of solutions, a similarity of rhythms, we should not avoid certain patterns of construction, for in certain cases we are bound to follow a logical pattern of rhythmical repetition, which is necessary for the rational formation of many parts of buildings, for the improvement and standardization of construction, as well as for prefabrication; and finally, it is also necessary, although not indispensable, from an aesthetic point of view.



Figure 9: Fragmentation expressed through structure – image from Grabrijan, (1986)



Figure 10: Fragmentation expressed through structure – image from Karanakov, (2014)

- Groupings of window openings on the facade – often two or three, as part of compact and monolithic structures, suggest the fragmentation of the interior space. (Fig. 11 and Fig. 12).



Figure 11: Fragmentation expressed through a grouping of window openings at a house in Tetovo – image from Grabrijan, (1986)



Figure 12: Houses in Ohrid, fragmented into various prismatic volumes

Fragmentation in architecture also affects our understanding of the nature of form and its identity. In this sense, fragmentation serves both as a feature of architectural form and as a tool in shaping human experience and perception. We can perceive this further through the following aspects:

- From the standpoints of perception and experience, fragmentation alters our complete understanding of an object, leading us to perceive it as a collection of distinct parts

rather than a unified whole (Fig. 12). Architecturally, the object is decomposed into various prismatic volumes arranged in symmetrical or asymmetrical configurations, often appearing in a seemingly random pattern, projecting or recessing in relation to the reference plane and at irregular angles. These volumes are often interconnected by chardaks and staircases in a dynamic interplay between interior and exterior spaces, thus effectively breaking down the massiveness of the object. Fragmentation through incisions and penetrations also facilitates a more even distribution of light, provides rich views, and enhances contact with nature, while creating a sense of openness and the illusion of floating forms. The breakdown of the building's form into smaller parts creates an expression of dynamism and tension that significantly contributes to the overall visual appeal of the building. In that sense, fragmentation is grounded in the idea that a building or structure can be more than just a static object; it can be a dynamic and evolving entity that responds and adapts to the needs of its inhabitants and the environment.

- In terms of identity, fragmentation challenges the stability and coherence of architectural form by breaking down boundaries between interior and exterior spaces, as well as between different parts of the building. This approach questions the conventional relationships among architectural elements and how they integrate with nature – bringing nature inside and extending the interior outward. In this way, architecture responds to its context and landscape, establishing an interplay that strengthens its relationship with the urban and natural environment. Thus, fragmentation serves as a means of humanizing architecture.
- From a functional standpoint, fragmentation divides the space into basic functional areas, allowing flexibility and adaptability in their use. This approach enables individual elements to serve various purposes, allowing for combinations and recombination according to the tenants' needs.

## CONCLUSION

In traditional Macedonian architecture, fragmentation is intrinsically linked to the use of wood as a structural element. Its versatility and load-bearing characteristics facilitate the division of space into distinct yet interconnected parts, reflecting functional relationships, complexities, and polarities within the design. This fragmentation serves pragmatic purposes, providing flexibility and adaptability in the use of space, and simultaneously acts as a visual manipulation and formal metaphor.

The use of wood allows for varied spans and supports, enabling the creation of prismatic volumes and dynamic configurations that break down the building's mass into smaller, more visually engaging components. This approach enhances natural light distribution, provides rich views, and fosters a stronger connection with the surrounding environment, contributing to the overall dynamism and tension of the architectural form.

By integrating elements such as chardaks and staircases, traditional Macedonian architecture achieves a fluid interplay between interior and exterior spaces, emphasizing the contrast between open and enclosed areas. This fragmentation not only enhances the practical functionality of the spaces but also imbues the structures with a transcendent character,

transforming them from simple functional responses into universally recognized cultural artifacts.

Therefore, the fragmentation in traditional Macedonian architecture, driven by the use of wood, exemplifies a harmonious balance between practical needs and aesthetic expression. It humanizes the architecture, enriching it with cultural significance and fostering a deep connection with both the built and natural context. This design philosophy underscores the enduring legacy of Macedonian architecture, where the structural logic of wood inspires and shapes its distinctive identity.

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