

INSPIRATION FOR CONTEMPORARY PREFABRICATION FOUND IN TRADITION

UDC 69.059

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Abstract. *The paper discusses the buildings from the past that can be considered the precursors of prefabricated buildings as we know them today, and can also be considered as inspiration for modern prefabrication. The research platform in the paper is represented by selected examples of buildings characteristic of the Western Balkans, namely: "kućer", "povoznica", "tronj", a hut on Koštan polje and a house from Kosovo. The second part of the paper presents an example from the world, a "yurt" characteristic of various locations on the Asian continent, which finds application in the modern world. Flexibility, mobility and economy, the main characteristics of prefabricated buildings as we know them today, are recognized as guiding ideas of the analyzed examples*

Key words: *regionalism, vernacular architecture, portable buildings, prefab buildings, assembly-disassembly, prefab evolution.*

1. INTRODUCTION

Prefabricated construction most often comprises factory-produced elements which are then transported to the construction site where they are joined together into a single unit by adequate methods. People constantly strived for faster completion and putting into function of the conceived structures by applying traditional ways of building and constantly perfecting them.

There are no exact timelines that can be considered the beginning of the application of prefabrication for the purpose of creating space for housing, living and working. Man has always been in a quest, both physical and spiritual, for an environment providing the most comfortable living conditions. The pursuit of stable and favorable living conditions is known to many peoples, therefore changing the habitat is not uncommon. The nomadic

Received April 30, 2022 / Revised May 10, 2023 / Accepted May 11, 2023

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way of life meant moving all the necessities of life and thus the housing buildings. In different parts of the world different designs specific for the living conditions and historical circumstances of the area have been created, according to the environment, climatic conditions and means.

In the history of the peoples of the Western Balkans, changes in the location of the population (migration) have been common. The reasons have been different, they were primarily existential or a consequence of historical events. Existential reasons include providing access to fertile land and rich pastures, and thus to food for humans and animals. These reasons are also identified in the migrations of the Serbian people. The turbulent history of the Serbian people, and especially of the Serbian peasantry in the Middle Ages, caused the continuing change of the place of residence due to frequent conflicts, constant changes of people in power and levies that usually exceeded the incomes of ordinary people. In their literature, Novaković [1] and Filipović [2] investigate these phenomena and the reasons that lead to them.

The change of place of residence due to frequent migrations has stimulated the research of residential buildings from the constructive aspect in terms of their mobility. The region that has proven to be a good research base of the greatest interest to us, is the area of the Western Balkans from the end of the Middle Ages and the beginning of the new ages. Therefore, considering the previously mentioned aspects, as well as the regional and time specifics, the main part of the paper includes the presentation of selected residential structures, which could be moved from place to place as a whole or in a disassembled condition [3]. This moving option, i.e. disassembly and reassembly of almost universal/unified elements, was achievable owing to the material, primarily wood, which was most used at that time. The previously listed characteristics (option of moving, disassembly/assembly, universality of elements and their connections) represent the main features of prefabricated structures as we know them nowadays (Fig. 1).



Fig. 1. Log churches – constructed with no use of connectors

(Source: I. Marić, *Tradicionalno graditeljstvo Pomoravlja i savremena arhitektura* pp. 52)

Based on the concept of a log house, and in fact different due to their constructive properties, the paper presents representative examples from the end of the old and the beginning of the new century from the Western Balkans region: *kačara*, *kućer*, *povoznica*, *tronj*, hut on Koštan polje and a house from Kosovo.

There are always elements of permeation between the national and the international, but also components of separation. According to Marić [4], it is often difficult to determine which elements originated from a certain environment, and which are external influences. That is why an example from the world is given – a yurt as an example of the diversity of ideas and designs, which primarily depend on the lifestyle and needs of nomads on the Asian continent, and on the other hand the similarity and universality of the need for portable structures are observed.

2. REPRESENTATIVE EXAMPLES OF WESTERN BALKAN

On the territory of the present day Serbia, a country house in areas rich in forests such as Šumadija, Stari Vlah and Podrinje is basically a log house [5]. In the beginning, it had a single room, small in size, it was built quickly and easily, it could be disassembled and thus transported in parts to another place. The distances to which the buildings were moved range from a few hundred meters when, for example, there was a division of property to several tens of kilometers when people moved in search of better living conditions, either voluntarily or being forced to do so. The transportation of the buildings was made possible primarily by their simple construction, where the previously cut parts can be joined without any connectors, or with a small number of them, mostly required for the roof joining.



Fig. 2 Transport of a whole building

(Source: A. Fotić, *Privatni život u srpskim zemljama u osvit modernog doba*, pp. 167)

The following is a list and description of several buildings that people in the Western Balkans have used in the past, and which could be moved as a whole or in parts from place to place over varying distances.

Kačara – “Kačare” (plural) are separate buildings within rural households used to store casks and other vessels necessary for keeping, processing and storage of final products which was an important source of income for families at those times. “Kačare” in terms of their size are among the largest buildings in the curtilage (property), with elongated layouts and centrally placed doors with two wings, without windows. The structure of the building is founded on strip stone foundations. The body of the buildings is a timber frame [6], where the upper and lower rings are rectangular, made of timber beams, connected at the corners by double notched joints (“na ćert”). At the middle of the span, there are wooden posts as well as on the corners, and at every 1 or 1.5m of spacing. The spans between the posts are filled with horizontally laid hewn planks. The roof is hipped, covered by shingles, stone slabs or roof tiles. The structure of the building facilitates easy and quick dismantling and an option of transporting to a different location and their reassembling.

Kučer – The simplest building is named “kučer”, and it is of modest dimensions intended to provide a place for sleeping for a shepherd, so it is often called a bed near the cattle pen [7]. It can be transported from one place to another because it fitted to a structure resembling sleighs. In literature it is often listed as a “covered bed on sleigh”. *Kučer* is often made of timber, but at some places the walls are woven from wattle, it is covered by thatch or boards fitted on linked purlins (Fig. 3).

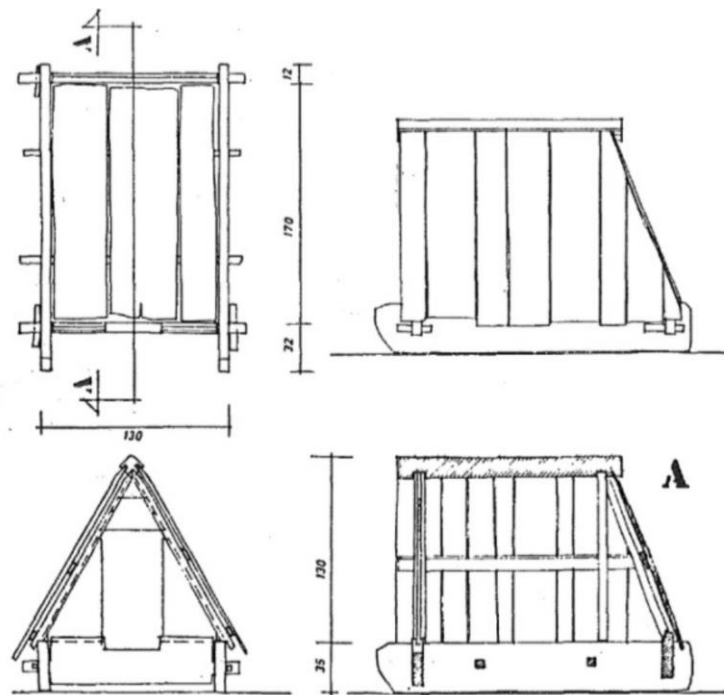


Fig. 3 Sketch of “kučer” in different views
(Source: R. Findrik, Etnografski glasnik 50, pp. 103)

Povoznica – It is of slightly larger dimensions than “*kućer*”, while it is fairly similar. “*Povoznica*” represents a warm shelter for the shepherd or lambs. There is also “*mlečar*” which is dairy product building. *Povoznica*, as seen in the Fig. 4, has a mixed structure where the sleighs and basic structure are made of timber, while the walls are made of wattle or sheaths of straw while the roof is always made of thatch [8, 9].



Fig. 4 *Povoznica*

(Source: A.Deroko, Narodno neimarstvo I, slika 27)

“*Tronj*” is the name of a peasant’s house (kmet-čifčija) on Kosovo, Skopsko polje, central parts of Serbia and parts of Montenegro rich in forests. The size allows accommodating beds for entire families, which were multi-generational ones at the time, with many children (Fig. 5). The structure provided for the disassembly of the »*tronj*« if needs be, and there always was a need at the time, and for transporting it to an alternate location and for reassembling it there.

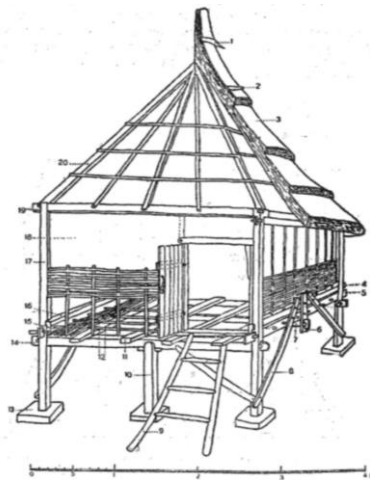


Fig. 5 “*Tronj*”

(Source: R. Findrik, Etnografski glasnik 50, pp. 104)

Huts on Koštan polje on the Pešter plateau are of a more complex assembly-disassembly structure. The huts are composed of 4 panels made of wattle woven between the foundation beams and the roof cornice, which are at the corners connected without the special connectors. The roof structure is made in a way so as to contribute to the stability and strength of the entire building. A detailed description of this structure is provided in the Ethnographic gazette no. 50 [9]. These buildings are easily transported, both whole or disassembled. When the roof thatch is removed, the rest of the structure is transported by placing the rollers under the building.

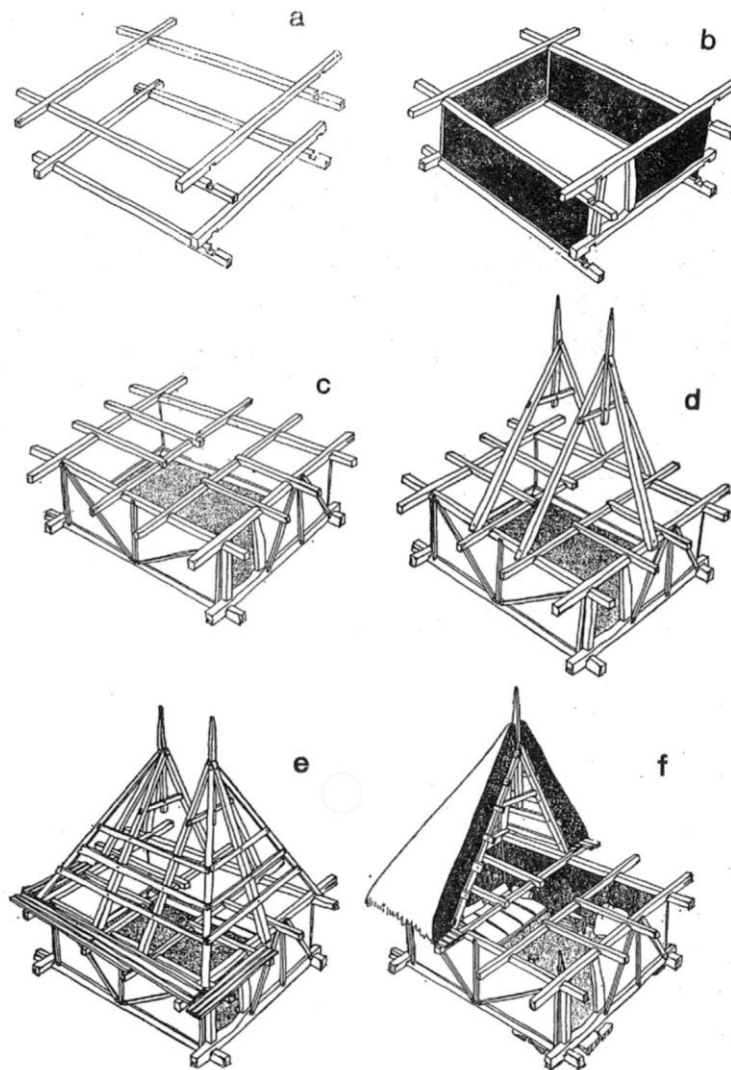


Fig. 6 Construction houses of the abode on Koštan polje
(Source: R. Findrik, Etnografski glasnik 50, pp. 106)

House on Kosovo is of a more complex structure than the buildings described in the previous text. The stone blocks serve as the support for the horizontal beams (“*podvale*”) which are joined at their ends and fixed by notching, and where vertical elements are fitted (“*čošnici*”). On the top end, they (“*čošnici*”) are connected with horizontal elements (“*nastavnice*”). The corner posts form a wall screen divided into the smaller panels with other posts, while the walls are made with wattles (“*pletka*”) after which the walls are daubed in mud. The walls are composed of only 6 different parts (elements). The stability of the building is provided by strengthening the wall structure by fitting the braces which connect and fix the position of horizontal and vertical elements (“*pajante*”). The roof structure is “*stolica*” and the cover is most often a straw thatch, and rarely a reed thatch. Even though this was a complex structure at the time, this type of houses was built of a small number of light, almost standardized elements. As such, this house type is lightweight, and easy to disassemble, transport and reassemble. According to the researchers, such house could be dismantled in two days and reassembled in the same time.

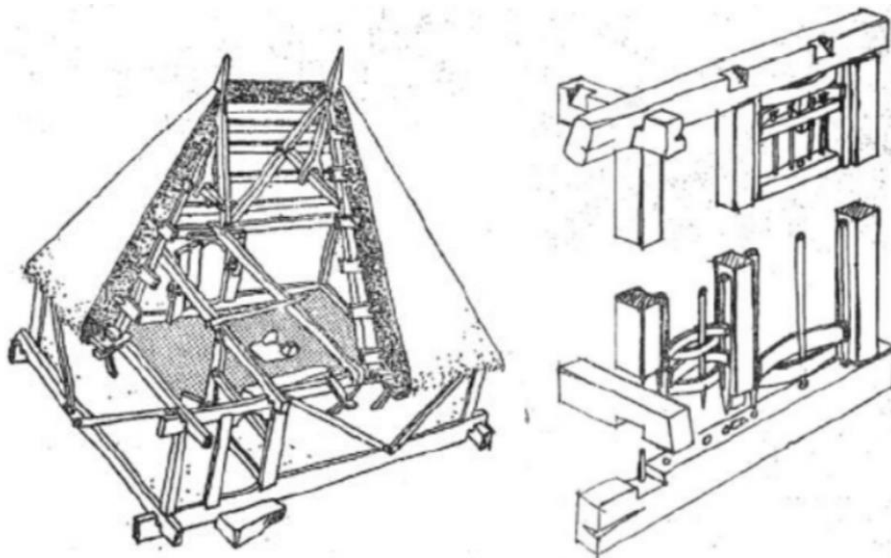


Fig. 7 House from Kosovo

(Source: R. Findrik, *Etnografski glasnik* 50, pp. 108)

Thanks to their construction, the previously described buildings could be moved from place to place, to different distances. The *kučer* and *povoznica* were moved the least, usually a few hundred meters. The abodes on Koštan polje and on Pešter plateau are moved several kilometers, and the peasants could move even a few tens of kilometers with their houses from one bey’s estate to another.

3. ASIA (MONGOLIAN, KYRGYZ, KAZAKH): YURT

The nomadic way of life in the past also determined the way of living. The need for movement arose from the basic needs for providing food for people and animals throughout the year. The need to be in a safe place has also necessitated a design of a house that can be easily moved from place to place in accordance with the current needs and circumstances. Yurt is a round, portable nomadic tent. Although it is adopted by various peoples of Asia (Mongols, Kazakhs, Kyrgyz), historians believe that the yurt originates from eastern Siberia, from the Buryat people who live in the vicinity of Lake Baikal. The conquests of Genghis Khan in the 13th century made it possible for this practical structure to take root among various peoples in Asia whose way of life comprised constant movement.



Fig. 8 Mongolian yurt

(Source: <https://www.worldhistory.org/Yurt/>)

Yurt (or “ger” in Mongolian) is basically a round tent, light weight, easy to assemble and disassemble, portable and reusable, and the constitutive elements are standardized, the materials are local and easily accessible. Assembly and disassembly time is usually about 1 hour, and the elements of which it is composed can be transported on animals kept by the people.

Assembling the yurt is simple because the circular wall consists of several blocks and each block of crossed beams. The size of the yurt depends on the number of blocks. The roof is made of long beams that rest on a wooden ring in the center of the roof. Thin leather straps are used as fasteners. The roof covering is multi-layered and consists of a thicker canvas made of wool or cotton, followed by several layers of thin cotton canvas. The last layer is fixed with ropes made of animal and human hair. In Mongolia, the yurt is usually white, and in Kyrgyzstan it is gray. The circular base provided maximum use of space, the shape of the roof was suitable for protection from strong winds and the natural materials used for the yurt cladding provided the accommodation even at outside temperatures of - 40 degrees Celsius. Yurts can have a small surface area and a diameter of only 10 meters up to 60 meters, which was thought to be the Genghis Khan yurt [10], with a surface area of almost 3000 m².

4. CONCLUSION

The buildings listed here from the area of the Western Balkans, but also others with similar characteristics represent a significant feature of our vernacular architecture. Buildings that can be transported are not a rarity in the world, and each of them is influenced by the specifics of the area and the age in which they are built. Migrations inevitably had an impact on buildings, their shape, construction, complexity and even the applied structural designs. The results were buildings of simple but ingenious structure, made of a small number of elements that were in some way "standardized" and as a rule were made of local materials. Structural joints were simplified and could be made with or without connectors, so it was possible to disassemble and reassemble the facilities.

The yurt is an example of a structure present since ancient times, which, with inevitable modifications, exists and is still used today. *Kućer, povoznica, tronj*, the Koštan polje and house from Kosovo are a rich heritage from the Western Balkans in the field of architecture and construction and as such can be considered a precursor of prefabricated buildings and inspiration for modern prefabrication.

Through the research conducted in this paper, the beginnings of some basic postulates on which modern systems of prefabricated construction as we know it today are recognized such as: typification of elements and their connections as well as construction speed. The previously considered traditional ideas represent the basis for further research of prefabricated construction development following technological progress, which will be described in future papers.

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TRADICIJA KAO INSPIRACIJA ZA SAVREMENU PREFABRIKACIJU

Rad se bavi sagledavanjem objekata iz prošlosti koji se mogu smatrati pretečom montažnih objekata kakve danas poznajemo a mogu se smatrati i inspiracijom za savremenu prefabrikaciju. Istraživačku platformu u radu predstavljaju odabrani primeri objekata karakterističnih za zapadni Balkan i to: “kućer”, “povoznica”, “tronj”, koliba na Koštan polju i kuća sa Kosova. U drugom delu rada prikazan je i primer iz sveta, “jurta” karakteristična za različite lokacije na Azijskom kontinentu, a koja pronalazi primenu i u savremenom svetu. Fleksibilnost, mobilnost i ekonomičnost, glavne karakteristike prefabrikovanih objekata kakve danas poznajemo, se prepoznaju i kao ideje vodilje analiziranih primera.

Ključne reči: regionalizam, narodna arhitektura, prenosive zgrade, prefabrikovane zgrade, montažno-demontažne, razvoj prefabrikacije