

Log Roofing of Ukrainian Wooden Church in the Context of World Wooden Temples Space Construction

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ABSTRACT

The spatial form and construction of the five basic types of Ukrainian wooden church's towered log roofing was analysed aiming to identify possible formal and constructive analogies with the roofing of other wooden religious buildings in the world. No complete constructive-spatial analogues of Ukrainian wooden church's log roofing were found in the world. Archaic types of Ukrainian wooden church's log roofing (raised longitudinal type, pyramidal type, so called *octagon-on-cube* type) can be observed in the sacral architecture of the territories neighbouring to Ukraine: Russia, the Caucasus and the Carpathians. It can be considered as a proof of a common source existing for wooden temple architecture formation in this region. Novel types of Ukrainian wooden church towered log roofing (so called *zalom* tiered type and its derivatives) have a pronounced compositional, but not constructive, correspondence with the tiered sacral towers of Asian countries. That may indicate the presence of ancient genetic links between the Ukrainian wooden church and eastern building traditions.

Keywords: Ukrainian wooden church, Wooden temple, Sacral architecture, Religious building, Log roofing, Wooden space construction.

1. INTRODUCTION

The problem of Ukrainian wooden church genesis is still in some meaning uncertain. This leads to the uncertainty of the place of this national phenomenon at the global history of architecture as well as at the history of wooden sacral buildings developing and mutual influence. The development of sacral wooden building space composition is closely connected with its constructional structure. So here, this paper investigated quite special topic of wooden architecture space structure analysing it in Ukrainian wooden church log tower roofing in comparing with other sacral wooden buildings roofing of the world aiming to determine possible analogies.

2. COMPOSITIONAL STRUCTURE OF UKRAINIAN WOODEN CHURCH

Usually there is no great attention paid to the genesis and mutual influence of wooden building spatial constructions and Ukrainian wooden church is not an exception in this case. However, according to the results of Japanese specialist investigations, spatial constructive structure is one of the most evident markers of wooden building genesis [1]. In the case of Ukrainian wooden church [2] It can be argued that the most original part of its space structure is the various volume structures of log roofing [3], [4]. Ukrainian wooden church has horizontal log construction traditionally basing on three partial or cruciform planning with more spacious central part. All components of the plan are shaped with independent log compartments

jointed together with openings only at the ground level [5]. Tower-like log roofing may be placed over the central compartment of the plan or log-towers or appear over every log-compartment of the church. This roofing has quite stable tectonic shape and no need to have supporting inner elements allowing to create opened vertically developed

interiors well lightened with windows in the sides of log-towers ("Figure 1"). The space construction of these log-towers is the most interesting and original point of Ukrainian wooden church while the base part of it can be considered common for the wooden architecture of the Eastern Slavic region.

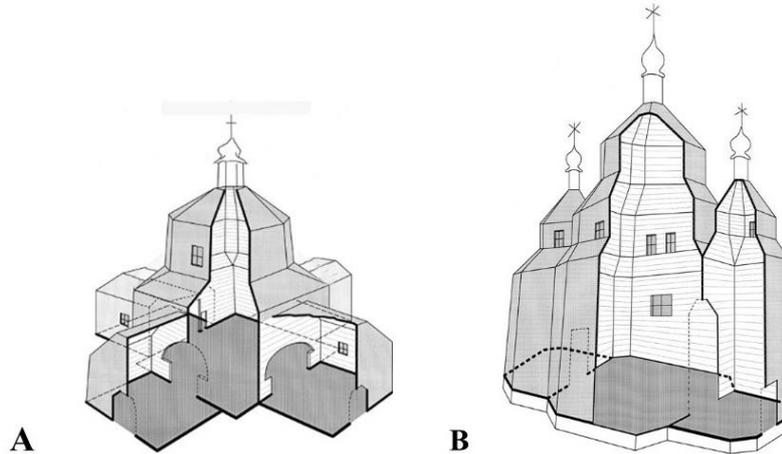


Figure 1 Some examples of Ukrainian log church space structure (by authors). A – cruciform planning with one central tower, B - three partial panning with three towers.

In our previous works, were determined five basic types of Ukrainian wooden church log-towers space constructions. They are raised longitudinal type, pyramidal type, so called *octagon-on-cube* type, so called *zalom* tiered type and the mixt between *octagon-on-cube* and *zalom* ("Figure 2"). The first three named above types of Ukrainian wooden church log-tower roofing are simple archaic initial ones (see "Figure 2"-a). The last two are novel and much more complicated volume constructions [6]. *Octagon-on-cube* is spacious log-tower creating a kind of tier (really, it is a false tier

by changing its volume shape from cubic to octagonal (see "Figure 2"-b). *Octagon-on-cube* probably has some relationship to Byzantine and Caucasus architecture tradition and can be considered to develop in Ukrainian lands in the time of Kiev Russ [7]. *Zalom* is centrally tiered space log-tower construction created by shortening of the logs without changing of tower shape in plan (see "Figure 2"-b). The genesis of *zalom* is considered to be linked with local vernacular architecture of granaries and pre-Christian crop sanctuaries [6].

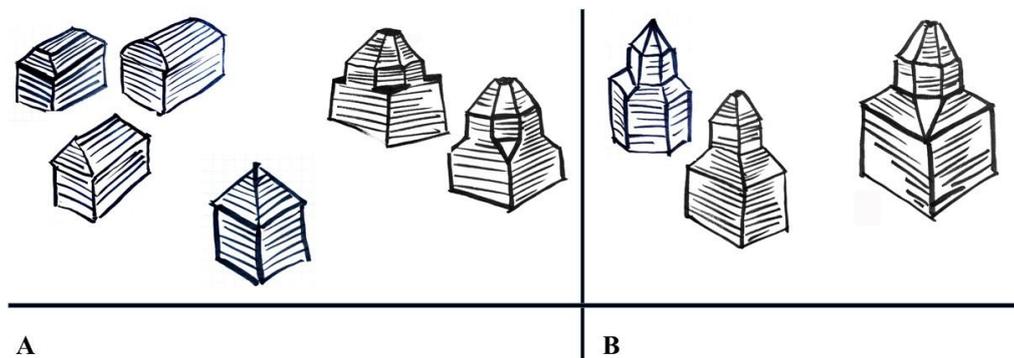


Figure 2 Basic types of Ukrainian wooden church's log-towers space constructions (by authors): A – simple archaic initial types (from left to right): variations of raised longitudinal type, pyramidal type, variations of *octagon-on-cube* type; B – complicated novel types (from left to right): variations of *zalom* tiered type, the mixt between *octagon-on-cube* and *zalom*.

3. RAISED LOG ROOFING OF UKRAINIAN WOODEN CHURCH AND ITS ANALOGIES IN THE WORLD WOODEN SACRAL ARCHITECTURE

Here was made an attempt to analyze briefly main types of world wooden temples with vertically developed roofing structures that are available to investigation now (survived until our days).

It has to be noted that in principle the same volume shape of wooden roofing can be elaborated with different constructive methods. For wooden architecture, it exists two main erecting constructive methods: beam-pillar (frame) structure and log structure (that usually is horizontal but there are also preserved some old examples of vertical log structures). Beside of this, it is also can exist some hybridized structural forms mixing beam-pillar and log structures in different ways [8]. It is interesting, that beam-pillar and log wooden structures spreading in the world is depending on the climatic circumstances of the territory determined with the peculiarities of annual temperature, humidity and the presence or absence the vibration factors (such as strong winds or seismic activity) of the region. Roughly speaking, the beam-pillar structures are easy to ventilate and resistant to the vibrations so they are more suitable for hot climate with strong winds and seismic activity. The log structures are cold resistant but weak to the vibration that is why they are more suitable for cold climate with no strong winds or seismic activity [8]. Examining geography map it is easy to notice that usually the hot wet climate is accompanied with strong vibration factor and cold

dry climate is not. This point determined the existing of some geographic fixed areas of beam-pillar and log structures spreading in the world. At the borders of global areas of two systems spreading appear some zones where the both constructions flourishing or sometimes mixing; there are for example the lands of Carpathian region. There are also special territories where the factors of temperature, humidity and vibration came to contradiction. Simply speaking, there are cold lands with strong winds, for example coast territories of Scandinavia, where wooden construction had to adopt for this unusual circumstances creating united hybridized forms of beam-pillar and log structures [8].

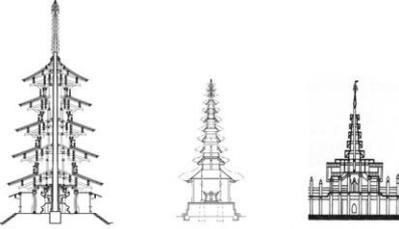
According to this point, examined vertical wooden roofing of world sacral buildings could be divided with territorial and constructive principle sequentially speaking about:

- A. Wooden raised beam-pillar structures of Far East, South-East Asian and South European (the border of spreading) temples roofing developing in hot and humid climatic region with strong seismic and wind vibrations. In this group, it has been examined ("Table 1"):

Far East (China, Japan) and South-East Asian (Myanmar, Thailand, Vietnam, Laos and so) beam-pillar temple pavilions with raised central part [9], [10];

Far East (Japanese and Chinese) pagodas [9], [10], [11] and wooden sacral towers of South-East Asia: shikhara style towers of Myanmar [12], meru style towers of Bali, Indonesia [13] and so.

Table 1. Asian frame raised roofing and Ukrainian wooden church roofing (by authors)

	Far East and South-East Asian temple pavilions	compositional analogies	constructive analogies
A			
B			
	Japanese and Chinese pagodas, sacral towers of Myanmar and Bali		

a A – temple pavilions; B – Far East pagodas; C – South-East Asian sacral towers.

- B. Wooden raised log structures of Russian, Carpathian and Caucasian temples roofing developing in cold climatic region with no strong vibration. In this group, it has been examined ("Table 2"):

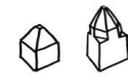
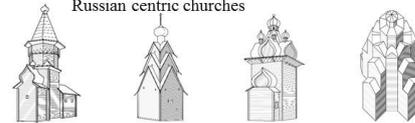
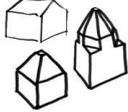
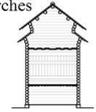
Pyramidal log-roofing of dwellings and archaic temples of Caucasus region (so called darbaza in Georgia, ghatun in

Armenia and karadam in Azerbaijan) [14], [15];

Russian centric log-towered churches (so called pyramidal, tiered, cubic and many-towered types) [16];

Russian longitudinal churches with log raised or tiered roofing (so called klet, and cascade types) [16], [17].

Table 2. Caucasian and Russian log roofing and Ukrainian wooden church roofing (by authors)

		compositional analogies	constructive analogies
A	Caucasian pyramidal roofing 		
B	Russian centric churches 		
C	Russian longitudinal churches 		

a A – Caucasian pyramidal roofing; B - Russian centric churches; C - Russian longitudinal churches.

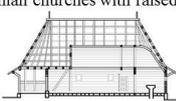
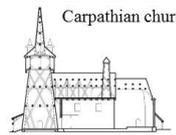
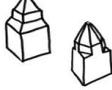
- C. Wooden raised mixed structures of Carpathian region situated on the border of log-house and beam-pillar systems world spreading areas ("Table 3"):

Romanian log churches with raised longitudinal log-roofing under rafter roofs (Bukovina region) [18];

Polish Romanian, Hungarian and so Basilica-shaped log churches with rafter roofs and frame towers over the narthex [18];

Romanian sacral pavilions with pyramidal frame roofing [8].

Table 3. Carpathian mixed temples' roofing and Ukrainian wooden church roofing (by authors)

		compositional analogies	constructive analogies
A	Romanian churches with raised longitudinal roofing 		
B	Carpathian churches with rafter roofs 		
C	Romanian sacral pavilions with pyramidal roofing 		

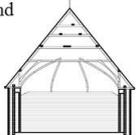
a A – Romanian churches with raised longitudinal log roofing; B - Carpathian log churches with rafter roofs; C - Romanian sacral pavilions with pyramidal roofing.

- D. Wooden hybridized structures of Scandinavian temples roofing developing in anomaly region with cold climate and strong wind vibrations. In this group, it has been examined ("Table 4"):

Medieval wooden stave churches of Norway [19].

Wooden churches of Finland with so called buttress-pier [18] or box-like pillar [20] wall construction.

Table 4. Scandinavian temples hybridized roofing and Ukrainian wooden church roofing (by authors)

		compositional analogies	constructive analogies
A	Stave churches of Norway 		
B	Buttress-pier churches of Finland 		

a A – stave churches of Norway; B - buttress-pier churches of Finland.

4. RESULTS AND DISCUSSION

All presented above wooden roofing structures were subsequently compared with determined five basic types of Ukrainian wooden church roofing. The comparing was fulfilled according to two criteria: presence or absence of compositional analogies and presence or absence of constructive analogies. In general, it became evident the absence in the world of complete (compositional and constructive) analogies of Ukrainian log church raised roofing. In this point, Ukrainian wooden building tradition is separated from European and Asian wooden religious architecture as well.

Some analogies of archaic Ukrainian church log roofing structures can be found in Russia and Caucasus (raised longitudinal type, pyramidal type, *octagon-on-cube* type and in very restricted cases – simplified type of *zalom*) and Carpathians (raised longitudinal type only). All these territories are neighboring to Ukraine so it is no wonder the existing of common source for their wooden temples' architecture formation. Especially interesting point there is a common for Caucasus, Ukraine and Russia *octagon-on-cube* log roofing type. It can be considered as a sign of common tradition sourcing from pyramidal log roofing of dwellings of Caucasus region that penetrated in the time of Kiev Russ to Ukraine and subsequently in Russia through Orthodox Christian architecture tradition spreading [21].

Novel types of Ukrainian wooden church log roofing (developed *zalom* type and its derivatives) have a pronounced compositional, but not constructive, correspondence with the tiered sacral towers of Asian countries (pagodas of Far East, *shikhara* and *meru* towers of South-East Asia). That may indicate the presence of ancient genetic links between the Ukrainian wooden church and eastern religious building traditions, particularly as the entire compositional structure of Ukrainian wooden church also is evidently linked to South-East Asian compositional architype [22], [23].

5. CONCLUSION

Space construction of Ukrainian wooden church generally links to centric wooden log towered churches of Eastern Europe but in the same time poses an originality. Namely, it has unique for Europe entire composition and is operating with some original types of raised log tower-like roofing structures such as *zalom* tiered type and its derivatives allowing to create lightened interior of the churches fully opened till the top. This is a witness of a long way of Ukrainian wooden church development like an original national phenomenon. Some compositional peculiarities of Ukrainian wooden church indicate the presence of ancient genetic links with eastern sacral building traditions.

AUTHORS' CONTRIBUTIONS

Galyna Shevtsova conducted the leading role of this research. This theme is the continuation of her doctoral thesis "Genesis of Ukrainian wooden church (sources, principle of architectural formation, worldwide context)" fulfilled at Kiev National University of Construction and Architecture in 2013. In this article, she shaped the main idea, collected all data, designed general layout of the research, and formulated the results and conclusions of the work.

Olga Andropova significantly helped specifying the constructive details of all examined worldwide examples of wooden sacral architecture. In addition, she created all original drawings for this article.

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