**Architectonics of domed temples of modern Ukraine**

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**Abstract.** The article highlights some results of scientific work conducted by the Institute of Architecture and Design of Lviv Polytechnic National University, Department of Fine Arts and Design, Ternopil Pedagogical University, Department of Design Architectural Environment Lviv National Agrarian University and Art Theory Vasyl Stefanyk Precarpathian National University. Scientists study the art of temple building on the territory of Ukraine. The analysis was conducted based on reliable sources - archival, publications of leading scientists, their own field research. The method of field inspections included visual inspection of sacred complexes, architectural measurements, photography, sketches, etc. The aim of the scientific work is to study the genesis of the architectural and constructive creation of the sacral dome space through the tradition of Ukrainian shrines and the development of modern trends in temple building. Tradition is one of the most important components and means of creating Ukrainian church architecture. It is an expression of national features and characteristics, its identification. The most canonical type of Ukrainian churches is the cross-domes churches, which is associated with the adoption of Christianity. This tradition is closely connected with the liturgical process and is based on a combination of Eastern and Western building traditions. In figurative and compositional expression, the dome is dominant, and tectonic accent. The architecture of dome temples depends on the capabilities of structures and building materials, which are important factors in the formation process. The authors explore the traditional ways of erecting cross-dome temples on the territory of Ukraine, which are indicative and expressive features of Ukrainian temples. An important group of dome temples are buildings created in the modern period, when architects were looking for signs of Ukrainian national style. Particularly valuable is research related to the construction of neoukrainian traditional and neoteric temples designed by Ukrainian architects. Their planning and spatial decisions directly depend on new construction materials and design solutions. Some temples are described, which are an example of innovation, but at the same time are based on national traditions. Thus, the article examines the genesis of the creation and architecture of the Ukrainian cross-domed temples. Defined peculiarities of the search for national features and identification in the Ukrainian temple building in the interwar period was determined. Highlighted contribution of modern architects and designers to the process of revival of temple building in Ukraine.
1. Introduction
The revival of national culture, the restoration of existing and the construction of new religious buildings, new confessional transformations force architects to continue the search for a modern national style in the architecture of the church. A number of scholars have recently addressed the issues of tradition and national identity in the new Ukrainian architecture, including the sacred one. Among them: Cherkes B., Bevz M., Gniedets R., Dyachok O., Linda S., Obidnyak M., Taras J. and others. However, the issue of architecture of Ukrainian temples has not been fully covered in the scientific literature, which is the relevance of this study.

In accordance with the goal and objectives, the study used a set of general scientific methods: empirical (observation, description, comparison) and theoretical (structural analysis, abstraction), as well as special methods (method of field surveys, method of historical - comparative analysis, method of art analysis).

2. Main material presentation
Tradition is one of the most important components and means of creating Ukrainian church architecture. It is an expression of national features and characteristics, its identification. The most canonical type of Ukrainian churches are cross-domed churches. In Ukraine, the development of brick temples is associated with the adoption of Christianity and is based on a combination of Eastern and Western building traditions. The use of the dome over the central space of the temple is an expression of the ideological and symbolic image of the universe and all of heaven. This tradition is closely connected with the canons and the liturgical process. In the three-dimensional image of the church, the dome is dominant in the internal and external volume of the church building, is its tectonic accent [1].

The domes that rise above the temples reflect the outlines characteristic of all periods of development of the architecture of the Ukrainian church. They have various shapes: helmet-shaped, pear-shaped, hemispherical, spherical, pyramidal-tent, with flat or elongated spherical shapes.

The spatial structure of the dome space depends on the capabilities of structures and materials, which are important factors in the formative process, along with architectural, planning, stylistic, functional - compositional, symbolic - figurative, etc. Traditionally, dome forms were placed along the main axes east-west and north-south. (Figure 1). The placement of the three-nave endings on the main axis in three-part and cruciform churches and the five-nave ones above the sides of the cross and over the bell towers in seven or nine-nave churches are indicative and expressive features of Ukrainian churches. In churches of the cruciform-bath type, the system of supporting arches constituted a developed spatial scheme of mutual absorption of forces from bath and vault loads [2-4].

In the second half of the 19th century, the rapid development of engineering and industrial construction in Europe allowed the application of modern building structures and materials in temple construction, although the changes hardly affected the planning decisions. To cover the nave, builders began to use metal arches, which allowed to create large columnless spans, cast iron columns, concrete and reinforced concrete [5].

In the period from the end of the 19th to the beginning of the 20th century, historical processes in Western Ukraine led to a surge in church construction, and the search for a national style in temple construction began. There is an increasing need to create such three-dimensional and constructive forms, which would clearly show the original features of the architecture of the national church, expressed in modern forms. Architects such as Lev Levynsky, Sylvester Havryshkevych, Yevhen and Vasyl Nahirim, Oleksandr Lushpynsky and others were innovators in the use of new building materials and constructive solutions in Ukrainian church building. The prototype for the creation of temples during this period were authentic Ukrainian wooden churches, a combination of traditional three-part space and a cross plan.
Therefore, most of the design solutions were based on the type of cross-domed temple [6]. Domes on massive light jugs were placed on the longitudinal axis above the nave, nave or altar. An example of such solutions are the projects of temples, the drawings of which are in the archives of the Lviv National Gallery of Arts named after B.G. Voznytsky (Figure 2).

For the first time in Western Ukraine, reinforced concrete structures for the dome were used by architect Roman Hrytsai in the construction of the Church of the Basilian Sisters in Lviv. The cross-plan of the church had an elongated structure east-west, free without supports, a volume of more than 20 meters, completed with a semicircular altar, topped by a dome [7].

A metal truss was also used for the dome and dome completions of the entrance towers in the Church of the Transfiguration of the Lord, built in Lviv according to the design of Sylvester Havryshkevyych. The spaces of the altar, however, remained vaulted. The church was built in the neoclassical style with elements of Baroque in 1878 - 1898. (Figure 3).
Experiments in sacred architecture, as well as church building in general, were interrupted with the arrival in 1939 in Western Ukraine of Soviet authority and the annexation of these territories to the USSR. A new stage in the construction of temples came only with the proclamation of Ukraine's independence, the revival of national culture began, the restoration of existing and construction of new religious buildings, which continues today. In many cities of Ukraine and other post-Soviet countries, there is a need to revive spiritual shrines, symbols of national identity, which were destroyed in an extremely dramatic totalitarian period [8].

The first temples built during the independence of Ukraine reproduced the types of temple buildings of the late XIX - early XX centuries. Architects used forms or directly quoted stylistics of their architectural solutions of Ukrainian Art Nouveau. After 1995, experiments with form in sacred art became more frequent. Along with new design solutions, new architectural ideas appeared in the construction of temples [9].

Modern temple construction uses the achievements of the Ukrainian Art Nouveau period, which is characterized by a domed completion. Modern architects creatively interpret domes. Such an example is one of the largest churches in the city of Lviv - the 14-domed Church of All Saints of the Ukrainian People, designed by Larysa Skoryk (construction began in 1996) [10]. The building has a stepped, pyramidal composition, culminating in the main dome, located above the cross, which forms the main compositional axis. The architecture of the church is formed of simple, monumental volumes, which, with the help of the dynamic arrangement of the dome spaces, create a form that has clear features of the Ukrainian tradition. The subordination of the composition of the domes is perceived as a reminiscence of the temples of the princely era (Figure 4).

Another example of a modern interpretation of the domed completion of the church is the Church of the Ascension in Lviv (2, 3). The temple in the shape of a cube was designed by architect Igor Gnes. Dimensions of the building: 17 meters in height and 17 - in width. Metal trusses were used in the construction of the temple (Figure 4) [11, 12].
Figure 4. Examples of modern bath completion: 1 - Church of All Saints of the Ukrainian People; 2, 3 - Church of the Ascension in Lviv.

Ternopil architect Serhiy Hora can also be considered a modernist. His most famous works are the Church of the Holy Apostle Peter in Ternopil, the Church of Peace, Love and Unity of Christians in Kyiv, the Cathedral of the Supreme Apostles Peter and Paul in Chortkiv, and others.

Ternopil Church of St. Peter attracts attention with modern forms with plastic and simple lines. The temple has a traditional planning system, reminiscent of the Latin cross. On the main axis is the central dome and the bell tower, which are raised high above the building of the complex. The constructor of the project Józef Zimmels used metal trusses not only for domes, but also to create a vast space completely free of supports. With the help of reinforced concrete it was possible to build a temple, which is distinguished by a kind of plasticity and dynamism (Figure 5).

Figure 5. Church of St. Peter in Ternopil: 1 - plan; 2 - cross-section; 3 - General view.

These listed samples vividly present the creative interpretation of the traditional domed completions of the temples of Ukrainian modernism and their innovative embodiment in modern buildings.

3. Conclusions
The study shows that innovation in the church architecture of Ukraine is an important driver of development, along with the principles of canonicity and symbolism. Architectural and constructive solutions and the search for the idea-form are paramount in terms of formation, architectural and spatial structure of modern Ukrainian churches. The use of reinforced concrete and metal allowed
architects to lighten the main load-bearing structures and forms, expand the interior space, create new formative components of temples. Thus, the constructive factors of the formation of spatial domed temples through the invention of new construction technologies and materials are gaining more and more importance. As a result of the research, data on some modern architects of Ukraine and their most significant temples were put into scientific circulation.

References
[1] Yu. Lukomsky, “Planning and constructive features of the cruciform churches of ancient Halych,” Bulletin of the National University «Lviv Polytechnic» Architecture, vol. 410, pp. 225-231, 2000.
[2] R. Hnidets, “Constructive features of the cross-bath structure of Ukrainian churches of the Princely period (X-XII centuries),” Bulletin of the National University «Lviv Polytechnic» Architecture, vol. 410, pp. 326–331, 2000.
[3] R. Hnidets, “Typology and form of bath completions of modern churches in the city space,” Bulletin of the National University «Lviv Polytechnic» Architecture, vol. 568, pp. 186–191, 2006.
[4] R. Hnidets, “Tradition of sacral architecture as a factor in the establishment of spirituality and faith”, Bulletin of LSAU. Architecture and Agricultural Construction, vol.5, pp.199-208, 2004.
[5] O. Diachok, “Search of national style in western ukraine’s sacral architecture in the post-soviet period,” Norwegian Journal of development of the International Science, vol. 42, pp.23-27, 2020.
[6] B. Cherkes, “Tradition and Identity in the New Ukrainian Church Architecture”, Bulletin of the National University «Lviv Polytechnic» Architecture, vol. 486, pp. 71 – 91, 2003.
[7] B. Cherkes, O. Diachok, and N. Datsiuk. The evolution of the sacred architecture development in Western Podillya: IOP Conference Series: Materials Science and Engineering Urban Planning Symposium - WMCAUS, June 2019, Prague, Czech Republic, 2019.
[8] R. Hnidets, Ed., Architecture of Ukrainian churches. Design and shape. Lviv: Lviv Polytechnic National University, 2007.
[9] M. Gabrel, The philosophical and ideological component in the architectural and spatial organization of regional systems. Bulletin of the National University "Lviv Polytechnic", vol. 486, pp.292-302, 2003.
[10] S. Linda, “The Presence of History in the Architecture of Soviet and Post-Soviet Ukraine”, Bulletin of the National University "Lviv Polytechnic", vol. 486, pp.147-159, 2003.
[11] Ya. Krekhovetskyi, Ed., Theology and spirituality of the icon, Lviv, 2000.
[12] Yu. Kryvoruchko, “What should be the architecture of the Ukrainian church after tomos”, Збруч, 07. January, [Online] 2019 [Accessed Dec. 2, 2020] Available at: https://zbruc.eu/node/85965.