

SPECIFICITY OF THE CONSTRUCTION OF HISTORICAL TEMPLES OF SHAANXI PROVINCE AS THE BASIS OF THEIR PRESERVATION AND RESTORATION

Yang DING¹, Yulia IVASHKO^{1,*}, Justyna KOBYLARCZYK², Michał KRUPA²,
Aneta PAWŁOWSKA³

¹Kyiv National University of Construction and Architecture, 31 Povitroflotskyi Avenue, Kyiv, 03037, Ukraine

²Cracow University of Technology, 24 Warszawska Street, 31-155, Cracow, Poland

³University of Lodz, Institute of Art History, 65 Narutowicza Street, 90-131, Lodz, Poland

Abstract

The Shaanxi province and its capital, the city of Xi'an, are areas of concentration of traditional Chinese architecture outstanding monuments. The study of the peculiarities of the genesis and compositional construction of various objects of functional purposes as a framework for restoration and monument protection activities is relevant. Using the example of the author's drawings of the temples of the Shaanxi province, the departure from the dominant pagodas of Buddhism borrowed from India in the early periods towards the temples of the local religions of Taoism and Confucianism, whose architecture is subordinated to the local environment, in the late Ming and Qing periods is argued. The commonality of temples with secular buildings – residential pavilions and small architectural forms – pavilions, which is a national and regional feature, has been proven. The gradual simplification of the types of local temples, the decrease in the number of varieties and the eclecticism of forms indicate compliance with the general process of style formation - emergence, flowering, gradual decline due to eclecticism.

Keywords: Historical temples; China; Shaanxi Province; Compositional analysis; Preservation; Restoration.

Introduction

The revival of national traditions in modern Chinese architecture and the government's line aimed at educating the population in respect for national traditions and cultural heritage and the development of the tourism industry have determined the interest in the Chinese architectural monuments study, both less or well-known in the world, known mainly in circle of specialists. Just like other developed countries of the world, China today is included in the general process of globalization, which finds expression, including in modern architecture, especially in the case when these are unique objects designed by a foreign architect with a world name.

This fascination stems from the cultural difference also in the construction of architectural structures within China. It makes examples of Chinese architecture interesting especially for European residents who are familiar with European culture and architecture. This interest in the diversity of form applies to both historical buildings and contemporary

* Corresponding author: yulia-ivashko@ukr.net

developments that draw on new technologies. Chinese residents themselves are keen to replace traditional architecture with the new one, and this is the case with residential buildings.

For example, the Hutongs, some of which have been adapted to modern requirements, are being demolished in favour of high-rise flat blocks in which the price of a flat is adjusted to the number of windows.

At the same time, China has a unique multi-thousand-year history and objects of world significance.

China's contemporary architecture is characterised by cutting-edge design and construction. It is difficult not to mention the World Financial Centre in Shanghai or Tsim Sha Tsui, which is becoming the new centre of Hong Kong, although it is not located on an island. These examples of contemporary Chinese architecture captivate locals and tourists alike and are becoming a major tourist destination.

In citing examples of Chinese architecture, it is also difficult not to mention the same solutions for not only the architecture itself, but also for public spaces such as squares and gardens. Typical square spaces such as Tian'anmen square are characterised by the extent of the open area. The square in question can accommodate a million users. It is one of the largest, if not the largest square in the world at 440,000 square metres. Empty squares for public gatherings are the main idea behind their architects. The gardens have a different character, being characterised by a sequence of interiors that provide a view into the neighbouring, successive interiors through openings. It should therefore be noted that in addition to modern architecture, it is above all architecture with historical value that is part of a place's tradition and creates its identity.

Fascination with international architecture leads to the gradual loss of national architecture. The use of simplified Chinese forms in tourist objects leads to an oversimplified image of traditional Chinese architecture, since such citations often do not take place on a proper scientific basis, without taking into account regional characteristics. Using the example of Shaanxi province and the city of Xi'an with a unique historical heritage, it is possible to trace and argue which specific objects of this region could act as models for modern citation in new objects.

The specificity of the monument protection activities of Shaanxi province, if we talk only about temple architecture, is the multiplicity of protected objects from the point of view of their religious affiliation, since for thousands of years there were temples of Taoism, Confucianism and Buddhism nearby. It is a national feature that even foreign religions introduced from outside, as happened, for example, with Buddhism borrowed from India, gradually underwent radical transformations on local ground. If we compare the architecture of the temples of Shaanxi province with the architecture of buildings and structures of other functional purposes, it is noticeable that they all developed according to similar canons, based on local artistic and construction traditions. This similarity was also due to the concentration of objects of different purposes on the same territory, among which today there are nine significant objects – ruins of buildings and tombs of the Zhou dynasty, six significant objects – ruins and tombs of the Qin dynasty, eighteen significant objects – ruins and tombs, as well as examples of stone carving from the times of the Han dynasty, one notable object – a tower from the times of the Sui dynasty, eighteen notable objects of various functional purposes – towers, grottoes, ruins, temples, tombs from the times of the Tang dynasty, five remarkable objects of the Song Dynasty, five remarkable objects of the Yuan Dynasty, twenty-two remarkable objects – temples of various denominations, towers, tombs, ruins, bridges of the Ming Dynasty, ten remarkable objects – temples of various denominations, palaces, ruins, burials of the Qing dynasty). Objects from the early dynasties have been preserved exclusively in the form of tombs and ruins, the largest number of objects are from the times of the Tang, Ming, and Qing

dynasties. Temples and temple complexes are the best preserved, so the main analysis was carried out precisely on these objects [1-9].

Given the multifaceted nature of the research, existing scientific sources covering various issues were studied:

- aspects related to traditional Chinese religions: publications by *Y. Chen* [1], *Q. Li* [10], *B. Liu et al.* [11];

- general problems of degradation of the historical and cultural environment and its preservation: publications by *I. Sandu* [16], *P. Spiridon and I. Sandu* [17], *P. Spiridon et al.* [18];

- issues of traditional Chinese architecture: publications by *D. Kuśnierz-Krupa and P. Chang* [4], *Y. Ivashko et al.* [5], *Y. Ivashko et al.* [6], *Q. Li* [10], *M. Żychowska et al.* [21];

- restoration aspects: articles by *Y. Ding and I.G. Sandu* [2], *P. Gryglewski et al.* [3], *Y. Ivashko et al.* [7], *Y. Ivashko et al.* [8], *Y. Ivashko et al.* [9], *B. Liu et al.* [11], *M. Orlenko and Y. Ivashko* [12], *M. Orlenko et al.* [13], *M. Orlenko et al.* [14], *M. Orlenko et al.* [15], *I. Sandu et al.* [19], *F. Yang et al.* [20];

- aspects of the influence of traditional Chinese architecture on the architecture of other countries and on modern Chinese architecture: publications by *Ivashko et al.* [7], *Y. Ivashko et al.* [8], *M. Żychowska et al.* [21].

Studying the existing sources helped formulate a list of understudied aspects. The historical and architectural heritage of Shaanxi province and in particular the city of Xi'an is well known in the world, but there is a lack of dimensional drawings and analytical studies of the composite construction of objects. For this, computer drawings of the facades were made using modern graphic programs such as Archicad, Photoshop and others, and the photogrammetry method, where these objects are depicted without perspective reduction, and therefore without distortion of the real proportions and ratios of the parts of the building.

The analysis of the source base proved that the research is concentrated in the field of historical-architectural heritage, but it has not been analyzed how the modification of historical forms can occur in the modern architecture of China, in particular in Shaanxi province as a center of unique artifacts. Also, it has not been analyzed which historical site of Shaanxi province should be taken as a model of imitation with the justification of their choice.

The historical temples of Shaanxi province are the research object, the specifics of their construction as a basis for preservation and restoration are the main objective of the research. The purpose of the study is to determine and argue the specifics of the development of the temple architecture of Shaanxi province and to prove how it is directly related to the preservation and restoration activities.

Materials and methods

The tasks of the research determined the choice of general scientific research methods. In particular, the method of historical analysis and cultural analysis was used to study the external factors influencing the formation of traditional temple architecture of various denominations, the ritual significance of individual architectural elements. The method of comparative analysis made it possible to trace the genesis of temples in different periods, to identify common and different things between them. The method of system-structural analysis made it possible to present the temple heritage of Shaanxi province in the form of system integrity and introduce certain structural divisions in accordance with the established indicators. The method of photogrammetry combined with the grapho-analytical method made it possible to build a study based on the author's drawings of the facades of the temples.

Results and discussion

Analysis of the composite construction of pagodas in Shaanxi Province

A feature of the existing historical and cultural heritage of Shaanxi province is the concentration of monuments from different historical periods, most of which are included in local, state or world monument protection registers. This allows us to trace the development of cultural-artistic and architectural-artistic traditions on the territory of the province since ancient times. At the same time, information about the architectural structures of the early dynasties is limited, as it is based mainly on studies of burials and ruins. From this point of view, the earliest architectural forms cannot be considered as a role model for modern Chinese architecture. That is why, in our research, we based ourselves on objects that have preserved the integrity of the authentic form and meet certain criteria. In particular, they vividly represent the characteristic features of the architecture of Shaanxi province in a certain period or – on the contrary – are an atypical original object, they represent a complete or almost complete form that has mainly preserved authentic features. If we talk about the capital of Shaanxi province – the city of Xi'an – the monuments of six dynasties have been preserved here.

Two groups of religious buildings were selected for photogrammetric and grapho-analytical analysis. The first group consists of pagodas, the second - temples of Taoism, Confucianism and Buddhism.

The analysis took into account the fact that the period of maximum prosperity for the construction of Buddhist pagodas is the Tang and Song periods, which were marked by economic and cultural prosperity. At the same time, despite the commonality of certain basic canons borrowed from India for pagodas throughout the territory of China, local traditions were imposed on their architectural appearance, so pagodas in the north and south of China are not identical. In the case of pagodas in Shaanxi province, brick pagodas with the use of wood were selected for the study. From the total number of pagodas, were selected those that preserved the integrity of the authentic form (such as Xi'an Two Dragon Tower and Xiangji Temple Shandao Pagoda), instead, objects that did not allow to determine in detail their original appearance including the completion were excluded.

Pagodas of the Sui, Tang and Song periods were analyzed, and most of them are dated to the Tang period:

- a. Hannah Pagoda of Xianyou Temple (Fa Wang Tower) belongs to the Sui period;
- b. Xi'an Two Dragon Tower, Chang'an Huayan Temple Tower, Da-Yan Tower – otherwise – the Giant Wild Goose Pagoda (Fig. 1), Xingjiao Temple Tower, Chang'an Shengshou Temple Tower, Small Wild Goose Pagoda, Xiangji Temple Shandao Pagoda belong to the Tang period;
- c. Daqin Temple Tower, Jingde Tower belong to the Song period.

A complex compositional analysis was carried out on the specified objects – silhouettes, proportional and metro-rhythmic construction (Fig. 2). For historic Chinese objects, this is important because they do not conform to traditional European proportional and metro-rhythmic schemes.

The first indicator for determining the types of historical pagodas was the angle of inclination of the outer walls, and according to this, three types of pagodas were determined in Shaanxi province (Fig. 3):

- Type 1 – with almost parallel walls and an angle of inclination of the walls less than 10°
- Type 2 – with an angle of inclination of the walls of 10° – 15°
- Type 3 – with an angle of inclination of the walls of 20° and more.

The analysis made it possible to reveal the existence in Shaanxi province of a type of pagoda with almost parallel or slightly inclined outer walls to the central axis, a type of pagoda with an average angle of inclination of the walls, and a type of pagoda that is more squat and less vertically elongated, although it did not become so widespread. Thus, this proves that

despite the layering of local architectural and building traditions, the basis of the canonical image of the pagoda borrowed from Indian Buddhism as a vertically elongated very tall building with a prospective reduction of a significant number of tiers remains.



Fig. 1. Giant Wild Goose Pagoda made with bricks. Fragments of walls and eaves.
Photo by Y. Ding

The following pagodas belong to type 1: Tang period – Xi'an Two Dragon Tower, Xiangji Temple Shandao Pagoda, Small Wild Goose Pagoda, Song period – Jingde Tower.

The following pagodas belong to type 2: Tang period – Xingjiao Temple Tower, Chang'an Huayan Temple Tower, Song period – Daqin Temple Tower.

The following pagodas belong to type 3: Sui period – Hannah Pagoda of Xianyou Temple (Fa Wang Tower), Tang period: Chang'an Huayan Temple Tower, Da-Yan Tower – otherwise – Giant Wild Goose Pagoda.

Thus, three type 1 pagodas are dated to the Tang period and one to the Song period, two type 2 pagodas to the Tang period and one to the Song period, one type 3 pagoda to the Sui period and two to the Tang period. The dating of the surveyed pagodas with intact form also proves that the vast majority of them are dated to the Tang period. At the same time, it should be mentioned here immediately about the specific characteristic of this period: despite the

maximum spread of pagoda construction compared to other periods, one single dominant type of pagoda was never formed, all three types of pagodas are equally represented.

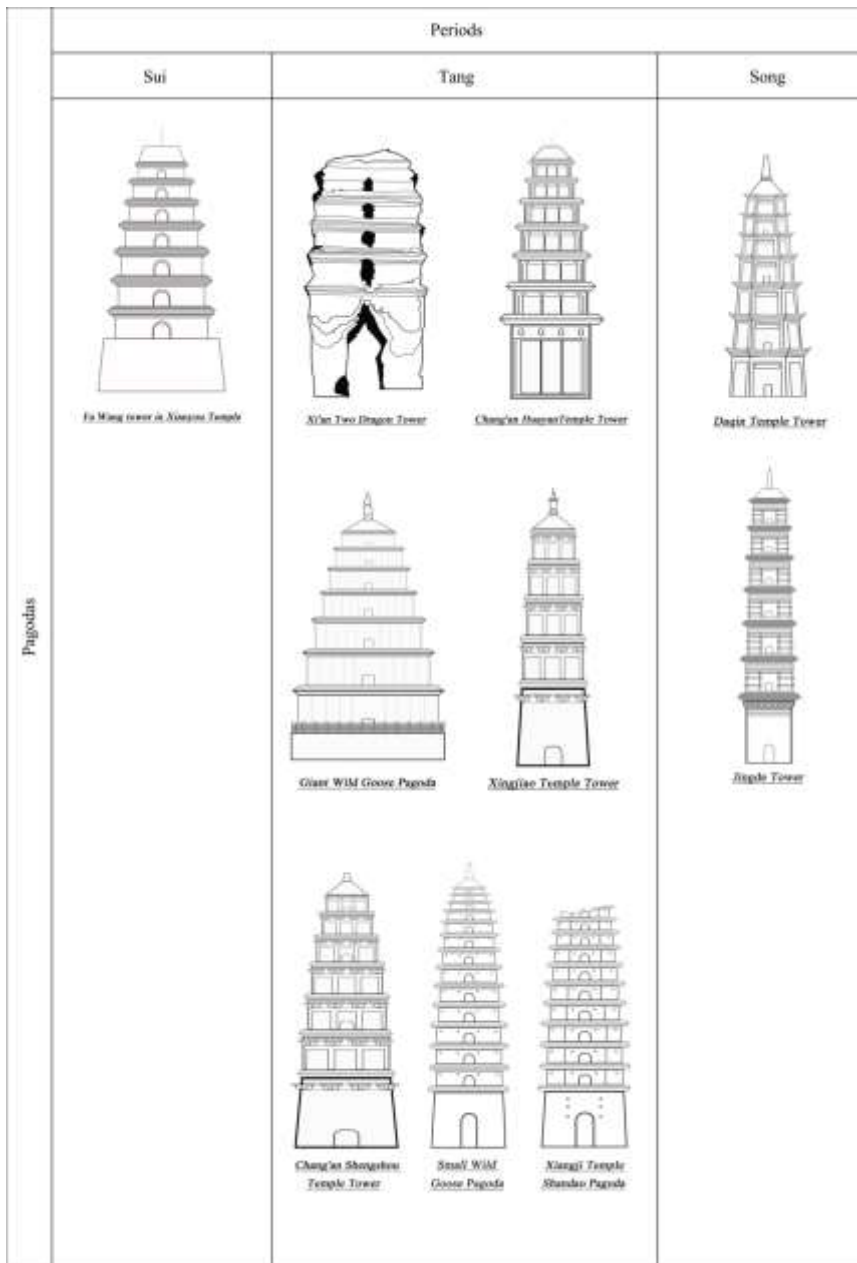


Fig. 2. Pagodas of different periods in Shaanxi Province.
Drawings by Y. Ding

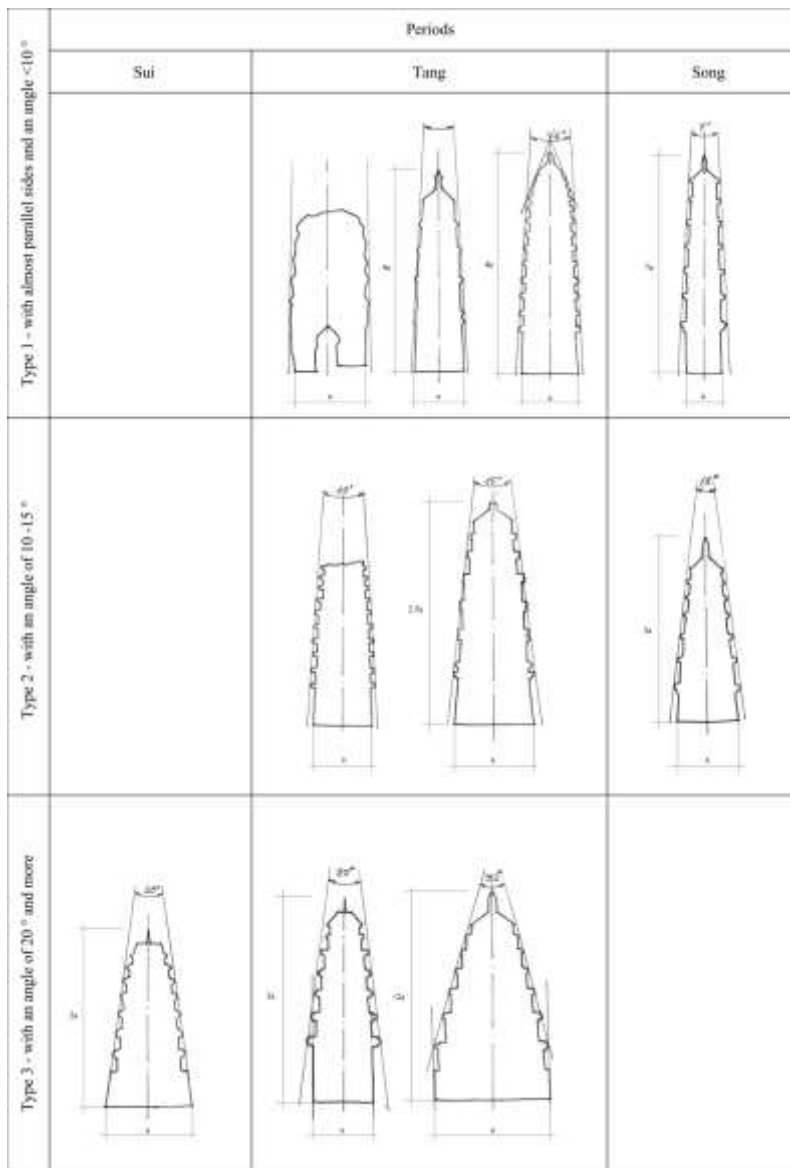


Fig. 3. Classification of pagodas according to the angle of inclination of the walls and the ratio of height and base.
Drawings by Y. Ding

Despite certain architectural differences, all the studied pagodas of Shaanxi Province have a promising reduction of a large number of tiers. Among the investigated pagodas there are those with five tiers (one pagoda), seven (three pagodas), eight (three pagodas), fourteen (one pagoda). So, the most typical for the pagodas of the province were seven to eight tiers, prospectively shortened upwards.

At the same time, despite the general "pyramidity" of the pagoda, there were variants of the ratio of tiers. In particular, the authors singled out the following three groups of pagodas based on this indicator:

- the lower tier can be much more massive compared to the upper tiers to express the tectonics of the structure: Hannah Pagoda of Xianyou Temple (Fa Wang Tower), Chang'an

Huayan Temple Tower, Jingde Tower, Chang'an Shengshou Temple Tower, Small Wild Goose Pagoda, Xiangji Temple Shandao Pagoda;

– the lower tier can be almost the same as the upper tier above it: Daqin Temple Tower;

the lower tier is deliberately reduced to express the effect of being crushed by the weight of the upper tiers: Da-Yan Tower – otherwise – Giant Wild Goose Pagoda. Despite the existence of all three variants of pagodas in accordance with the ratio of the lower and upper tiers, the traditional version of the more massive lower tier with different angles of inclination of the external walls became the most widespread, that is, the canonical, conservative and change-resistant image of the Buddhist pagoda was preserved.

Despite the dominance of tradition, certain unusual methods should be noted, such as changes in the angles of inclination of the walls of different levels. This technique is recorded in the Small Wild Goose Pagoda. As an analogue of this method, we can cite the Southern Pyramid of Pharaoh Sneferu in Egypt, where the angle of inclination of the faces of the pyramid changes abruptly at about the middle of the height from a little more than 54° to a little more than 43° , it is believed, for the quick completion of construction due to the premature death of the pharaoh.

Also noteworthy is the fact that reference to the pattern of the pagoda and at the same time the pyramid can be also found in the Western world in the first half of the 20th century. Examples include the monumental monument to the Battle of the Nations (Völkerschlachtdenkmal) in Leipzig, Germany, 92 meters high, erected between 1898 and 1913 (architect Bruno Schmitz), and the Voortrekker Monument in Pretoria, South Africa, built between 1937 and 1949. This fact underscores the universality of architectural aspirations in the world.

The next classifier of the composite construction of pagodas is the silhouette. Despite the presence of such a common feature as an active silhouette, such an indicator as the ratio of the side of the base (conditionally a) to the total height of the pagoda (conditionally h) may vary (Fig. 3):

- $h < 2a - 1$ object: one example from the Tang period (Big Wild Goose Pagoda);
- $h = 2 \div 2.5a$ – two objects: one example from the Sui period (Hannah Pagoda of Xianyou Temple (Fa Wang Tower)), one example from the Tang period (Chang'an Shengshou Temple Tower);
- $h = 3 \div 4a$ – four objects: three objects from the Tang period (Chang'an Huayan Temple Tower, Xiangji Temple Shandao Pagoda, Small Wild Goose Pagoda), one object from the Song period (Daqin Temple Tower);
- $h > 4a$ (up to $7a$) – one object of the Song period (Jingde Tower).

Such a classifier made it possible to determine the most common type of ratio "base side-total height" for pagodas of Shaanxi Province: $h = 3 \div 4a$, which takes into account the optimal ratio of the base side to the total height to ensure the staticity of the building.

The authors systematized the types of plans of the existing pagodas of Shaanxi province, proving with examples that there were twice as many square pagodas in plan (eight square plans versus four faceted).

The following pagodas have square plans: Fa Wang tower in Xianyou Temple, Xi'an Two Dragon Tower, Chang'an Huayan Temple Tower, Da-Yan Tower, (Big Wild Goose Pagoda), Xingjiao Temple Tower, Small Wild Goose Pagoda, Xiangji Temple Shandao Pagoda, Jingde Tower.

Pagodas with faceted plans: Chang'an Shengshou Temple Tower, Zhaohui Tower, Gaoling Pagoda, Daqin Temple Tower, Xi'an Wanshou Temple Tower.

On the basis of the historical analysis, the change in the types of religious buildings from the early to the later periods was traced. In particular, in addition to the already formulated conclusion about the concentration of pagoda construction in the Sui, Tang and Song periods, it

is argued that after the Song period, pavilion-type temples were built instead of pagodas, and the only noted example of pagodas in the late period is the Xi'an Wanshou Temple Tower of the Ming era.

On the basis of the obtained conclusions regarding the peculiarities of the composite construction of the pagodas of Shaanxi Province, the authors conducted a comparative analysis of these pagodas with the pagodas of China as a whole. In particular, the fact of the synthesis of ritual Buddhist stupas and Chinese tiered military pavilions on the borders in early Chinese Buddhist pagodas is known. At the same time, it is worth emphasizing the common origins of the military strategic pavilion on the borders and the multifunctional type of building – the pavilion, but despite the common origins of imitation, the further development of pagodas and pavilions went in two different directions. The pagoda type has largely remained conservative with regard to change, while post office, temple, garden pavilions, bridge pavilions, etc., with various plan forms and various compositional constructions have appeared over time.

The pagodas of Shaanxi province, despite certain differences between them, are similar, they all have a vertical vector of development. On the other hand, if we determine all the types of pagodas known on the territory of China from the earliest times, that is, from 450, from the era of the Southern and Northern Dynasties, to the beginning of the 20th century, to the era of the Qing Dynasty, then among them there were single-tiered ones, and with a large by the number of low tiers (so-called multi-layered), according to the outline of the bottle, a separate type is vajra (vajra based). The analysis of the general schemes of the genesis of pagodas in China, which is found in the literature, briefly argues why pagodas of mainly one – multi-tiered – type are found in Shaanxi Province: the single-tiered pagoda type, although it took place in the periods of the Southern and Northern Dynasties, the Sui Dynasty, the Tang Dynasty, the P era dynasties and Song dynasties, i.e. it spanned the time period of 450–1300 AD, but it turned out to be a dead end, just like the other two types – bottle-shaped pagodas and vajra pagodas. Bottle-shaped pagodas and vajra pagodas were built parallel to multi-tiered pagodas in the Tang and Song eras, but they were not as widespread.

In the case of such a ritual structure as a pagoda, we can say that despite the conservatism of the image, it received such a prevailing appearance that most corresponded to local cultural and architectural preferences. Such multi-tiered pagodas existed the longest, from approximately 400–500 AD to the beginning of the 20th century. Most often, it was a change-resistant type of multi-tiered pagoda with tiers of medium height, with window openings, inter-floor eaves and eaves, and the pagoda itself topped with a tent roof.

However, the genesis of the multi-tiered pagoda type also happened gradually, at an early stage (approximately 450–700 AD) the gap between single-tiered and multi-tiered pagodas in height is not yet so noticeable, this "gap" is sharply fixed somewhere from the 700. Over time, within one type of multi-tiered pagoda, two subtypes are formed – pagodas without columns and pilasters on the facades and pagodas with a wooden frame.

From the last quarter of the 10th century, the main diversification of varieties begins already in the subtype of pagodas with a wooden frame, it continues until the middle of the 19th century in the southern school and until the end of the 19th century in the northern school. This diversification results in two even smaller "subtypes of the subtype", where one subtype is a strongly vertically developed pagoda with a smaller side of the base, and the other is a more massive, so to speak, squat pagoda with a correspondingly larger side of the base.

Compared to the genesis of pagodas with a wooden frame, the type of pagoda without columns and pilasters changed little and, as a rule, the canonical image of an elongated structure was replicated. We can talk about certain changes only from the beginning of the 20th century, when pagodas of this type become squatter due to the increase in the side of the base in accordance with the decrease in the number of tiers, and therefore the height. However, this example is uncharacteristic, because, as we have already noted, in later periods the type of pagoda actually gave way to the type of temple pavilion.

Another conclusion was obtained on the basis of historical analysis, namely the periodization of pagodas throughout the territory of China. This proved that the flourishing and diversification of pagoda construction falls on the period of the 7th–13th centuries (Sui, Tang and Song dynasties), which is also true in relation to the studied pagodas of Shaanxi province.

Analysis of the compositional construction of the temples of Shaanxi province

As already mentioned above, the pagodas of Shaanxi province represent the early periods of the development of cult construction, on the other hand, the later periods of cult construction are mainly the temples of the traditional religions of China – Taoism and Buddhism. That is why the next aspect of the presented research was the study of 19 temple pavilions of the Tang, Yuan, Ming and Qing periods. Using the method of historical analysis, the maximum activation of the construction of such temples during the Ming and Qing periods was argued (Fig. 4).

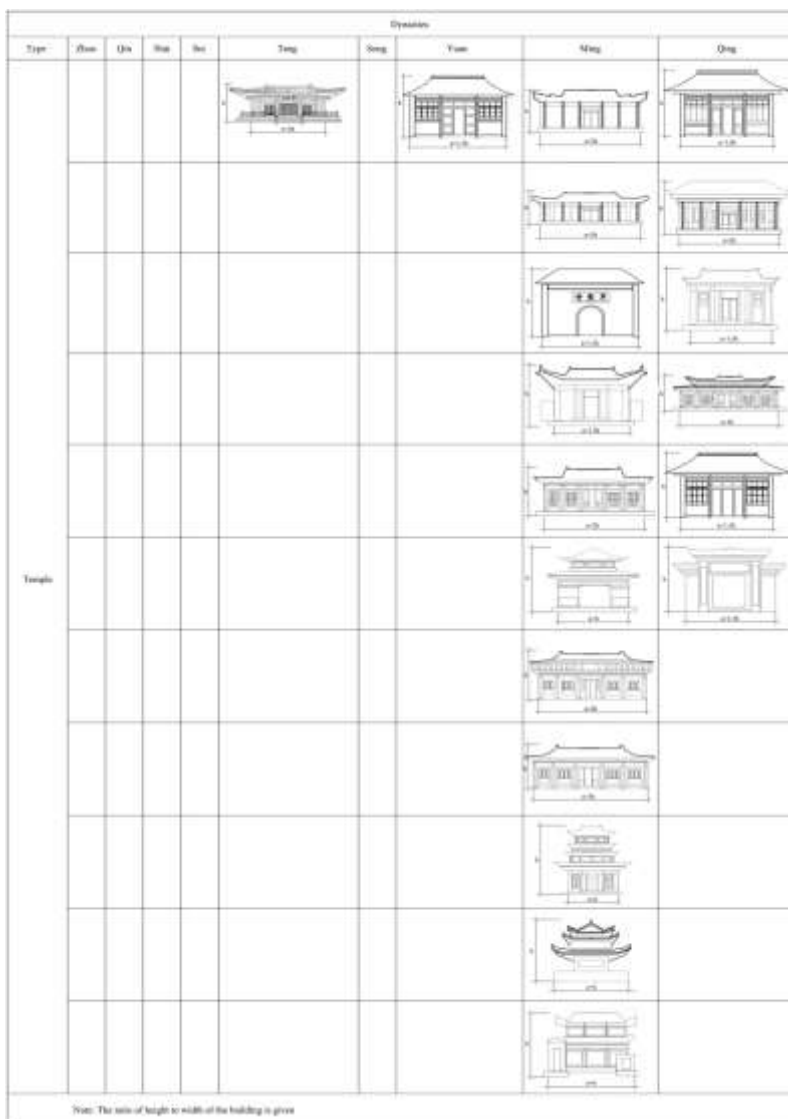


Fig. 4. Periodization of temples.

The direct influence on temple construction of all denominations (even Islam) of the type of traditional Chinese pavilion was briefly noted, which actually erased the external visual differences inherent in temples of different faiths.

To systematize the types of temples in Shaanxi province, the authors used the same scientific methods of historical analysis, system-structural analysis, photogrammetry and grapho-analytical method. The main aspect of the study of traditional temples was the analysis of their compositional construction, which is fundamentally different from the compositional construction of pagodas, which are characterized by an emphatically vertical vector of development. Instead, temple pavilions receive a horizontal vector of development and most often become single-level.

Another notable difference between temples and pagodas is that a pagoda cannot be confused with any other building or temple of another denomination, instead, temple pavilions of different faiths are similar to each other and at the same time similar to imperial or ordinary residential pavilions.

Just as in the case of the pagoda, varieties can be identified, which then began to be replicated with minor changes into smaller subtypes, such varieties – models for imitation – were also found in the temple architecture of Shaanxi province. In particular, two different prototypes can be identified. Xingjiao Temple is the oldest pavilion of the first type in Shaanxi province, Huayang Temple of Hu County is the oldest pavilion of the second type in Shaanxi province. Xinjiao Temple became the model for eight temples in the main Ming period (only one temple belongs to the Qing period). The Huayang Temple became the model for the four temples in the main Qing period, when the prototype was repeated almost without modification. In addition to these two main types, there were three objects of two types, which are successively connected in image with tiered small architectural forms – pavilions (Fig. 5). The analysis of the genesis of the type of temple pavilion from the Tang era to the Qing era proved that after the maximum flourishing and diversification of types in the Ming era, there was a gradual limitation of types, their direct replication, the type of pavilion of the Tang era acquires an eclectic character, oversaturated with the division into additional tiers.

Just as for pagodas, an important characteristic of the composite construction of temple pavilions is the ratio of the height and length of the side of the facade. If we conventionally denote the height as h , and the length of the facade as a , and count how many times which ratios occur, we will get the following results:

- $a < h - 1$ object;
- $a = h - 2$ objects;
- $a < 1,5 h - 5$ objects;
- $a = 1,5 h - 2$ objects;
- $a = 2 h - 5$ objects;
- $a < 3h - 1$ object;
- $a = 3 h - 2$ objects.

So, the ratio when the length of the facade is less than or equal to the height is recorded in three objects, when the length of the facade is less than one and a half height or equal to one and a half height in seven objects (the most common type), when the width of the facade is equal to two heights in five objects and when the width of the facade is less than three heights or equal to three heights in three objects.

An important aspect is also the horizontal divisions of the facade, which can be three-part (roof, cornice, wall) (two objects), four-part (roof, cornice, wall, plinth or stylobate) (five objects) and multi-part (one object). A comparison of the number of examples of each horizontal division argues that it was the four-part division that became the most widespread.

Since, as already mentioned, the main attention during the analysis of the types of temples was paid to the compositional construction, one of the compositional characteristics was the types of silhouettes in comparison with similar silhouettes of traditional pavilions,

which proves their commonality (Fig. 5). According to the created classification based on the method of photogrammetry and the grapho-analytical method, the relationships between one of the "canonical" temples of each of the two types and the modifications formed from it are presented:

1. Xingjiao Temple (type A) – on its basis, four modifications were formed with their smaller varieties in the following temples: of the Ming period – Dongyue Temple (type 1A), Arhat Temple (type 2A), Shuilu Temple (type 3A1), Huxian Temple (type 3A2), Qing period – Guangren Temple (type 3A3), Ming period – Baxian Temple (type 3A4), Ming period – Little Piyuan Mosque (type 4A1), Daxingshan Temple (type 4A2).

2. Huayang Temple (type O) – on its basis, two modifications were formed with their smaller varieties in the following temples: Qing period – Wang's Ancestral Hall of Hu County (type 1O1), Du Gong Temple (type 1O2), Ming period – Caotang Temple (type 2O1), Dapiyuan Mosque (type 2O2).



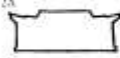

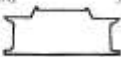

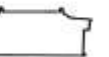
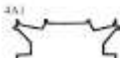


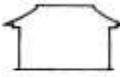
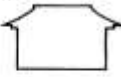
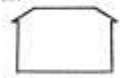
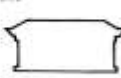

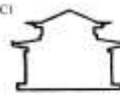


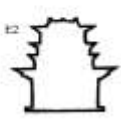
	Main type	Modifications
General types	<p>A</p> 	<p>1A</p>  <p>2A</p>  <p>3A1</p>  <p>3A2</p>  <p>3A3</p>  <p>3A4</p>  <p>4A1</p>  <p>4A2</p> 
	<p>O</p> 	<p>1O1</p>  <p>1O2</p>  <p>2O1</p>  <p>2O2</p> 
Uncommon types	<p>C</p>  <p>Arbour</p>	<p>C1</p> 
	<p>E</p>  <p>Arbour</p>	<p>E1</p>  <p>E2</p> 

Fig. 5. Classification of temple silhouette types and their relationship with gazebos.

The commonality of the literal origin of individual examples of temple pavilions from small architectural forms – pavilions is proven by comparing the Heavenly and Earthly Pavilion of the Five Dragons in the Imperial Garden on the northern bank of the Beihai River and the Magnificent Pavilion of the Imperial Summer Palace in Beijing with three temples of the Ming era: Gongshui Temple (C1), Thunder Temple Wan Pavilion (E1), Louguantai (III).

Analysis of the morphology of expressive forms of national traditions in the temple architecture of Shaanxi province

According to the method of system-structural analysis, the object is systematically examined and structurally dissected at different hierarchical levels. The first stage of the system-structural analysis involves a comprehensive study of the composition, which was actually carried out in the previous section. The second stage involves the analysis of the morphology of forms, i.e., the whole form is divided into certain aggregated components, and these, in turn, into smaller ones. The main facade of various types of pagodas and temples was taken as a complete form. Among the enlarged components of the facade, the roof, eaves, wall, and within the walls – window and entrance openings and decor are highlighted. On the basis of such a structural division, all possible noted types of roofs, cornices, walls with smaller components, the so-called "elements of elements", were brought together. The analysis of the constituent elements of pagodas was carried out on the most characteristic examples of the Sui, Tang and Song eras. The analysis of the constituent elements of pagodas was carried out on the most characteristic examples of the Sui, Tang and Song eras.

Pagodas

Roofs: four-pitched simple – Sui period – Fa Wang tower in Xianyou Temple (601, reconstruction 725), Tang period – Chang'an Huayan Temple Tower (between 627 – 649), Da-Yan Tower (The Big Wild Goose Pagoda) (652), Xingjiao Temple Tower; faceted – Tang Dynasty – Chang'an Shengshou Temple Tower, Zhaohui Tower (Gaoling Pagoda), Song Dynasty – Daqin Temple Tower. The roofs end with a spire (Sui period – Fa Wang tower in Xianyou Temple, Song period – Jingde Tower) or a small dome with a spire (Tang period – Chang'an Huayan Temple Tower, Da-Yan Tower (Big Wild Goose Pagoda), Zhaohui Tower (Gaoling Pagoda), Song Dynasty – Daqin Temple Tower).

Cornices: developed, large scale: Sui period – Fa Wang Tower in Xianyou Temple (601, reconstruction 725), Tang period – Xi'an Two Dragon Tower, Chang'an Huayan Temple Tower (between 627 – 649), Da-Yan Tower (Big Wild Goose Pagoda) (652), Xingjiao Temple Tower, Chang'an Shengshou Temple Tower, Zhaohui Tower (Gaoling Pagoda), Small Wild Goose Pagoda, Xiangji Temple Shandao Pagoda, Song Dynasty – Daqin Temple Tower), Jingde Tower (1092).

Walls: with a large number of tiers – Sui period – Fa Wang tower in Xianyou Temple (601, reconstruction 725), Tang period – Xi'an Two Dragon Tower, Chang'an Huayan Temple Tower (between 627 – 649), Da-Yan Tower (Big Wild Goose Pagoda) (652), Xingjiao Temple Tower, Chang'an Shengshou Temple Tower, Zhaohui Tower (Gaoling Pagoda), Small Wild Goose Pagoda, Xiangji Temple Shandao Pagoda, Song period – Daqin Temple Tower, Jingde Tower (1092).

Window openings: semicircular opening – Sui period – Fa Wang tower in Xianyou Temple (601, reconstruction 725), Tang period – Xi'an Two Dragon Tower, Da-Yan Tower (Big Wild Goose Pagoda) (652), Xingjiao Temple Tower, Small Wild Goose Pagoda, Xiangji Temple Shandao Pagoda, Song period – Daqin Temple Tower; rectangular opening – Chang'an Shengshou Temple Tower, Zhaohui Tower (Gaoling Pagoda), Jingde Tower (1092).

Entrance opening: semicircular opening – Sui period – Fa Wang tower in Xianyou Temple (601, reconstruction 725), Tang period – Xi'an Two Dragon Tower, Da-Yan Tower (Big Wild Goose Pagoda) (652), Xingjiao Temple Tower), Xiangji Temple Shandao Pagoda;

rectangular opening – Chang'an Shengshou Temple Tower, Zhaohui Tower (Gaoling Pagoda), Song period – Daqin Temple Tower, Jingde Tower (1092).

Decor: without decor – Sui period – Fa Wang tower in Xianyou Temple (601, reconstruction 725), Tang period – Xi'an Two Dragon Tower, Chang'an Huayan Temple Tower (between 627-649), Da-Yan Tower (Big Wild Goose Pagoda) (652), Xingjiao Temple Tower, Zhaohui Tower (Gaoling Pagoda), Xiangji Temple Shandao Pagoda; with decor – Tang period – Chang'an Shengshou Temple Tower, Song period – Daqin Temple Tower, Jingde Tower (1092).

So, the most characteristic type of pagoda in Shaanxi Province is a vertically elongated, square structure with a small, medium or greater slope of the outer walls, with 7 – 8 low-height tiers, which perspectively decrease upwards, with an emphatically higher, wider and more massive lower tier, with a four-pitched roof with a spire or a small dome with a spire, with semicircular openings in the walls of the tiers and with a semicircular entrance, without decoration. It is this set of morphological features that most fully expresses the image of a pagoda in Shaanxi province.

Temples

Roofs: in most examples, four-pitched or four-pitched with a fold, as a rule, single-tiered. The corners of the roofs can be slightly curved upwards, strongly curved upwards, barely curved downwards and strongly curved downwards. Compared, for example, with the roofs of small architectural forms – pavilions, there are much fewer types of temple roof types, the most stable types of roofs are often replicated.

Temples which have roofs with not too curved upward corners: Tang period – Xingjiao Temple.

Temples which have roofs with strongly curved upward corners: Ming era – Dongyue Temple, Arhat Temple, Little Piyuan Mosque, Thunder Temple Wan Pavilion, Qing era – Daxingshan Temple, Dongyue Temple of Hu County.

Roofs with strongly curved downward corners have temples: Yuan era – Huayang Temple, Ming era – Caotang Temple, Baxian Temple, Gongshui Temple, Qing era – Wang's Ancestral Hall of Hu County, Dapiyuan Mosque, Guangren Temple, Du Gong Temple.

This allows us to argue that two types of roofs spread – with strongly raised or strongly lowered corners, which was obviously dictated by natural and climatic requirements.

Eaves: developed, with a large overhang.

Walls: most often single-tier regardless of denomination (except for a few examples: Ming era – Gongshui Temple, Thunder Temple Wan Pavilion, Louguantai, Xuandi Temple Jade Emperor Building, Qing era – Daxingshan Temple, Dongyue Temple of Hu County).

Window openings: rectangular of different proportions – square, elongated vertically and horizontally, round – Dongyue Temple of Hu County.

Entrance opening: rectangular of different proportions (with the exception of Caotang Temple), semicircular – Dongyue Temple of Hu County.

The ancient pagodas of Shaanxi province have practically no decoration, they are emphatically simple. The color scheme is restrained – gray-ochre or ocher. The analysis of examples of the decoration of temples of different denominations of four periods proves that the most traditional methods of decoration were the use of symbolic figurines on the roof, the use of contrasting bright polychromy with the dominance of red, blue and yellow (in imperial objects) colors, and paired sculptures of lions were often installed in front of the temple, the entrance and walls were decorated with sacred inscriptions. The technique of wall ornamentation with polychrome ornaments was used less often.

Constructive schemes and materials for construction of pagodas

All investigated pagodas of Shaanxi Province are built of brick. At the same time, as already mentioned, this is a later structural scheme, since the early pagodas were entirely wooden. In all cases, it is a three-part structure consisting of a plinth, a main part with many

tiers and a top. The traditional order of construction of brick pagodas with wooden structures (as well as individual imperial pavilions) provided for the following stages:

- arranging a clay foundation;
- construction of brick walls;
- installation of wooden support pillars on the foundation;
- fastening on the pillars-supports of the floor beams;
- arrangement on top of roof structures with a roof made of ceramic tiles or reeds.

You can find evidence of the peculiarities of pagoda construction schemes even in ancient literary works, in particular, there is a revealing saying "Saving a person's life is a more righteous thing than building a 7-story pagoda." That is, a pagoda with seven tiers was considered perfect, although examples of thirteen-tiered pagodas are also known. The numbers 7 and 13 were considered the most fortunate, but this was not associated with Buddhism.

Gradually, in the process of developing and improving the types of pagodas, the materials for construction also varied, pagodas were built not only from wood, but also from brick and stone, the roof could be made of reeds, water tiles, iron, even gilded. In parallel with the diversification of materials and structural schemes, the types of pagoda plans varied, although square plans were the most common, six- and eight-sided, even round ones were found.

If we summarize the list of all possible varieties of pagodas in China in relation to their structural schemes, which directly determined the appearance, then we can talk about six main types:

- 1) pagodas with a closed eaves (密檐塔 miyanta) – the oldest type of pagoda (a 12-sided 10-tiered brick pagoda with 15 dense ring eaves that decrease towards the top, in Chunyuesi Temple, Denfeng County, Henan Province (523);
- 2) tower pagoda (楼阁塔 lougeta) – the most common type of pagoda in China based on the use of brackets of the Dou-Gong design;
- 3) the "Diamond Throne" pagoda (金刚宝座塔 jingagnbaozuota) is an uncharacteristic type of pagoda borrowed from India with the location of a group of pagodas (one in the centre, four at the four corners) on a dense square stylobate ("Diamond Throne");
- 4) dagoba ((喇嘛塔 lamata) – a Tibetan pagoda with the shape of an inverted bowl and hanging in the form of a cone with a dome on top, similar to an open umbrella with bronze bells on the sides of the dome, on a huge brick platform;
- 5) "Mother and Children" pagoda (母子塔 最合) – uncharacteristic, a complex of several white pagodas – the highest "Mother" and smaller ones, similar from a distance to lotus flowers;
- 6) forest of pagodas (塔林 talin) – a Buddhist monastery cemetery with the ashes of monks (the most famous, oldest and largest of the 220 brick decorated 3 – 7 tiered pagodas in the Shaolin Monastery in Henan Province).

Conclusions

The analysis of pagodas and temples of traditional religions on the territory of Shaanxi province made it possible to formulate certain conclusions that can serve as a basis for monument protection and restoration measures.

It is emphasized that pagodas, on the one hand, and temples of Taoism and Confucianism, on the other hand, were based on opposite principles in relation to the natural environment. In the case of pagodas, we observe an emphasized dominance of the artificial structure over the natural environment, instead, local religions in cult buildings continued the principle of subordination of height and size to the natural environment inherent in small pavilions, and this process took place against the background of the accumulated skill of

erecting tall pagoda objects. So, the pagodas emphatically dominated the surroundings (which is historically uncharacteristic of China), and the temples of local religions were subordinate to it in terms of height and silhouette.

On the basis of the method of system-structural analysis, photogrammetry and grapho-analytical method, the compositional and morphological features of pagodas of the Sui, Tang and Song periods were analyzed and the most characteristic type of pagoda of Shaanxi province was formulated, which is an emphatically elongated structure, completed by a four-sloped roof with a spire or a bathhouse with a spire, mainly with square plans of the lower and upper tiers, where the angle of inclination to the central axis of the outer walls varies – from small to more significant, with 7 – 8 tiers, the height of which is quite small, but sufficient for the arrangement of semicircular or rectangular window openings in walls, and the tiers prospectively decrease upwards both in terms of dimensions in plan and in height (Fig. 6).

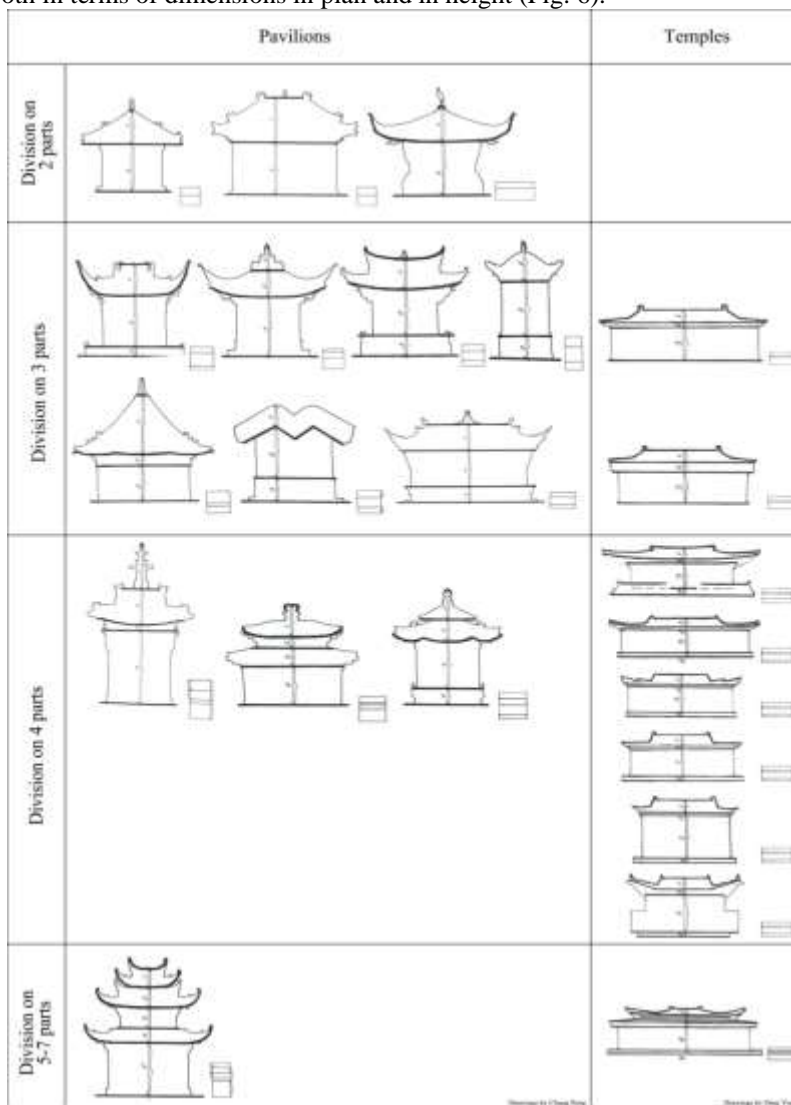


Fig. 6. Proof of the commonality of the composite construction of temples and small architectural forms – pavilions.

A typical pagoda of the Shaanxi province has an emphatically more massive lower tier with a semicircular entrance and is practically devoid of external decoration.

The next conclusion concerns the gradual replacement of pagoda construction in the early periods (the Sui dynasty (581–618), Tang (618–907) and Song dynasties (Northern Song (960–1127, Southern Song 1127–1279), mainly between 581 and 1279, that is, from the 6th to the 13th centuries, with the construction of temples in later periods (Yuan (1271–1368), Ming (1368–1644), Qing (1636–1912), that is, there was a shift from the imperially supported Buddhism borrowed from India towards the traditional Chinese religions of Taoism and Confucianism. If the pagoda was a rather conservative type of building, resistant to noticeable changes, then the temple pavilion turned out to be more flexible for architectural diversification.

Shaanxi temple types of different periods were analyzed and systematized. The dominance of two types of temple pavilions derived from Xingjiao Temple and Hu County Huayang Temple is argued. On the basis of a comparison of the shaping of later Ming and Qing temples, it is argued that Xingjiao Temple became the model for eight temples in the main Ming period, and Huayang Temple became the model for four temples in the main Qing period, when the prototype was repeated almost without modifications. Several examples of temples have been identified, which are successively connected with the formation of small architectural forms – tiered pavilions. The most common for temples was the division into four parts (roof, cornice, wall, plinth or podium) with the ratio of the width of the facade to the height: the width of the facade is less than one and a half height or equal to one and a half height – 7 objects (the most common type), the width of the facade is equal to two heights – 5 objects.

The commonality of architectural and building traditions of temple and secular pavilions is proved, which is a national and regional feature, argued on the example of Shaanxi province (Fig. 6). The gradual limitation of the types of temple pavilions, their simplification and eclecticism prove the conformity to the general process of the genesis of any style with the stages of emergence, flowering and gradual decline.

Both in the case of pagodas and in the case of temple pavilions, we can talk about a certain replication of the canonical image, including the division into certain parts, the ratio of parts, the number of tiers, the width-length ratio, etc.

References

- [1] Y. Chen, *Taoism in the People's Republic of China*, **The Encyclopedia of Taoism** (Editor: Fabrizio Pregadio), Routledge, London – New York, 2008, pp. 174-175.
- [2] Y. Ding, I.G. Sandu, *Genesis of Images and Technique of Ancient Chinese Wall Painting*, **International Journal of Conservation Science**, **12**(4), 2021, pp. 1309-1326.
- [3] P. Gryglewski, Y. Ivashko, D. Chernyshev, P. Chang, A. Dmytrenko, *Art as a message realized through various means of artistic expression*, **Art Inquiry. Recherches sur les arts**, **XXII**, 2020, pp. 57-88.
- [4] Y. Ivashko, D. Kuśnierz-Krupa, P. Chang, *History of origin and development, compositional and morphological features of park pavilions in Ancient China*, **Landscape Architecture and Art**, **15**(15), 2020, pp. 78-85.
- [5] Y. Ivashko, T. Kuzmenko, S. Li, P. Chang, *The influence of the natural environment on the transformation of architectural style*, **Landscape Architecture and Art**, **15**(15), 2020, pp. 101-108.
- [6] Y. Ivashko, D. Chernyshev, P. Chang, *Functional and figurative and compositional features of traditional Chinese pavilions*, **Wiadomości Konserwatorskie – Journal of Heritage Conservation**, **61**, 2020, pp. 60-66.
- [7] Y. Ivashko, P. Chang, A. Dmytrenko, T. Kozłowski, D. Mykhailovskyi, *Influence of Structural Schemes on the Shaping of Historical Wooden Buildings: On the Examples of Traditional Chinese Pavilions, Pavilions of the Chinoiserie Style and Ukrainian Wooden*

- Churches*, **Wiadomości Konserwatorskie – Journal of Heritage Conservation**, **67**, 2021, pp. 49-60.
- [8] Y. Ivashko, P. Chang, P. Zueva, Y. Ding, T. Kuzmenko, *Continuity of traditions and innovation in modern landscape design in China*, **Landscape Architecture and Art**, **18**(18), 2021, pp. 94-103.
- [9] Y. Ivashko, P. Chang, Y. Ding, M. Krupa, Ł. Bednarz, *Genesis, functional features of Chinese pavilions and experience in the restoration of wooden structures*, **Wiadomości Konserwatorskie – Journal of Heritage Conservation**, **69**, 2022, pp.43-56.
- [10] Q. Li, **Chinese pavilions**, China Architecture and Building Press, Beijing, 2019.
- [11] B. Liu, V. Peng, H. Li, Y. Chu, *Increase of moisture content in Mogao Grottoes from artificial sources based on numerical simulations*, **Journal of Cultural Heritage**, **45**, 2020, pp. 135-141.
- [12] M. Orlenko, Y. Ivashko, *The concept of art and works of art in the theory of art and in the restoration industry*, **Art Inquiry. Recherches sur les arts**, **XXI**, 2019, pp. 171–190.
- [13] M. Orlenko, M. Dyomin, Y. Ivashko, A. Dmytrenko, P. Chang, *Rational and aesthetic principles of form-making in traditional Chinese architecture as the basis of restoration activities*, **International Journal of Conservation Science**, **11**(2), 2020, pp. 499-512.
- [14] M. Orlenko, Y. Ivashko, Y. Ding, *Fresco Wall Painting and its Regional Modifications*, **International Journal of Conservation Science**, **13**(1), 2022, pp. 57-72.
- [15] M. Orlenko, Y. Ivashko, P. Chang, Y. Ding, M. Krupa, K. Kuśnierz, I. G. Sandu, *The Specificity of the Restoration and Monument Protective Measures for the Preservation of Historical Chinese Gardens*, **International Journal of Conservation Science**, **12**(3), 2021, pp. 1003–1026.
- [16] I. Sandu, *Modern Aspects Regarding the Conservation of Cultural Heritage Artifacts*, **International Journal of Conservation Science**, **13**(4), 2022, pp. 1187-1208.
- [17] P. Spiridon, I. Sandu, *Muselife of the life of public*, **International Journal of Conservation Science**, **7**(1), 2016, pp. 87-92.
- [18] P. Spiridon, I. Sandu, L. Stratulat, *The conscious deterioration and degradation of the cultural heritage*, **International Journal of Conservation Science**, **8**(1), 2017, pp. 81-88.
- [19] I. Sandu, G. Deak, Y. Ding, Y. Ivashko, A. V. Sandu, M.-A. Moncea, I. G. Sandu, *Materials for Finishing of Ancient Monuments and Process of Obtaining and Applying*, **International Journal of Conservation Science**, **12**(4), 2021, pp. 1249-1258.
- [20] F. Yang, B. Zhang, Q. Ma, *Study of Sticky Rice-Lim Mortar Technology for Restoration of Historical Masonry Construction*, **Accounts of Chemical Research**, **43**(6), 2010, pp. 936-944.
- [21] M. Żychowska, Y. Ivashko, P. Chang, A. Dmytrenko, N. Kulichenko, X. M. Zhang, *The influence of traditional Chinese landscape architecture on the image of small architectural forms in Europe*, **Landscape Architecture and Art**, **18**(18), 2021, pp. 59-68.

Received: September 12, 2022

Accepted: May 04, 2023