Convenience of Statistical Approach in Studies of Architectural Ornament and Other Decorative Elements Specific Application

O Priemetz, K Samoilov, M Mukasheva
Faculty of Architecture, Kazakh Leading Academy of Architecture and Civil Engineering, 28, Ryskulbekov street, Almaty 050043, Republic of Kazakhstan

E-mail: info@kazgasa.kz

Abstract. An ornament is an actual phenomenon of the architecture modern theory, a common element in the practice of design and construction. It has been an important aspect of shaping for millennia. The description of the methods of its application occupies a large place in the studies on the theory and practice of architecture. However, the problem of the saturation of compositions with ornamentation, the specificity of its themes and forms have not been sufficiently studied yet. This aspect requires accumulation of additional knowledge. The application of quantitative methods for the plastic solutions types and a thematic diversity of facade compositions of buildings constructed in different periods creates another tool for an objective analysis of ornament development. It demonstrates the application of this approach for studying the features of the architectural development in Kazakhstan at the end of the XIX-XXI centuries.

The ornamental compositions used in architecture and individual elements are constantly the subject of research both in the historical, cultural, and in the specifically applied aspect. The aspiration to comprehend architectural ornament as an independent phenomenon was reflected in a number that became classical works [1]. However, active attempts to rethink the architectural process in general and architectural shaping in particular led to a sharp polarization of opinions about the appropriateness of interpreted as purely decorative elements. And if the controversy about architectural orders remained within the bounds of mutual assumptions on the basis of an understanding of the nature of a naturally tectonically justified rack and beam system, the discussion about architectural ornament, strangely recognized as purely decorative and in terms of meaning, an insubstantial element, has come to the brink of conceptual negation in formulations like "Ornament and Crime "[2].

Polemic pathos of criticism of the "decorative saturation" of Eclectic, Neoclassic and Modern forms paved the way for the elegance of "pure forms" of Functionalism, which was later romantically renamed Modernism. A legend about a new, world-wide, international architecture was formed, reflecting the globalism of modern thinking and its reflection in architecture. This idea ensured the emergence of a large number of beautiful works that by the middle of the last century had become the defining ones for the appearance of most cities of the planet.

But the declarative denial of architectural ornament by the leaders of the profession did not reflect the prevailing views of a significant part of the customers. The first projects of the "Pioneers of Modern Architecture" miraculously coexisted harmoniously with elegant displays of the super popular...
style of "Art Deco". And in some countries that seemed progressive, for example, Constructivism was already, by the early 1930s, successfully replaced by neoclassicism with a national and regional decor, which was more understandable to most people. The decline of Modernism was marked by the paradoxical appearance of ornamental features in large forms, and the emerging Postmodernism in general led to a rethinking of the very essence of the interpretation of shape formation in architecture, including ornament. The dialectic of the unity and struggle of opposites has appeared in all its splendor, and the echoes of the debate of a century ago have been manifested even to this day, maintaining the sharpness of the assessments and the futility of the formulations: "Ornament is Crime: Modernist Architecture" [3].

Nevertheless, ornamental compositions of various types and themes are still a fairly common technique for solving architectural and artistic problems. Thematic diversity is based both on abstract general cultural and on specific ethnic motives. Constantly conducted research of historical and modern practice of the use of ornament (Alekseev, S. 1954 [4]; Basenov, T.K. 1957 [5]; Khan-Magomedov, S.O. 1964 [6]; Auger, B. 1976[7]; Brolin, B.C. and Richards, J. 1982, 2000 [8]; Hamburger, B. and Thiebaut, A. 1983 [9]; Tarkhanov, A.1984 [10]; Brolin, Brent C. (2000) Architectural Ornament: Banishment & Return (Norton Books for Architects & Designers). - New York: W. W. Norton & Company; Rev Sub edition [11]; Kazhigali-uliy, A. 2003 [12]; Samoilov, K.I. 2004 [13]; Ferrari, G. 2007 [14]; Mal’chik, A.U. 2010 [15]; Gleiter, J.H. as editor 2012 [16]; Khmelnitsky, S.G. 2013 [17] and other).

In general, the development of ornamental compositions in architecture has a dualistic basis. On the one hand, these are the structural features of various materials that determined a kind of spontaneous appearance of patterned surfaces. On the other hand, differently interpreted geometric figures and their combinations, and also to a greater or lesser degree realistic and schematic depictions of natural climatic phenomena, landscape, vegetation, insects, reptiles, fish, animals, people, as well as household items, composed ritual compositions, Which were applied to scenes acceptable for the scenario of the surface of bearing and enclosing structures.

However, it is advisable to supplement the massively distributed descriptive methods with the analysis of quantitative data. This method in the context of ornamentation was first applied in the study of the development of ornament in the architecture of Almaty, the end of the last century - the beginning of the present century [18]. The analysis was carried out according to the degree of saturation of the facades with ornamental compositions.

Made from various materials and having the appearance of belts, vertical inserts, frames, cartouches or panels, ornamental compositions in color, relief, lattice or combined performance are a widespread element in modern Kazakhstan architecture. Despite the conventionality of thematic boundaries and the variety of interpretations of patterns, the main motives are presented in most cases quite clearly read by anthropomorphic, zoomorphic, plant, subject, epigraphic, heraldic, astral and abstract-geometric figures. Of particular importance in this case is the interpretation of the architects of different motives, which, depending on the intentions of the customer, allows to correlate both individual elements and the general composition solution of the building with traditional subregional, regional or transregional conceptions of form-building.

In various periods of development of Russian architecture of the late XIX - early XXI centuries. The use of ornamental compositions differed both in the mass application in general and the saturation of the facades of individual buildings and structures, and in the degree of proximity of the pattern configuration to certain prototypes from the sphere of architecture of previous periods, as well as the historically developed forms of monumental decorative and applied arts. The use of ornamental compositions in the Kazakhstan architecture of the twentieth century was largely due both to the spontaneous aspiration of the authors of the projects, and to the recommendations, which sometimes had directive character, to accentuate the national and regional imagery of architecture.

As the research has shown, the development of architectural ornament in the Almaty architecture of the end of the previous - the beginning of this century has a number of peculiar features. One of them -
is a pronounced waveform in the quantitative saturation of the patterned elements of these or other parts of buildings and structures.

To analyze this phenomenon, several groups of architectural elements are singled out, in the composition solution of which ornaments are used. These elements are: cornices and belts, columns and pilasters, platbands and frames, panels and insets. The calculation of different types of ornamental compositions on these elements gave the results given in Table 1.

Table 1. The number of ornamental elements in buildings by period.

| Periods (years) | 1890-1920 | 1930-1940 | 1950 | 1960 | 1970-1980 | 1990-2000 |
|----------------|-----------|-----------|------|------|-----------|-----------|
| Groups of elements | Ornamented Cornices and belts | 12 | 21 | 41 | 3 | 1 | 32 |
| | Ornamented Columns and pilasters | 1 | 26 | 59 | 1 | 1 | 8 |
| | Ornamented Platbands and frames | 13 | 47 | 54 | 1 | 4 | 15 |
| | Ornamented Panels and inserts | 3 | 35 | 55 | 30 | 127 | 32 |
| | Total species of ornamental elements | 29 | 129 | 209 | 35 | 133 | 87 |

The average number of ornamented elements in the building:

| Periods (years) | 1890-1920 | 1930-1940 | 1950 | 1960 | 1970-1980 | 1990-2000 |
|----------------|-----------|-----------|------|------|-----------|-----------|
| Total Surveyed buildings | 17 | 51 | 50 | 27 | 115 | 41 |

In the period of the 1890s - 1920s, the use of ornamental compositions in seventeen buildings was revealed. At the same time ornamented cornices and belts met in 12 cases, ornamented columns and pilasters - in 1 case, ornamented platbands and frames - in 13 cases, ornamented panels and insets - in 3 cases. Total species of ornamental elements - 29; the average saturation is 1.71 (mainly - two: cornices and belts, trim and frames). Patterns in the form of wooden and metal carved compositions are mostly represented by geometric themes with accents of S-shaped curls in various combinations with petals. There are also molded low-relief compositions of mainly plant themes.

In the period of the 1930s-1940s, the use of ornamental compositions in fifty-one buildings was revealed. At the same time ornamented cornices and belts met in 21 cases, ornamented columns and pilasters - in 26 cases, ornamented platbands and frames - in 47 cases, ornamented panels and insets - in 35 cases. Total species of ornamented elements - 129; the average saturation is 2.53 (predominantly two or three in the same degree: platbands and frames, panels and inserts, as well as columns and pilasters). In the main, molded patterns are represented in all the variety of their subjects, mainly in a two-plane solution with accentuation of the traditional equivalence of the pattern and background. It is significant that it was during this period that the tendency of synthesis of the traditional spiral curl with ionic volute appeared for the first time. Ornamented molded pilasters widely interpret the form of the traditional wooden carved "Central Asian Column". By the end of the period, the palm-like-larch capital is being massively applied with ornamental inserts and ornamented belts at the junction of the column's trunk or pilasters with a base.

In the 1950's, the use of ornamental compositions in fifty buildings was revealed. At the same time ornamented cornices and belts met in 41 cases, ornamented columns and pilasters - in 59 cases, ornamented platbands and frames - in 54 cases, ornamented panels and inserts - in 55 cases. Total
species of ornamented elements - 209; the average saturation is 4.18 (mainly four: columns and pilasters, as well as other elements). Preserving the thematic diversity of the previous period, mold patterns are increasingly used in the form of highly relief or even sculptural compositions, although the two-plane solution remains dominant. The synthesis of a spiral curl with ionic volutes is massively applied, and the ornamental saturation of palm-like foliage capitals becomes even greater.

In the 1960s, the use of ornamental compositions in twenty-seven buildings was revealed. At the same time ornamented cornices and belts met in 3 cases, ornamented columns and pilasters - in 1 case, ornamented platbands and frames - in 1 case, ornamented panels and inserts - in 30 cases. Total species of ornamented elements - 35; the average saturation is 1.29 (mainly - one: ornamental inserts and panels). Patterned compositions of the panels, occupying the entire height of the facade, in the majority acquire multicolor, preserving the low resolution of the spatial solution.

In the period of the 1970s-1980s, the use of ornamental compositions in one hundred and fifteen buildings was revealed. At the same time ornamented cornices and belts met in 1 case, ornamented columns and pilasters - in 1 case, ornamented platbands and frames - in 4 cases, ornamented panels and inserts - in 127 cases. Total species of ornamented elements - 133; the average saturation is 1.16 (mostly - one: ornamental inserts and panels in the vast majority). The variety of thematic themes is concentrated in low-and high-relief single-color compositions of mainly balcony fences, ornamented lattices are widely distributed.

In the period of the 1990s - 2000s, the use of ornamental compositions in forty-one buildings was revealed. At the same time ornamented cornices and belts met in 32 cases, ornamented columns and pilasters - in 8 cases, ornamented platbands and frames - in 15 cases, ornamented panels and inserts - in 32 cases. Total species of ornamented elements - 44; the average saturation is 2.12 (mainly - two with a 2-3 trend: cornices and belts, panels and inserts, as well as platbands and frames in perspective). An interesting feature of the period was the revival of the epigraphic ornamental decoration, as well as the spread of overhead grating compositions. Unlike previous periods, the S-shaped curl in various combinations becomes the dominant pattern, interpreting the ornamental compositions applied in the state symbols of the country.

Thematically, the ornament is traditionally divided into several topics related to the evaluation of the configurational similarity of its elements to one or other of the natural forms or cultural signs. It is Vegetative, Zoomorphic, Astral, Anthropomorphic, Epigraphic, Geometric, Heraldic. In view of the typologically natural generalization of ornamental images, this differentiation has, to some extent, subjectivity. For example, the fencing of the roof of the Abai Opera and Ballet Theater in Almaty (1940) on the one hand is clearly associated with a number of dancing girls in a national dress ("anthropomorphic" theme), and on the other - because of sheet-shaped pointed forms - can be interpreted as an interpretation of the flower border ("vegetable" theme). A similar dualism of interpretation is possible when classifying the widespread form of a pair or single spiral curl. Here, and "zoomorphic" theme of the horn, and "astral" theme of the universe. In this case, the change in the thickness and tip sharpening occurring in this configuration can also be perceived as a still sprouting germ of the "vegetative" theme.

Nevertheless - these are, in the main, special cases, and in their mass of the configuration of the architectural ornament are quite definitely thematically differentiated. The corresponding calculations in absolute and relative parameters are given in Table 2.

Analysis of the distribution of the number of ornamental themes in buildings by period gave some interesting results. So on the quantitative indicators of prevalence the following line is built: "plant" - 506 examples; "Geometric" - 98 examples; "Heraldic" - 78 examples; "Zoomorphic" - 62 examples; "Astral" - 20 examples; "Epigraphic" - 9 examples; "Anthropomorphic" - 8 examples.

The average number of topics on the building for periods: two in the 1890s - 1920s; Three in the 1930s-1940s; Six in the 1950s; One in the 1960s; One in the 1970s and 1980s; Two in the 1990's - 2000's. From the perspective of the thematic latitude, it can be noted that the least thematically diverse periods (five of the seven possible) are the three periods: the 1890s-1920s (there is no "anthropomorphic" and "epigraphic"), 1930s-1940s (no "Astral" and "epigraphic") and the 1960s
(there is no "anthropomorphic" and "heraldic"). In the 1970s and 1980s, six themes were encountered (there was no "epigraphic" one), and in the 1950s and 1990s and the 2000s, all seven themes were presented.

### Table 2. The number of ornamental themes in buildings by period.

| Periods (years) | 1890-1920 | 1930-1940 | 1950 | 1960 | 1970-1980 | 1990-2000 |
|-----------------|-----------|-----------|------|------|-----------|-----------|
| **Ornamental themes** |           |           |      |      |           |           |
| Herbal          | 29        | 134       | 204  | 24   | 74        | 41        |
| (Total / per building) | 1,71 | 2,63 | 4,07 | 0,89 | 0,64 | 1,0 |
| Zoomorphic      | 3         | 2         | 5    | 2    | 26        | 24        |
| (Total / per building) | 0,18 | 0,04 | 0,10 | 0,07 | 0,23 | 0,59 |
| Astral          | 1         | -         | 4    | 3    | 4         | 8         |
| (Total / per building) | 0,06 | 0,08 | 0,11 | 0,03 | 0,19 |
| Anthropomorphic | -         | 1         | 1    | -    | 4         | 2         |
| (Total / per building) | - | 0,02 | 0,02 | 0,03 | 0,05 |
| Epigraphic      | -         | -         | 4    | 2    | -         | 3         |
| (Total / per building) | - | 0,10 | 0,07 | 0,07 | 0,07 |
| Geometric       | 7         | 14        | 27   | 6    | 28        | 16        |
| (Total / per building) | 0,41 | 0,27 | 0,54 | 0,23 | 0,25 | 0,39 |
| Heraldic        | 2         | 21        | 44   | -    | 3         | 8         |
| (Total / per building) | 0,12 | 0,41 | 0,88 | - | 0,03 | 0,19 |
| **Thematic compositions** | **42** | **172** | **289** | **37** | **139** | **102** |
| (Total / per building) | **2,48** | **3,37** | **5,79** | **1,37** | **1,21** | **2,48** |
| Total ornamental themes | 5 | 5 | 7 | 5 | 6 | 7 |
| Total           | 17        | 51        | 50   | 27   | 115       | 41        |

Most often (three periods: the 1890s - 1920s, 1930s - 1940s and 1970s - 1980s) there is no "epigraphic" theme; two periods (1890's - 1920's and 1960's) there is no "anthropomorphic" theme; for one period there is no "astral" (1930's - 1940's) and "heraldic" (1960's) theme. The most common themes are "plant" and "zoomorphic", which are found in all periods. The "epigraphic" thème is the rarest.

The "vegetative" theme is the most widespread in terms of distribution, and its separation from other common themes amounts to the periods: 1890s-1920s (from "geometric" - 1.3); 1930's - 1940's (from the "heraldic" - 2.22); 1950s (from the "heraldic" - 3.19); 1960s (from the "geometric" - 0.66); 1970s-1980s (from "geometric" - 0.39); 1990's - 2000's (from "zoomorphic" - 0.41). The most uniformly thematically saturated period of the 1990's - 2000's. The greatest unevenness is indicative of the period of the 1950s, with a clear dominance of the "vegetable" theme.

It is interesting that in terms of the "number of topics on the building" indicator, the periods of the 1890s-1920s and 1990s-2000s coincide: 2.48. However, at the turn of the 19th and 20th centuries, there are five themes, and seven at the turn of the 20th and 21st centuries. The largest indicator of thematic saturation - 5.79 - was recorded in the period of the 1950s, and the smallest - 1.21 - in the period of the 1970s and 1980s. And the large indicator corresponds to the presence of an explicit thematic dominant, and to a small one - the relative thematic uniformity.

In terms of the uniformity of use, the "even" indicators have an "epigraphic" theme (0.10-0.07), the least uniform "vegetative" theme (4.07-0.64).

From the point of view of the types of color-plastic solution, all examples can be clearly divided into five positions: Color, Relief, Color-relief, Lattice and Spatial. Of course, in the Spatial and Grid
solutions there are color accents, but from a classification-plastic point of view, they are insignificant to perceive the shape of the ornamental composition.

The corresponding calculations in absolute and relative parameters are given in Table 3.

An analysis of the distribution of the number of examples of color-plastic ornamental solutions in buildings by periods gave a combination of the following results. On the quantitative indicators of the prevalence of solutions, the following series are built: Relief - 369 examples; Lattice - 72 examples; Spatial - 28 examples; Color - 20 examples. The breadth of type distribution is determined by the presence of all five decisions during the 1930s-1940s; 1970s-1980s and 1990s-2000s. Four solutions are found in the 1890's - 1920's (there is no color); 1950's (there is no color); and the 1960s (absent from the Spatial). Round the number of types per building: two in the 1890s - 1920s; three in the 1930s-1940s; four in the 1950s; one in the 1960s; one in the 1970s-1980s; two in the 1990's - 2000's. The most saturated type is the 1950s period (4.12 types per building); the least saturated - the 1970s - 1980s (1.23 types per building).

Table 3. The number of types of color-plastic decoration solutions in buildings by period.

| Periods (years) | 1890-1920 | 1930-1940 | 1950 | 1960 | 1970-1980 | 1990-2000 |
|-----------------|-----------|-----------|------|------|-----------|-----------|
| Color           | 2         | 3         | 4    | 5    | 6         | 7         |
| (Total / per building) | 3       | 0.06      | 0.11 | 0.04 | 0.22      |           |
| Relief          | 10        | 95        | 142  | 12   | 65        | 45        |
| (Total / per building) | 0.59 | 1.86      | 2.84 | 0.44 | 0.57      | 1.10      |
| Color-relief    | 12        | 28        | 38   | 14   | 31        | 26        |
| (Total / per building) | 0.71 | 0.55      | 0.76 | 0.52 | 0.27      | 0.63      |
| Latticed        | 9         | 3         | 11   | 6    | 36        | 7         |
| (Total / per building) | 0.53 | 0.06      | 0.22 | 0.22 | 0.31      | 0.17      |
| Spatial         | 1         | 5         | 15   | -    | 4         | 3         |
| (Total / per building) | 0.06 | 0.09      | 0.30 | -    | 0.03      | 0.07      |
| Solution types  | 32        | 134       | 206  | 35   | 141       | 90        |
| (Total / per building) | 1.88 | 2.63      | 4.12 | 1.29 | 1.23      | 2.20      |
| Total solution types | 4       | 5         | 4    | 4    | 5         | 5         |
| Total           | 17        | 51        | 50   | 27   | 115       | 41        |
| Surveyed buildings |         |           |      |      |           |           |

The separation of the most common Relief type from the least common in terms of periods is: 1890s-1920s (0.65 from Spatial); 1930s-1940s (1.80 from Color and Lattice); 1950's (2.62 from Lattice); 1960s (0.41 from Color); 1970s-1980s (0.54 from Spatial); 1990's - 2000's (1.03 from Spatial). The most uniform (based on the relative indicator) is presented for the periods Color-relief type of solution: 0.71 / 0.55 / 0.76 / 0.52 / 0.27 / 0.63. The most uneven is the spatial type: 0.06 / 0.09 / 0.30 / - / 0.03 / 0.07.

Relatively rare application of the Color type throughout the 20th century is explained in many respects by the specificity of the facade elements that are under the conditions of aggressive atmospheric influences, which, in the absence of sufficiently weatherproof dyes, imposes corresponding restrictions. At the same time, the combination of the Relief solution and the Color one gave an optimal result, since the ornament continued to be contrasted even with the fading of the painting. The expansion of the palette of weatherproof paints at the turn of the past and the present century naturally intensified the use of the Color-type solution.
The presented example of application of an estimation technique on the basis of relative and absolute data is the first step, for it is expedient to conduct corresponding researches in separate regions. The use of this technique for analyzing various aspects of the development of architecture in the framework of "big" styles and styles is also very promising. Of particular interest are possible analyzes of works of Art Deco, Postmodernism and Neo-Romanticism, both globally and regionally. This will allow us to make important generalizations that are important for the prospects of popular practice of using ornament in modern architecture.

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